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A STUDY OF EQUALITY, INDIVIDUAL
AND SOCIAL.

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In this thesis there has been attempted an analysis of scientific opinion and arguments on the subject of the innate equality and disequality of men. The views of various authorities, and the reasons they adduce in support of those views, have been presented and contrasted. Conclusion has been drawn that we have, as yet, insufficient evidence upon which to base a definite decision. The existence of variation of constitutional capacity appears to be very probable, but whether this is more or less influential than environmental forces is incapable of the determination. The latter forces are considered as being factors of much greater importance than is attributed to them by the extreme hereditarians. Furthermore, and most important for the subject of sociology, it is indicated that this uncertainty with regard to individual difference is multiplied many fold when group differences are considered. Indeed in the latter case there is absolutely no secure evidence, one way or another, and our social policies must be framed in recognition of the fact that variation of group ability is a quite unproven hypothesis.

LESTER WARD

There has lived no stronger protagonist of equality than Lester Ward. His conviction that all men are innately equal was a result of, and was based upon, careful research in many fields.--Botany, paleobotany, and human biography. Just why men were innately equal Ward was unprepared to say. But of the fact of equality he was certain. The cause of the principle of equality was beyond the capacity of the science of his day (and of our day) to determine; but of the existence of the principle Ward believed there to be much evidence. His work as a botanist and paleobotanist had first suggested the principle to him. Further research convinced him that as far as plants were concerned, innate adaptability was about as great in one species as another. Was each individual human's capacity to adjust himself to his environment ---i.e. his "intelligence", using the work in its broadest sense---equal to (and no greater or less than) that of any other individual? To make such a statement simply upon the strength of evidence gained in the field of botany would be to indulge in a gratuitous assumption of similarity. Ward of course, was not prepared to do this. Yet he considered that the evidence of botany at least, adumbrated the possibility of the existence of equality in humans. So he transferred his investigation to the scene of social forces. Statistical evidence and individual biography were utilized as data. He concluded that equality was as true for man as for plant organisms. Of the nature of the facts he uncovered, of his reasoning from these facts, and of his conclusions in detail, this essay will treat at a later point.

The position on this matter at which Ward finally arrived is best expressed by employing the words of an opponent of his views. The writer (F. H. Hankins) said: "Only nine years ago it was possible for the veteran sociologist, Lester F. Ward, to reiterate with great vigor the claims of his applied sociology that the form of the distribution of the natural abilities of a population is that of an exact parallelogram, except for one-tenth of one per cent of genius above and one-half of one per cent of mental deficiency below. This was a statement by a noted philosopher in the twentieth century of the most extreme claims ever made for human equality."

This description of Ward's views is one which he would have completely accepted and to which he would have given full approval. The writer of the statement in question was not exaggerating Ward's opinions in order to facilitate their demolition; on the contrary, for the quotation fairly and clearly represents Ward's position. Thus Ward himself quotes with distinct approval, the dictum of J. M. Robertson: "When all is said, the researches of M. de Candolle yield the outstanding result that, of all social grades, the numerically small upper class has in the past yielded the largest proportion of eminent men of science, from the days when in Britain, Napier and Bacon, Newton and Boyle were contemporaries till at least the last generation; the middle class yielding proportionately fewer, and the poor class by far the least of all, and as the principle of heredity entirely fails to explain the facts, we are drawn back once more to the conclusion that potential genius is probably about as frequent in one class as in another, and that it emerges in the ratio of its total opportunities."

Equality was Ward's guiding principle in his interpretation of social phenomena and in his advocacy of social reforms. Of the evolution of his views a few words have already been said. We will here treat of

them in more detail. In the earlier stages of his opinion, the influences largely guiding and moulding his ideas were his experiences as a botanist and paleobotanist. From his observations in this work, he concluded that the power of self-adaptation is sufficient to habituate any organism "to almost any inorganic situation." That some species are restricted to and capable of surviving in a situation which will not permit of the growth of other species is not due to the innate superiority of the former, nor the innate inferiority of the latter, but rather is attributable to the fact that the former already occupy the locality; i. e. by virtue of having preceded the latter, they are now in possession of the field and thus, environmentally favored, are enabled to be successful and to appear superior. In brief, in this instance, opportunity not heredity was the explanation of greater achievement. Had the apparently weaker species received the same chance as the successful species, it too would have displayed equal strength. Due to the heterogeneous nature of the environment and the diversity of circumstances, some groups are almost inevitably favored at the expense of others so that the former succeed and the latter fail. Granted completely homogeneous conditions then, the difference in achievement of one individual and another would be of negligible order.

The following account, related by Ward, is but one instance of many of a similar nature which occurred to him in his work as a botanist. In his botanical rambles he chanced upon a peculiar, stunted little grass. Completely at loss to classify the plant, he took some specimens home and dissected them at leisure. The dissection--the accuracy of which could not be doubted--showed that the "poor, depauperate little grass" was none other than that noble cereal wheat. Granted favorable circumstances, the plant would have grown and flourished in its natural wealth and beauty. This dwarfed condition was the result of the unfavorable environment. Wheat, as we know it, is a cultivated product; it has been presented with every possible condition suitable for its development. Denied these advantages--as had accidentally occurred in this instance--and that ordinarily large and sturdy plant becomes a degenerate weakling. Such is effect of hostile conditions. In Ward's own words, "The difference between my little starveling grass and the wheat of the well-tilled field is a difference of cultivation only and not all of innate capacity. In short, it is the difference between it is the difference between nature and nurture." Is not the gulf of difference between Ward's "depauperate grass" and wheat much greater than the difference between the "common laborer" and the intellectual leader? And if "nurture" is a sufficient explanation of the difference in the former case, may it not also be equally so in the latter? Certainly there is a possibility here which is worthy of consideration.

Ward did not, of course, indulge in a simple analogy between plants and man, nor does he even suggest that such an analogy would be justified. But at least, the entire matter is very suggestive. And all his other researches in botany and paleontology had strengthened his early convictions. Was the principle universal? In his efforts to test this possibility, Ward engaged in direct investigation and examination of human achievements, the environmental influences operative, and the relation between the environment and the nature and degree of achievement. But these were not all. He subjected the matter to a negative test. What districts produce the least number of successful men in proportion to their population? Is there any correlation between environment and achievement in these cases also? In pursuing this objective, Ward came upon the work of M. Odin. This writer's work was just what he wanted, indeed, almost too much so, for this monumental study was so thorough and convincing as to

leave Ward but little to do himself. But this "little", the improving of Odins study by rearrangements and additions, did much to improve that work. However, Ward gives all the credit to Odin disclaiming any merit or honor for himself. At no point does he seek to hide his indebtedness. He is prepared to rest his entire case upon the improved and expanded work of Odin which he presents. Before taking up Odin's arguments, Ward gives a brief discussion of other studies, both preceding and succeeding Odin's study, which have dealt with the same subject. These he compares with Odin's effort. Primarily does he deal with Francis Galton's Hereditary Genius. Then he passes in review the contributions of De Candolle, M. Th. Ribot, William James, Jacoby, M. Henri Joly, Lombroso and Cooley. Almost no essay dealing with the relations of heredity, environment and achievement seems to have escaped the filter of Ward's careful erudition.

After some analysis, Ward reduced the essential environmental factors of civilization to the following: (1) Centers of population containing special intellectual stimuli and facilities; (2) Ample material means; (3) A social position conferring self respect upon its possession; (4) Prolonged intellectual training in youth, this training being sufficiently varied as to enable its recipient to select the line of endeavor most congenial to his temperament and talents. Using these four factors as criteria, and armed with the studies of Odin and his own knowledge, Ward subjects the careers of all great men to a searching analysis. These criteria had in the main been derived from Odin's researches into the conditions of the various districts of France and the general achievement of the individuals born within these districts. Ward's own knowledge consisted of an intimate acquaintance with the biographies of great men.

Ward's penetrating analysis served to devastate the claims of the hereditarians. One after another, he examines Galton's hereditary geniuses--the fortunate possessors of "pre-efficients" whose operations produce achievements--and in each case he demonstrates that Galton had erred in proclaiming these individuals to have been divest of all advantages of circumstance. Several examples will best serve as an illustration of the nature and effectiveness of Ward's methods. Of D'Alembert Galton wrote: "He was a foundling (afterwards shown to have been well-bred as respects ability) and put out to nurse as a pauper baby to the wife of a poor glazier..... He was illegitimate..... the origin of his surname is not known..... He showed as a child extraordinary eagerness to learn, but was discouraged at every step. The glaziers wife..... ridiculed his pursuits; at school he was dissuaded from his favorite mathematics... But his passion for science urged him on. He became a member of the academy at Twenty-four and thenceforth his career was one of honor." One could ask for no more excellent story of innate superiority overcoming all handicaps imposed by a hostile environment and triumphing in despite of every disadvantage. Unfortunately, for the beauty of this example, Ward punctures it with the following quotation from Odin: "D'Alembert was, of course, a natural child, but it is to this in reality that his whole misfortune was confined. Far from receiving an inadequate education as they should have us to understand, he received on the contrary an excellent education for the time. His father moreover, insured him for an income of 1200 pounds, which certainly was no small matter." Ward goes on to remark that illegitimacy was so prevalent in France that much tolerance was extended to it and it constituted but little handicap, so that a young man with plenty of money, even though he were illegitimate, would find no lack of opportunity. "If what Galton told were the whole truth, the world would never have heard of Jean Le Rond D'Alembert." In a like fashion, Ward indicated that many other "self made" men--Spencer, Scalger,

Burns, etc---were, contrary to general opinion and the claims of Galton, quite definitely favored by circumstances. Thus of Spencer, Ward wrote: "Herbert Spencer is commonly represented as the type of self-educated man. Nothing could be farther from the truth-----so far from struggling to educate himself, his main efforts as a boy seem to have been to escape from the perpetual drill of the domestic school...Herbert Spencer as a boy was always being taught...he was highly favored by circumstances."

Thus we see that Ward regarded intellectual superiority as a monopoly of privilege. "Progress is one, not of internal power, but of external advantage." In what manner did he apply this doctrine to social conditions?

Under this new conception, man is dominated by his environment rather than by his internal constitution; and environment is subject to our deliberate control, whereas biological inheritance would require scientific knowledge far in excess of what we now possess, and a social control which will probably forever remain beyond our capacity to achieve. So for all practical purposes, inheritance must be regarded as a constant. And fortunately, it is a relatively small constant. Environment, on the other hand, is a variable---and we can control its changes. Progress is ours for the taking, no longer must ideal programs be abandoned because they are contrary to human nature. For human nature is what we make it. "The caveman within", "unchanging human nature"---these are abandoned scientific concepts and can no longer be used as obstacles to "possibility, at the expense of the pains of learning, instead of an effortless but limited stock of inborn modes of behavior," as Julian Huxley expresses it. Man can learn, he can change. Contrast human behavior with the highly complex social instincts of the ant. Ant society functions far more effectively than human society. But the ant cannot learn, he cannot advance. He is a fixed quantity. And if the environment changes, he cannot adjust.

But change is not necessarily improvement. How can we guarantee that it shall be? How can we make it so? Ward answers in a word. Knowledge! Knowledge is power. If we know, we can do. Man is the only animal to inherit acquired behaviour. For he does so through special tradition. The experiences of his ancestors descend to him in the form of education; and he makes a further contribution to this fund of knowledge and hands it down to his descendants. Each generation is wiser than the preceding one. Each generation is more fitted to see that its social changes will be for the better.

So Ward offers education as the cure for all the social ills that beset mankind and as the principle of progress. The capacity for, and the utilization of, education constitutes the essential difference between man and the lower animals. It is by means of education that man has risen from savagery and barbarism to modern civilization. Let us then not neglect this key to progress. Of all the environmental forces moulding mankind, education is the most powerful and it is the one most subject to our control. If education can raise one man so far above another that we are almost tempted (and indeed actually do) to regard the higher as differing in kind--i.e. in innate constitution---from his less fortunate fellow-human, how much more than can the same force do to raise all of mankind.

The program offered then is education. But what kind of education? Its varieties are numerous. They do not produce the same results. And these results are by no means necessarily good. And if the difficult question of the nature of the education be settled there still remains the problem of

How that education is to be applied; the plan must be made to function effectively.

Of the practicability of his educational panacea, Ward had no doubt; for this is inherent in the principle of equality. Granted the premises--equality--and the conclusion becomes practically incontestable. Man can be educated because individual men have been educated; and what one man can do another can likewise accomplish, granted the same opportunities.

Ward defines education as "universal distribution of extant knowledge." Most essential to the educational process is a comprehensive grasp and acceptance of the concept of causation. Only when the isolated facts have been inter-related by fitting them in the frame-work of causation, does education actually live and function. Until this necessary role of determinism has been fulfilled, the education remains but a dead collection of items of information. The emphasis that Ward places on causation is common among biologists. Thus a modern American biologist defines science as, "Knowledge causally organized." But it was Ward who utilized the concept of determinism as the guiding principle of the entire educational process.

It is proposed to show, elsewhere in this paper, that the belief in the general innate equality of all men is inconsistent with much evidence and knowledge which has come to light since Ward's day. We propose, however, to accept Ward's view that class equality is a fact, that it has never been shown that one economic class is the innate intellectual inferior of another, or that any one race is possessed of an inborn superiority to another. This anticipatory acceptance of conclusions to be later reached is done in order that we might at this point discuss the merits and practicability of Ward's educational program. Although, as will be shown later, Ward never definitely accepted the doctrine of the inborn equality of each and every man, and indeed, on occasions expressly denied his belief in this view, yet he seems at other times to have forgotten his own denials and almost tacitly admitted the case of the extreme equalitarians. To some degree, it would seem that he was somewhat in the latter mood when he formulated his educational views. If this is so, then it is entirely possible that we, starting with different principles than those with which he commenced, will arrive at different conclusions. Let us see.

The first objection which comes to mind is this: If equality is true, only of classes and not of individuals, will there not then be many individuals who cannot sufficiently profit by education to justify their receiving it after, say, the conclusion of grade school; i.e., for many individuals should not education terminate at grade seven or eight. Certainly the bare essentials of knowledge which are received in the early years of school can, by no stretch of imagination, be called a "scientific education." Certainly to nothing less than a High School training (up to Grade Twelve) could the term "Scientific education" be applied, and even then the curriculum would have to receive a greater bend in the direction of science and away from the old "humanities." Is it not a necessary inference from our (anticipatory) acceptance of the belief on varying degrees of hereditary mental strength, that there are some in our high schools who are simply lacking in the constitutional capacity to benefit by the educational influences brought to bear upon them?

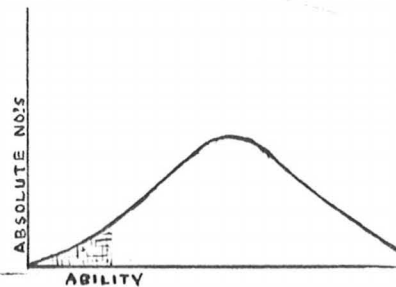
These criticisms of Ward's educational program are answered in part by himself, and in part by a pair of modern authorities--J. C. Chapmen and George S. Counts--who might be said to have carried on his tradition and supported his doctrines in our time.

The two educationalists write: "Since education is in itself one of the greatest opportunities and is at the same time a force that levels artificial inequalities due to other causes, it logically follows that the community which holds to equalitarian social doctrines is under obligation to provide a degree of education for all....in adjusting himself to the complexities of the modern social order, the individual finds that some formal educational agency is indispensable." This passage reads like a quotation from Ward himself. In common with Ward, they favor universal extension of educational opportunities. Of course, this support from modern educational leaders in no way settles the problem. It still remains true that education requires the expenditure of considerable sums of money and it may well be, as suggested before, that the recipients will benefit in no degree commensurate with the outlay. We require some guarantee that educational moneys will not be devoted to seeking to drive the shafts of knowledge and the barbs of wisdom into impenetrable cement blocks.

The reasoning by which Chapman and Counts justify the universalization of education is as follows:

(1) The ever growing complexities of modern civilization absolutely necessitate an educated electorate. If the potential electorate can not grasp the work required of them in our High Schools, then the work must be so changed that they can do so. We have no choice in the matter if we desire to retain the institution of democracy. Proper arrangements would render it quite unnecessary that those of greater ability would be held back to the level of those of less ability. Just because the High School training of the past was beyond the intellectual orbit of many, does not mean that it must necessarily remain so. Why should we, for no discoverable reason, insist upon regarding the high school curriculum as a constant. In brief, the whole argument here amounts to saying that as expensive as education may seem in contrast with the results obtained, yet it would be far more expensive not to educate; and furthermore, by a proper adjustment of the curriculum there is no reason at all why the results secured should not be great.

(2) Secondly, in ability, as shown by the accompanying diagram of a surface of distribution, the majority of humans are grouped within striking distance of the average, the definitely mentally inferior like the greatly superior being relatively few in number. Since the narrow class education of the past failed to equip the larger proportion of the citizens of the future, if it is to train them properly must be universalized. The only waste resulting from such a process would be the expenditure in attempting to educate the very small number represented by the shaded surface area at the extreme left of the diagram.



(3) As Ward demonstrated, the "average" man is possessed of far greater ability than is generally appreciated. The vast majority of people i.e. the average--can be taught to do routine scientific investigation (even if the more obtruse and complex problems are beyond them) and they can be taught to appreciate the spirit and meaning of science.

If a scientific education is both possible and necessary, then what could be a better investment? Indeed, is it not the best investment?

HENRY GEORGE

The methods and reasoning employed by Henry George in his study of the innate equality or disequality of man are markedly different from those of his predecessors and his successors. The earlier students of this question had investigated primarily the life-histories of great men. This "case-study" method had, in the hands of men of profound scholarship, yielded excellent results, though these results were not of a decisive nature. The erudition necessary for the proper use of this manner of investigation was not possible for a man such as George, whose major interests lay in other directions. The immediate successors of George conducted elaborate statistical analyses in their study of the problem. In modern times experimental work in the biological laboratory is employed almost exclusively. George's method is so unlike all those commonly used, that some question whether it could justifiably be called a method at all. His whole case rests upon a series of simple illustrations, the illustrations being accompanied and supported by clear, logical deductions. He himself had become convinced of the principle of equality as a result of his own "work-a-day" experiences and associations. The illustrations he uses serve by their diversity and aptness to produce conviction where more elaborate methods would have failed. So forceful are these illustrations, in their association with the plain, definite reasoning used by George at all times, that one feels almost compelled to accept George's view. Indeed, were one to take into consideration only the reasons pro, confining oneself strictly to those advanced by George--without regarding the reasons contra, then George would win his case without a single skeptic as dissenter. Since, however, one must oppose in this question not merely the doubter, who evinces skepticism because of the meagreness of one's material, but also he--and this one is much more troublesome--who offers positive evidence to the contrary,---for this reason, the case is not so easily settled. But to many of George's contemporaries, his arguments were completely satisfying, and an examination of these arguments shows us that it is small wonder that they were so. In many ways, his arguments are as much to the point as ever. Certainly, the extreme claims of modern eugenicists are effectively rebuked by Henry George's writings. And in discussing this question of eugenics, it is perhaps well worthwhile to note that George, considerably in advance of Weismann's factual demonstrations, maintained that acquired characteristics were not inherited. This "inviolability" of the germ plasma is now a commonplace of modern biology, but it was by no means so in his day. Indeed, the great majority of biologists held the contrary view. Henry George's selection and anticipation of the modern view, was by no means fortuitous or purely accidental. Rather was it but another example of the clear-sighted layman seeing to the core of difficulties which baffled the trained biologist. The latter, in his attention to details, missed the obvious. The net of knowledge used by George was of coarser weave and contained larger holes, but it caught the big fish.

In George's view, the influences that mold man after he comes into the world are of much greater importance than the ability with which he is born. To give an illustration of his methods:

He draws the reader's attention to the phenomena of language--an "obvious" that had hitherto been overlooked. He uses this example as both an illustrative and deductive analogy. What characteristic is more thoroughly ingrained or more definitely indicative of nationality than language? Yet no one is born with the ability to use his native tongue; nor does a foreign language offer any more difficulty to a child, if only he be accustomed to it from infancy, than the language of the land of his birth. Nor does a child of foreign born parents

experience any more trouble in learning the English tongue than his native playmates. If a characteristic of such great importance and significance is "acquired" and not "in-born", how much less reason is there for accepting other so-called racial and sub-racial traits---Scotch thrift, Latin excitability, etc.,-- as inborn. E. A. Ross' Principles of Sociology is a typical example of a modern study which has fallen into error on this point through failure to examine or appreciate the merit of George's simple arguments. Simplicity is not necessarily "simpleness" (using the word in its derogatory sense), nor is obscurity necessarily profundity; Certainly Ross' sweeping racial characterizations will but lightly affect one who has read George's Poverty and Progress.

George next gives an example of a negative rather than positive nature. It serves as a check on the hasty generalizations based on an apparent differential traits distinguishing one race from another. A school teacher had told him that Negro children were, in their earlier years, as "bright" as white children, but as they grew older, they seemed to grow dull and were outstripped by their white competitors in the race for scholastic laurels. At first, George, in common with his informant, was inclined to regard this as evidence of the innate inferiority of the Negro. He was led to change his mind, however, when an intelligent Negro friend pointed out that the "dullness" appeared at the same time as, and was proportional to, the growth of, the Negro child's awareness of his inferior social status. This realization on the part of the child made him apathetic. It destroyed his self-confidence. The slackening of effort consequential to this understanding was the real cause of his failure.

It is commonly claimed that the character traits which result in pauperism are transmitted from generation to generation. For has it not been positively demonstrated that the criminals and paupers of New York State are the direct descendents of a long line of paupers? To this George replied: "Paupers will raise paupers, even if the children be not their own just as familiar contact with criminals will make criminals of the children of virtuous parents." Furthermore the children of these unfortunates not only imbibe their attitude from their parents, but what is more important these same children are denied all opportunity for education, for self-respect, and for self-training. Association and lack of opportunity are the primary explanation in these cases. In both the genesis of individual and of national traits, the effective factor is the operation of environmental influences. In the case of racial and national differences, the child is placed in immediate and continuous contact with the beliefs, language, peculiarities, of the country in which he was born. But just as Jewish racial boundaries coincide with Jewish religious boundaries, so too, have the boundaries of ancestry (i.e. the habits and the environments of the parents) usually coincided with those of circumstance--with the result that the characteristics produced by environment are commonly attributed to inheritance. And this same error is committed by those who regard criminality and pauperism (or the character defects which predispose to these) as a product of biological inheritance.

George points out that at least the question of racial differences can be subject to test. This can be done when there occurs an exception to this correlation of ancestry and environment. The responsible factor in the determination of traits will here stand out clearly. And as George claims, wherever it has been possible to apply this critical test, the contentions of the environmentalists have been completely substantiated. To give only one of many possible examples: The Janisaries, composed of men who had been stolen in infancy from Christian parents,

were possessed of all the fanaticism of the true Moslem and all the personal traits which characterize the true Turk.

George was prepared to admit the existence of some degree of mental and physical difference. Indeed, physical difference is a matter of every day observation. "But nevertheless, there is it seems to me, a common standard and a natural symmetry of mind, as there is of body, towards which all deviations tend to return." And in the case of mental traits the ambit of these deviations was considered by him to be very small. It is the conditions under which we fall that produce the marked distortions and differences now so common. These changes, however, are not genetically transmitted to off-spring. Their appearance in the latter is a result of accidental and deliberate training. Human differences do not inhere in individuals but in society. It is the "web of knowledge, beliefs, customs, languages, tastes, institutions, and laws" into which the child is born and within which he dies, that makes him what he is. The most "humdrum scientist" of modern times is far above the level of Aristotle. Yet Aristotle is commonly regarded by philosophers as the greatest intellectual known to history. How then account for the superiority of the "humdrum scientist"? Henry George declares there can be only one answer: Environment !---The social transmission of acquired knowledge has in this case had the stupendously beneficent effect of raising an "ordinary, everyday man" far above the "greatest of philosophers." Can it then be otherwise with men living today? Is it not equally true that the man in modern society, who has been the fortunate recipient of powerful educational influences will display an even greater superiority to those less fortunately endowed by the environment? And will we not be tempted to regard such a fortunate one as almost differing in kind as well as quantitatively, from those to whom such advantages have been denied.

Henry George's "Law of Progress" is derived from and dependent upon (as well as contributing to) this great principle of equality. His "law" is an answer to the question: why, since men and societies are innately equal, has there arisen such a discrepancy as exists at present in their abilities and achievements? In seeking the solution to this problem, George "discovered" or elaborated his "law," and from the law itself as a deduction he drew the doctrine with which his name is always associated, the "Single Tax."

George considered "desire" to be the incentive to progress; "mind" the means whereby it is achieved. But "mind" is a fixed quantity, part of the energy of which must be utilized in securing mere sustenance. There then remains a surplus which could be employed in the achievement of progress. But unfortunately not all of this surplus can be so used. No small part of it must be directed into the channel of "conflict"; i.e. the sustenance and well-being attained must be secured from loss at the hands of predatory fellow humans by battle, or this sustenance and well-being may be gained by the same means. Harmony and cooperation obviate the necessity of this loss. Whenever inequality provokes conflict, there is an arrest of progress. And in the later stages of social evolution it is internal friction (conflict) developed by inequality which reduces and sometimes completely arrests the velocity of social progress.

This internal conflict owes itself to the inequalities of external physical nature, it is an inevitable development out of man's struggle with brute matter and environment. The heterogeneity of natural surroundings is such that some sections of mankind are favored with advantages others denied them. The variations of climate, soil, mineral wealth, all serve to bring about a discrepancy in the advance of one group as compared with that of another. There appears an ever-widening cultural gulf

between the "haves" and the "havenots." The awareness of some men that they are "higher" --or lower--than their fellows gives them a sense of "apartness," of difference, from other groups. The other "tribes" --as we may now call them--tend to assume the status of aliens, of ones with whom there is no sympathy or kinship. It must follow that this separateness produces a willingness to sacrifice the interest of the "outside" group to the interests of one's associates. And the outside groups have an attitude which is in no way different. This slow evolution of enmity and contempt finally finds expression in active warfare. The energy of progress has left its channel and is now dissipated in a manner which not only contributes nothing to human advancement but very often serves to destroy that which has been achieved. Only by neutralizing their grievances and engaging in harmonious cooperation can the long march from savagery and barbarism be recommenced. Progress is directly proportional to the degree of cooperation achieved.

It must be admitted that reasonable as these ideas of George's appear to be yet the proofs accompanying them want for much in strength and rigidity. Certainly George's views are in direct antithesis to those of many modern anthropologists (particularly Arthur Keith) who attribute progress to just those features considered by George to be most inimical to it--namely, conflict, intra-tribal patriotism combined with extra-tribal animosity. In the opinion of Professor Keith patriotism is the source of all ancestral progress. Men can only be bound together by the possession of common dislikes and mutual hatreds directed towards other men. No other chain will serve to link them together. It is for this reason that Keith considered warfare to be inevitable. George regarded war as unnecessary and an abomination. He maintained that civilization only springs up where association appears and dies down when this association is broken up.

If association persists then specialization of function follows. There is a growth of interdependence which this division of labor necessitates. Warfare threatens to disrupt this interdependence. If it successfully does so, the high degree of specialization upon which civilization depends is destroyed. That this structure against warfare is correct most of us would be inclined to agree. That it is necessarily true when projected back into the early stages of man's evolution, as George would claim, is another story. Keith would reply, "Non sequitur."

As George points out, this process of specialization is almost inevitably accompanied by an intensification of inequality and social difference. Such an effect could only be forestalled by a process of deliberate adjustment. Since the necessity of this adjustment is not observed and since its application would be a problem of considerable complexity, the result is the inequality continues to increase by unchecked leaps and bounds. Our present society is the end of result of a long process of such growth. And failing to realize the historical background of present conditions, we easily attribute wealth and position to the possession of innate wisdom, talent and ability. We have made a simple, outright confusion of cause and effect. In reality, intellectual superiority follows upon and is a result of social superiority--not the reverse. Advantage produces superiority. Even where wealth and position appear to be the well-merited reward of ability and effort, it will inevitably be found that "ability and effort" owe themselves to some advantage or other. The early poverty of these successful ones, was only in physical goods. Fortune gave them some definite advantages in the way of early train-

ing which marked them off from the comrades with whom they associated. It was the continuation of this start that raised them to the heights. And the friends of these fortunate ones---the failures with whom we so delight to contrast the achievements of the self-made man---they too, continued their "start". But the start was bad and so the result was terrible. "Innate capacity" is everywhere and nowhere. It appears when circumstances permit. And it disappears when conditions deny it the opportunity of emergence.

The inequality existing in modern civilization is the accumulative result of changes and processes stretching over centuries, processes originating in man's prehistoric past. The antiquity of inequality almost serves to give it the status of a law nature. But such it is not. It has advanced and developed with the growth of civilization. It owes its strength and position to the evolution of culture. But inequality is a result of and not a contributor to that growth. On the contrary, it is an ever-increasing internal weakness in the structure of civilization. This weakness has resulted in the collapse of great civilizations of the past. And the present one is threatened with destruction from the same source. Civilization grew in despite of inequality. But it is a self-limiting process. George thinks that there are already present indications that advancement has at last been arrested by the adverse influences of growing inequality. (He neglects to mention just what these indications are.) Decline is to follow. Such was the philosophy and outlook of Henry George. Of the solution propounded by him only a few words need be said. The remedy offered is not entirely original with him, but the manner in which he advanced it is so superior to that of his predecessors that the term "Single Tax" and the name "Henry George" are inseparably conjoined. The merit of his work is in the fact that he saw that the real problem was to discover the law which associates increasing want with advancing wealth. This "law" has been discussed in the preceding pages, from it is developed his doctrine of the "Single Tax," and beneath it lies the principle of equality. So that all returns to equality.

George is here referring to Rome and Greece primarily. He discusses the case of these civilizations, attributing their downfall to inequality, but it must be admitted that he is a trifle shy on proofs to support his generalizations.

George proposed that economic rent should be appropriated by the state. This should constitute the only form of taxation--hence the term "single tax." Such a procedure would arrest and reverse the growing menace of inequality. The increment in the value of a piece of property accrued to the land owner in the form of rent, and the increment owed itself not to the exertions of the proprietor but to the general growth of society. In this manner, the ever increasing fruits of civilization went to those who had done nothing to earn them. For this reason, we have the great anomaly of Progress and Poverty-- a society in which the growth of wealth does nothing to decrease poverty. Labor is robbed of the reward of its efforts. "Private property"-- the ownership of that which one produces---is the incentive which capitalism offers to Labor. And then capitalism promptly turns about and burkes the incentive by permitting the existence of private ownership of land. And, of course, it must make this denial, for personal possession of land is (according to George) the only form of private ownership. All others are derivatives from it. Capitalism is self-contradiction raised to the status of an active social policy. Capitalism offers as a reward that which it cannot give. And yet the justification for capitalism is the "existence" of this non-existent reward.

Logical vertigo could go no further.

George's "Single Tax" is really a form of socialism. He regarded it as such. But socialism would be the end result of a slow process of growth, a process which would owe its inception to the application of the Single-Tax. The reversal of social processes initiated by the single-tax would slowly sweep away capitalism, replacing it by socialism and equality. George believed that the abolishment of all forms of taxation save that on land would counteract the tendency to inequality, for the social blessings of cultural evolution would then be distributed to the community as a whole instead of falling into the hands of those whose distant ancestors had been favored by nature and by luck. So reasoned George. His interpretation of the importance of Rent, though much exaggerated, contains much of truth. It is his solution--the single tax--which the economists cannot see. They maintain that a complex economic system does not function in the ideal fashion presupposed by George's Single Tax.

It is upon the ground of the difference between the operations of the hypothetical system postulated by George and the operations of the actual economic system, that the economists base their rejection of George's Single-Tax. From his initial assumptions George develops his reasoning and conclusions with incontestable logic. The economists admit this. The assumptions, however, they do not admit. In practice ever fluctuating rentals (or rather, as George considers, ever increasing rentals) do not distribute their effects evenly upon all. Though it might seem that, with each producer seeking to force his costs of rent on the next stage of production and trying to avoid bearing the rental costs of the stage of production previous to his, competition would force each to pay his share, as a matter of fact, some producers are in a better position than others. The tax burden does not move along in the manner supposed by George, leaving a portion here and a portion there until each receives the share due him. This could only occur if there were a perfect fluidity or elasticity throughout the entire economic system so that rental changes could spread out evenly (like waves in a pool) over the whole system. The real economic structure, contrary to George's belief, is possessed of some degree of rigidity. Some portions of it resist change more than others. It is true that eventually the changes will have equalized themselves from one end of the economic order to the other. But this requires time, and during the period ensuing before the completion of the balance other changes will have occurred. This condition of continuous disequilibria is not only a matter of theory but a fact of common observation. Under these conditions the single-tax could not fail to work for economic injustice. It must do so in the semi-rigid-semi-fluid. No extended criticism of George's Single-Tax will be made here. Since, however, it has been received with almost unanimous condemnation by economists it would seem desirable to devote a few paragraphs to their reasons for rejecting it.

Their charge is that the Single-Tax would fall very unevenly upon the economic system as a whole, some sections being practically stripped of their profits by its operations, while others would escape its effects relatively unscathed; and since the Single-Tax is the only tax the producing units which successfully evade it are left entirely untaxed, contributing nothing whatsoever to the community and receiving the benefits of all public property and public services, benefits which are entirely paid for by others who are forced by the nature of their business to assume the full burden of the tax. George considered that all organizations would in the long run, contribute an equal

share to the taxes, for rents ultimately distribute their costs with proportional equality on all. Thus the producer of raw materials has to pay rent which enters in as an element of cost in the sale of the article to the manufacturer; the manufacturer seeks to shift not only this cost but his own rent burden to the wholesaler; the wholesaler does likewise to the retailer; and the retailer tries to shift the load onto the shoulders of the ultimate consumer. In this case one plainly sees that rent is accumulative and enters four times into the price of the commodity, so that the proportion which rent bears to the total value of finished goods must be rather large. And furthermore, this proportion increases with advancing productivity and civilization. It is for this reason that increased productivity benefits the worker not at all. The greater return for his efforts which the use of machinery gives avails only to increase the income of the land-holding class. If the government were to expropriate the landholders and take the rent themselves eventually all wealth would, by as slow and natural process of growth, be in the hands of the government and socialism would be a living reality. This the economic structure which actually exists. Only to a system possessed of unqualified fluidity would George's Single-Tax be applicable; or to the equally imaginary "static state" of the economic theorist. The realities of the case diverge widely from these hypothetical conditions--call the conditions of the actual system "sticky" or "heterogeneously semi-rigid", or what you will, the fact remains that to apply the Single-Tax to such an economic order would be to create injustice. Recognizing as we do that George's "hidden" assumption of a dynamic state of perfect fluidity (zero internal friction and zero external adhesion) or a static state (its parts stationary relative to one another, even though the structure as a whole may move) we must admit that his Single-Tax is simply not a practical possibility. This recognition in no way detracts from the quality of George's ideal. The man and his ideals remain to outlive his inductive errors.

INDIVIDUAL INTELLECTUAL DIFFERENCES

A general survey of the literature of psychology makes it quite evident that among psychologists, the prevailing opinion is that there are all degrees of constitutional mental power, that there is a wide variation from the highest to the lowest, and that education universally applied would be quite helpless to overcome the relative differences of ability. The psychologist is quite willing to admit that educational influences could be used if those applying them so desired, to exaggerate greatly or to overcome largely hereditary differences; but education if uniformly applied could only serve to raise the absolute ability of humanity in general, the difference of individuals would be as great as ever. As Knight Dunlop expresses it; "To say that you can take any child, however young, and make a mathematician or a musician or a poet or a mechanic of him by any practical method is against the present evidence and not to be seriously considered."

First, before considering this "present evidence" of which Dunlop speaks, we shall see if "psychologists in general" do agree on this point. The following brief quotations, which are gathered uninfluenced by any selective bias from a number of "popular" books, should suffice on this point:

R.S. Woodworth: "What evidence is there that the individuals degree of intelligence is a native characteristic, like his height or the color of his hair? The evidence is pretty convincing to most psychologists."

L.M. Terman: "Practically all the investigation which has been made of the influence of nature and of nurture on mental performances agree in attributing far more to original endowment than to environment."

Walter S. Hunter considers there is much evidence "supporting the belief that general intelligence is an inherited capacity."

E. L. Thorndike: "Individuals of the same sex and race differ in ways and to degrees that differences in training cannot account for."

Now, what are the reasons for these firm expressions of opinion? Surely, the factual evidence supporting such dogmatic assertions must be possessed of great weight. The arguments may be put, briefly as follows:

(1) The mental testers now find that the intellectual quotient of a child remains substantially the same from year to year.

(2) "The way feeble-mindedness runs in families is a case in point...in general it (mental defect) cannot be traced to accident but is inherent in the individual. Usually mental defect or some similar condition can be found elsewhere in the family of the mentally defective child: it is in the family stock. When both parents are of normal intelligence and come from families with no mental abnormality, in any ancestral line, it is practically unknown that they should have a feeble-minded child."

(3) Pearson and Galton, particularly the former, found that the measure of relationship for inheritance was much more important than that attributable to environmental factors. Pearson declared inheritance measurement to be seven times as great as that indicated as being due to nurture.

(4) Galton's investigation of twins resulted in his concluding that "one might almost question whether nurture counted for anything

at all by contrast with nature." Thorndikes "twins" are also considered as constituting important evidence for the hereditarians. (In this present essay, particular attention will be given to the work on criminal "twins" done by Johannes Lange.)

These arguments will now be considered in the order in which they are above listed.

THE CONSTANCY OF THE I.Q.

The intelligence quotient of a child is the ratio of his mental age to his chronological age. This is known to all. Also the reader will possess at least some slight knowledge of the nature of the tests enough, at any rate, for our present purposes, so it is here proposed only to discuss whether these tests do measure inherited intelligence apart from the influence of training. The belief that they do so is based largely upon "the constancy of the I.Q." Thus, just as the rate of disintegration of radio-active minerals is entirely uninfluenced by heat, pressure, absence or presence of sunlight, etc., so too, is the I.Q. independent of the surroundings, and it remains at about the same point from year to year. Mainly for this reason, the intelligence testers consider that they have measured a true innate characteristic.

On this point, Franz Boas, Dean of American Anthropologists, writes: "I believe all our best psychologists recognize clearly that there is no proof that intelligence tests give us an actual insight into the biologically determined functioning of the mind. They indicate the ability of the individual to perform certain actions which are ordinarily recognized as making for success in our city life. How far the reaction of the individual may be modified by individual experience and how far it may be determined by organic structure, cannot be determined by tests of this type. There is no doubt that both elements enter into the result. Among decidedly abnormal individuals, the organic basis is readily recognized, but among normal individuals a separation cannot be made by the results of mental testing." With all respects to America's greatest anthropologist, it must be said unequivocally, that he is in error in declaring that among "all our best psychologists" it is admitted that intelligence tests do not distinguish hereditary from acquired abilities; on the contrary, it is by virtue of the fact that they can so distinguish that these tests are hailed as being of great importance.

For example, R. S. Woodworth asserts, "We have the fact that the individuals intelligence is an inherent characteristic in the sense that it remains with him from childhood to old age." Woodworth justifies this remark by referring to data obtained from mental tests.

L.M. Terman writes: "Practically all the investigations which have been made of the influence of nature and nurture on mental performances agree in attributing far more to original endowment than to environment. A crucial test would be to take a large number of very young children of the lower classes and, after placing them in the most favorable environment obtainable, to compare their later mental development with that of children born into the best homes. No extensive study of this kind has been made but the writer has tested twenty orphanage children who, for the most part, had come from very inferior homes. They had been in a well conducted orphanage from two to several years, and had enjoyed during that time, the advantages of an excellent village school. Nevertheless, all but three tested below average, ranging from 75 to 90 I.Q.....Quoting from Stern, 'The tests actually reach and discover the general of intelligence, and not mere fragments of knowledge and attainments acquired by chance.'" And elsewhere the same writer declares: "All the refinements of educational method are incapable of bringing a child of 60 I.Q. to the level of seventh grade ability." It is very plain that Terman, at least, has no doubt of the capacity of intelligence tests to discover the "biologically determined functioning of the mind."

The general run of popular writings on psychology make it plain

that, contrary to what Boas asserts, the great majority of psychologists do consider intelligence tests to be a dependable indication of biological inheritance of intelligence. The behaviorists do not, of course, accept the results of intelligence tests. But there is one dissenter even in the ranks of the more orthodox psychologists. The essay by Otto Klineberg in the Encyclopaedia of the Social Sciences (1933) has the following to say: "The I.Q. is constant only if the accompanying conditions also remain constant. If there are marked social, educational or economic changes in the subjects status or significant changes in his health and his personality, the I.Q. may likewise change considerably. This has been demonstrated in the case of southern Negro children who have migrated to New York." As far as the constancy of the I.Q. is concerned this statement by one who speaks with authority, is in direct opposition both in its factual declarations and its spirit to the writers previously quoted. Apparently at least, one investigation served to show that the tested I. Q. does not remain unaffected by environmental influences.

The Terman Intelligence Tests have as yet not been subject, themselves, to sufficient testing to justify any dogmatic declarations as to their utility or futility. Sir John Adams says, "Where verification has been possible, the results have been satisfactory," but Klineberg's remarks indicate that within very recent times contradictory evidence has resulted from other research into the subject. Used in conjunction with evidence and reasoning from other sources, the intelligence tests may add weight, may give further support, to the doctrine of innate intellectual variation; alone, the tests certainly do not suffice, to justify such a belief.

FEEBLE/MINDEDNESS AND HEREDITY

If feeble-mindedness runs in families, it would then appear that marked lack of mental strength is a matter of inheritance, and since the increase in mental power from the idiot, the imbecile, the moron, to the average, and then to the greatest minds, is a continuous upward curve, is it not legitimate to infer that all intelligence is due to inheritance? Or is this curve from the lowest to the highest continuous, or is there a break, a discontinuity indicative of a qualitative difference between the definitely feeble-minded and the "average," or perhaps a quantitative separation of such size as to almost result in qualitative differences? Or is feeble-mindedness really inherited? Is Woodworth correct in maintaining, as the quotation earlier in this essay indicates, that mental defect "cannot be traced to accident, but is inherent in the individual?" It is with these questions that this section will concern itself. The eugenisists particularly must be given consideration.

On the subject of heredity and feeble-mindedness, the diversity of opinions expressed is truly amazing. The eugenists declare it to be an established fact of science that feeble-mindedness is an inherited characteristic, it is determined by the chromosomes in the zygote, and nothing in the world can change the destiny of the developing embryo. In Heredity and Eugenics (1912), we read: "From the studies of Dr. Goddard and others, it appears that when both parents are feeble-minded, all the children will be so likewise: this conclusion has been tested again and again." S. J. Holmes duplicates the confidence of this quotation in his remark: "There is a strong concensus of opinion among leading writers on the subject that feeble-mindedness rests largely on a basis of heredity. Where two feeble-minded persons mate--and there are hundreds of such cases known--it is almost invariably the case that the children are feeble-minded also."

Even one who is almost an anti-eugenist, H.S. Jennings, writes: "Certain types of seriously defective individuals are known to owe their origin to defective genes that are passed from parent to offspring," etc. H.S. Jennings advises Leonard Darwin's What is Eugenics as being about the best statement on this subject by one who is a strong proponent of eugenics. Let us then go to this book by the President of the Eugenics Education Society.

An examination of this book will convince many (perhaps the majority) of readers of the bankruptcy of eugenics. If this book constitutes one of the best arguments for eugenics, then all writings of lesser merit must make very sad reading indeed. Time and again, Darwin is forced by his lack of factual support to bolster up his case by special pleading which can only make an appeal to those who are already converts. His reasoning could hardly even be called specious. Thus he writes: "Feeble-mindedness is sometimes described as being hereditary: though as a fact, no clear line of demarcation can be drawn separating off such cases from those described as not being hereditary." He is at this point arguing in favor of sterilization, so he goes on to declare that since the duties of a mother require some degree of intelligence, the feeble-minded woman should be denied the privilege of motherhood since her children, even if free from mental defect, would be inadequately cared for. Whatever, one may think of this argument a little thought makes it plain that in endeavoring to secure conviction on this one point Darwin betrays the thesis which his book as a whole was pledged to support: for he, in effect, declares that it is quite true that the evidence for the transmission of feeble-mindedness is not all that it might be, but it doesn't matter, for such parents could not properly attend to their children, etc. But this is to give the whole show away--he admits that the evidence that mental defect is hereditary falls far short of scientific exactitude. In other words, to carry his confession to its logical conclusion, there is not yet positive evidence that variations in mental power owe themselves to heredity. Had Darwin not had handy another argument for sterilization, he would not have acknowledged this weakness of fact. And this instance mentioned is only one of many of a somewhat similar nature. Everywhere he gladly siezes any and all arguments which he considers to support his case. He has a belief to defend, not an inquiry to conduct. His book is a manual of apologetics, not a scientific study.

However inadequate one may consider Darwin's presentation of the case for eugenics, it still remains true that the great majority of genetecists do consider feeble-mindedness to be germinally determined and hence still serve to support the case of those who consider that constitutional capacity varies widely in individuals. Yet here, too, the ranks are not without dissenters, some of them of very high standing. J. B. Eggan writing on Leonard Darwin's Study of Eugenics, says: "Feeble-mindedness has never been proved to be hereditary. Myerson, in his The Inheritance of Mental Diseases utterly disbelieves (presenting trenchant reasons) that mental deficiency is any menace. He says the conviction is becoming widespread that familial feeble-mindedness is not hereditary, but due to injury of the germ-plasm from without....Many biologists, once believers in the potency of heredity, have had cause to change their belief. Ten years ago they were all eugenists, now Dr. Jennings (Behaviour of the Lower Organisms) says it is impossible to control human heredity, and Dr. Child (Physiological Foundations of Behaviour) shows the environmental origin of all activity. The leading psychologists (Kemf, Watson) have verified these facts, until eugenic theory is in a sad state."

There is a long distance separating Eggon's declaration that "the conviction is becoming widespread" that mental defect does not run in families, and the statement made in the previous paragraph by the present writer, that "the great majority" of students of this subject do consider feeble mindedness as hereditary; nevertheless, this admission was made only because it seems honestly to represent the case. Yet Eggon's remarks indicate that the question is by no means as completely settled as many would like us to believe. Once again we find that more recent work does more to discredit than to substantiate earlier findings.

PEARSON'S AND GALTON'S STATISTICAL STUDY
of
NATURE AND NURTURE

Galton's genealogical studies first served to convince him of the superior importance of nature (heredity) to nurture. Following this, and being mathematically inclined, he worked out various means and formulas of a statistical nature which would enable him, he thought, to determine in any number of cases just what weight must be attributed to the influence of inborn nature and what to environment. His work was carried further by the famous biometrician Karl Pearson. Pearson's "coefficient of correlation," and many other contributions of a like nature, are familiar to all students of statistics.

Galton concluded, as the result of his researches, that the natural mental capacity of the individual was so important that by comparison the influence of nurture was negligible, and that there was as wide a variation in innate intelligence as the evident variation in physical traits. Galton was succeeded by Karl Pearson whose conclusions, after much statistical investigation, concurred with those of Galton. One is inclined to wonder to just what extent, Pearson's work was influenced by his personal admiration for Galton and his faith in Galton's aims and ideals. Pearson was essentially a mathematician and a genuine scholar; Galton, on the other hand, was not erudite, he was a literary artist and a philosopher rather than a student. Pearson's methods, despite the difference between the two men, were really but the quantitative use of the same procedure of reasoning which Galton had employed in a qualitative way. Thus, as stated above, Galton thought that nurture was of but very minor importance in determining capacity; Pearson went further, giving qualitative expression to the same idea, and stated that nurture was but one seventh as influential as nature. Galton was biographical where Pearson was statistical, though each used both methods on occasion.

A brief example of Pearson's method is desirable as illustration. A man's height is influenced by the "start" he has at birth--i.e. his natural tendencies, which may be compared to a coiled spring which is slowly released by stages by the environment---, and by the conditions which he experiences during the period of growth--food, sunlight, fresh air, etc. Now Pearson attempted to separate and distinguish between the influence of the two factors, nature and nurture. Thus, in measuring heights of sons, if these heights differ from that of the general population and in the same direction as the father's height, it indicates the influence of heredity. If it does not differ and bears no relation to the father's height, then other factors are responsible.

The conclusions resulting from work of this sort were overwhelmingly in favor of Nature as opposed to nurture. But was the method employed to secure the results a reliable one? The data is there and the results are there, but what of the link connecting the two?

From our raw data are we conducted logically and inevitably to the conclusion at which Pearson arrives ? or is the reasoning invalid, the method fallacious ?

The answer must be that environment and heredity cannot be separated by the statistical methods. Countless factors enter into the problem, yet these factor, influential as they may be in reality, find no place at all in the statistical treatment. There are environmental variations within environmental variations. A certain group within a population, due to the psecial nature of the environment may vary from the population at large and in the direction of their parents--but this is simply due to the fact that these sons and daughters are subject to the same environmental differences as those experienced by their parents. And if, as A.A. Roback declares, Galton "failed to distinguish sharply between biological and cultural determinants of character and success," how much more guilty was Pearson who, even more than Galton, relied on statistical analysis alone. At least Galton did investigate individual cases and circumstances, in however a prejudiced fashion it may have been done. The abstract and theoretical analysis of Pearson was quite unsuited for a problem of this nature. Nothing is more desirable in science than the use of mathematical methods, but their premature application at a time when data is insufficient in quantity and quality, can but serve to discredit mathematics as an aid to discovery. There comes a stage in all sciences when mathematics can and must be brought to bear; butlike the tide in the affairs of men that occasion must not be anticipated.

Whatever we may think of the entire question, arguments from this source must be dismissed. J. B. Eggon's words are justified: "Galton's work on twins is paraded again as it has been in nearly every eugenic book we have ever seen. The errors of logic involved, the fallacies of argument therein, are unnoticed. Karl Pearson's statistical method is elaborated. It is too bad no one has ever pointed out the persistence of environmental effects which wrecks Pearson's delicate system of coefficients (of genetic correlation)." (Italics by present writer.)

The idea of the "persistence of environmental effects" is as follows: Suppose a girl to be systematically underfed during her childhood. This will have a detrimental effect upon her growth. This effect is definitely environmental in origin. Such a girl at adulthood may contract a satisfactory marriage from an economic point of view, or during her years of childhood, her parent's economic condition may improve. At any rate, she now finds herself in a more satisfactory environment than that of her early years. Physically, she will be inferior to her environment, as judged by its effects upon those with whom she is now associated. Now, if her children vary towards the "standard" of the mother, it will show the influence of heredity; and if they approach the standard of the community in which she now lives it will indicate the importance of environment---or at least, so reasons Pearson. But one important element has been omitted from consideration, namely the child's pre-natal life. It is true that after birth she is subject to the sociological environment of the neighborhood to which she is born, but prior to birth, during the nine month's period of her intra-uterine existence, she is also subject to an environment, though this one could not be called sociological. And, due to the unfortunate early environment of the mother, the child during this pre-natal period will be less favorably circumstanced than the average child of the same neighborhood. The final result is that this child will show a leaning toward the mother's standard and away from the standard of the neighborhood; and the former inclination would be attributed under Pearson's method of abstract statistical analysis, to

the influence of heredity---whereas to us, knowing the whole case, we see that the tendency towards the mother's standard is as much due to environment as is the tendency to depart from it. Pearson's system not only neglects this persistence but also it would be incapable of handling it even if this persistence were considered. Statistical methods do not as yet enable us to clearly distinguish between nature and nurture. Greater factual evidence is required before the problem can be investigated and solved in this manner.

EVIDENCE FROM IDENTICAL TWINS

In the opinion of many authorities evidence from the study of "identical" and "ordinary" twins is the best sort of justification for believing in the existence of constitutional mental differences of all degrees of magnitude. Here we have just what we have desired: a method of doing away with or rather equalizing, environmental influences. Galton employed data gathered from the study of identical twins in his writings but the material was handled carelessly and insufficient care was taken to determine whether the subjects studied were genuine identical twins. This last weakness of treatment vitiated Galton's entire effort. Within very recent years a rigidly scientific study of this aspect of the problem has been made by the Austrian, Johannes Lange, and a clear, concise statement of his finding is presented in his volume Crime and Destiny.

The introduction to this book is by J.B.S. Haldane. Here he points out that individual differences arise from only three sources: (1) Heredity, (2) Segregation, (3) Environment. In the case of ordinary or "disseparate" twins, each member of the pair is due to the fertilization of a separate ovum. Such twins do not have identical heredity for all ova and all spermatazoa are possessed of a different hereditary endowment. This difference is due to "segregation" --i.e. the process whereby, during the maturation division of the germ plasma, a different assortment of chromosomes and of genes is given to each cell. The heredity of the Zygote is then fixed by the assortment of "determinants" possessed by both the ovum and the spermatazoon. Of course, even in the case of dissimilar twins, there is a good deal of likeness for segregation can only rearrange the determinants already present in the germ plasma, and these "bunch" of determinants are unique in that they are, to some degree at least, unlike those possessed by any other pair of individuals. For this reason, offspring of the same parents, will possess a degree of resemblance to each other which is greater than their resemblance to any other members of the community.

Identical twins are due to an "accident" of embryological development. In some as yet unknown manner, the fertilized ovum suffers a complete cleavage and separation at the conclusion of the development of the first pair of daughter cells. Ordinarily these two cells, the fruit of the first division of the fertilized ovum, cling together and each goes through a second division, making four cells in contact, all these four cells again subdivide, and so on. The stages of morula, gastrula, etc., follow. Specialization of cell structure and function follows: and so on until the development of the fetus and the child; and then childhood, youth, maturity, and senescence. But when these two original daughter cells separate, each one develops as if it were a separate ovum, and thus, once again, we have the phenomena of twins. But here each child has an identical heredity. Hereditary differences due to segregation do not exist. These identical twins are instantly detectable in most cases. (Sometimes care must be taken before a definite decision can be given.) They are always of the same sex. Almost invariably the physical resemblance is so close as to result often in the confusion of one for the other. Their behavior--i.e. their mentality--is similar. Everything about such twins betrays the identical heredity with which they have been endowed.

In Lange's investigation, some thirty cases were examined. Some of the characters studied were members of a pair of identical twins. Others were simply members of a pair of ordinary twins. The individuals with whom the investigator first came in contact were convicted criminals in penitentiaries.

Wherever it was found that these criminals had twin brothers, the circumstances and careers of these brothers were investigated. The amazing result was disclosed that whenever these brothers were identical twins then the careers almost exactly paralleled that of the criminals first studied; whereas if the brothers were ordinary twins, then their careers diverged widely from that those in the penitentiary. The similarity of behaviour of the identical twins was little short of amazing. The ordinary twins, on the other hand, had acted no more alike than brothers and sisters who were not twins. In his introduction Professor Haldane writes: "Putting the figures thus;

	Concordant	Discordant
Monozygotic.....	10	3
Dizygotic.....	2	15

the odds that they are significant of a real difference are about seven thousand to one. This is an underestimate, because all known facts about twins point in the same direction. Clearly to obtain identical behavior one must have not only the same ancestry and the same environment, but the same set of genes dealt out by segregation.

"To get a complete story we should want yet a third class or records, namely of monozygotic twins, who have been separated from early infancy. These are much harder to obtain. So far as I know only four such cases have been investigated, namely, by Professor's Muller, of Austin, Texas and Newman, of Chicago, whose results are published in the Journal of Heredity. Unfortunately, none of these eight people concerned were criminals. But as the result of their different upbringings they did show markedly greater divergencies, both of character and of intellect, than extreme believers in the omnipotence of "heredity" would care to admit. In spite of this, the resemblances were striking. As Professor Lange states, about half of the criminals in the concordant dizygotic pairs, would probably have grown up into decent or at least harmless citizens if placed in suitable environments."

Lange's book is largely concerned with a discussion of the individual cases. In each case, direct observation and careful inquiry was made. Not only was the individual in prison examined, but also his twin brother who was at liberty, or who, as was usual in the case of the monozygotic twins, was in prison elsewhere. Lange's research was primarily realistic and factual, not theoretical.

Lange was so thoroughly convinced of the omnipotence of heredity by his investigations that he called his book Crime as Destiny. (The title Crime and Destiny was considered by the translator to be more suitable for English readers.) As the following quotation reveals, Lange was prepared to admit that environment could exert some influence, perhaps even a greater influence if it were a deliberately controlled environment; but in the main it remained true that the destiny of each man born upon this earth had been marked out for him at the moment of fertilization of the ovum.. At any rate he writes: "In giving this little book the title Crime as Destiny, I am aware that it should challenge much opposition. I am not thinking of the fact that the approach indicated may appear to some unprofitable for sober investigation; that I take for granted. I expect it rather from those whose views on life are diametrically opposed to the conception of life implied by this title. But the biologist and the doctor who has to deal with the individual criminal cannot help again and again seeing fate in crime stronger than the free will of the individual. The natural tendencies one is born with, the surroundings which he grows up in, these are essentially destiny, and it is destiny by which environment with its countless influences, makes to form natural tendencies into one whole."

Now, is the evidence from identical twins unimpeachable? After considering all previous arguments for the belief in the hereditary determination of intelligence, we have been forced to regard them as suggestive rather than conclusive. But does Lange's work decisively settle the question?

There are several features of his study that may well bear discussion. The first which comes to one's mind is the fact that his ordinary twins had a lower correlation of behaviour similarity than had ordinary brothers and sisters among criminals. That is to say, when the brothers or sisters of a number of criminals were investigated, it was found that the behaviour of these brothers (confining ourselves to the males) actually bore a closer resemblance to those of their incarcerated brothers than if they had been twins. In other words, the dizygotic twin brother of a prisoner was actually less likely to be a criminal than if he were just an ordinary brother, and not a twin, to the prisoner. This result, so definitely contrary to expectation and reason, would suggest then the number of cases investigated was too small; otherwise, such peculiarities would have been ironed out.

Another point which presents itself is this: how is it that, unlike Lange, other investigators have found that "twins" (using the word without distinguishing the two types) behave and "test more alike than ordinary brothers and sisters." Lange bases his belief in the hereditary determination of character and intelligence on the difference between identical twins and ordinary twins. As he reasons, ordinary twins are brought up in the "same" environment, yet they differ in behavior--therefore, the variations in behavior must be attributed to heredity (segregation). Identical twins also are subject to much the same environment, but no more so than ordinary twins, therefore their greater similarity of behavior must be due to the greater (indeed, exact) similarity of heredity. If ordinary twins were as functionally identical as monozygotic twins, then we would have no grounds for regarding differences of heredity as of great importance. Hence, psychologists who speak of the likeness in activity and appearance of "twins", without distinction of type, only destroy their own case. And often the psychologist will only partly distinguish monozygotic and dizygotic twins, as the following quotation of A. T. Poffenberger shows:

"One of the pioneer studies of mental heredity by means of psychological tests was made by Thorndike in his Measurement of Twins. He used a variety of simple mental tests upon fifty pairs of twins and found an average correlation between them of $+.80$ as compared with a correlation of $+.40$ for brothers and sisters, with the correlation among unrelated children taken as zero. Taking into account the degrees of resemblance of twins of different ages, the degrees of resemblance in traits varying in susceptibility to training, and the comparison of twins with siblings (ordinary brothers and sisters) in these respects left no doubt that heredity is the potent factor in determining similarity of performance. The more recent studies of twin resemblance, by means of the best standardized measuring instruments, confirm in essential respects the findings of Thorndike. For instance, Merriman found between all twin pairs a correlation of $+.78$, when measured with the Stanford-Binet examination. When the twins were classified into like-sex pairs and unlike-sex pairs, the correlation for the former was $+.87$ and for the latter was $+.50$. That is, the unlike pair approach siblings in their degree of resemblance, while the like-sex pairs approach a perfect correlation. Genetically speaking it is believed that unlike-sex twins do not differ from ordinary brothers and sisters, and this is confirmed by the results of the tests."

Certainly there is some confusion or carelessness here. It is true that unlike-sex twins must be dizygotic, but like-sex twins are not necessarily monozygotic; indeed they are as likely to be the one as the other. And since twins of different sex are each subject to a different environment by very virtue of this sex difference, then one would be quite as justified in attributing similarities and resemblances among like and unlike-sex twins to environment as to heredity.

Even the earlier investigations of which Poffenberger speaks, where the "degrees of resemblance" were taken into consideration, are not free from criticism on this score; for it is not a matter of "degrees of resemblance" but one of "either, or," i.e. the twins either are monozygotic, or they are not. This is no matter of "degrees" at all, it is all or nothing.

Yet Lange's study stands as the strongest argument for the inheritance, as contrasted with the acquirement, of mental traits. In the light of Lange's facts, we must admit that heredity is a very important influence in determining intelligence, that there are real innate differences present so that equality of educational opportunity would not be the great leveling force it was regarded as being by Ward. But this does not change the fact that education may be capable of producing great absolute improvements in mental powers, even though there is a limit set by natural endowments.

We have capitulated more completely to Lange's arguments than to others advanced in support of the same thesis. But even here the acceptance is not perfect. It is only admitted that the probabilities are there.

A distinct limitation on the conclusions drawn from Lange's work by the extreme hereditarians is given by the research on identical twins done by Muller and Newman. Here the subjects investigated were identical twins, who had been separated from infancy. In this case, the degree of resemblance could be considered as a rough indication of the influence of heredity, the differences indicate the effect of environment. To date, the pairs of twins of this sort investigated number six. (Haldane speaks of four pair, but the number has been increased since he wrote.) Here is what H. H. Newman says: "The results so far indicate that the environment very distinctly modifies some physical characters such as weight, general health, etc., but does not alter others such as eye-color, hair color, teeth, features, etc. Moreover, the environment profoundly modifies those characters described by the terms "intelligence" and "personality." In some cases the intelligence of a pair of separated twins was three times as different as the average of 50 pairs of twins reared together. But after full credit is given to the modifying effect of the environment, the fact stands out sharply that hereditary resemblances remain most strikingly close." (Italics by the present writer.)

In three of the six cases, the twins differed markedly in intelligence. And in two out of three of these cases, the superior twin had received the better education. In the third case, they had received "about the same amount and kind of education." On the other hand there is one case where education and social experience produced only temperamental differences. In discussing this instance, Newman expresses himself so awkwardly that it is difficult to make out just what he means. Thus he writes: "A pair of twin young women, one with very much more formal education than the other, but [and?] with a much more varied social experience," etc. If he had said "a much less formal education, but with a much more varied social experience," the sentence would have been

understandable.

For all this, an examination of the cases shows that there was some justification for the statement that despite the modifying influences of the environment "the fact stands out sharply that hereditary resemblances remain most strikingly colse."

The work on identical twins stands as the strongest argument for the inheritance, as contrasted with the acquirement, of mental traits. We must, in the light of evidence from this work, admit that heredity exerts a large influence in the determination of mentality. Whether it is the preponderating factor in the production of intellectual ability is by no means certain. Newman's statements would suggest that the mental trait with which we are particularly concerned, namely intelligence, is the one most amenable to environmental influences. Here heredity performs in a minor role, though still exerting a very tangible and important influence. Education can do much to "make" intelligence. If a portion of the population, hitherto denied educational opportunities is presented with them there will undoubtedly result a very large absolute rise in mental power; but universal equality of education could not produce equality of intelligence. Equality of intelligence would not be established because heredity would prevent; But insofar as environment is more important than heredity, the differences would be less than those now observable.

These statements involve a qualified capitulation to the case of the hereditarians as represented by Lange. Even here we do not admit, that the matter is entirely settled. It is simply a case of the probabilities, and research on the subject of identical is so cogent in its suggestibility that to admit that the hereditarians are very probably correct, though in a limited fashion, appears to be the only logical course for the unprejudiced student to adopt. It is particularly worthy of note that the whole affair is still entirely qualitative in nature. Though we accept the existence of differences of inborn intelligence, and admit that they must be of such a magnitude as to produce observable distinctions of ability, yet we can determine the range of variation no more closely than this. The variations may be small in ambit (though not too small to defy detection) or large (though not too large to be glaring) And even if the range be great, the number in the upper and lower reaches may be exceedingly small, the great majority being very closely grouped about the average.

Thus we may arrive at the conclusion of our discussion that individual differences of intellectual ability are very probably a fact, but that the observable differences between one man and another may be due to this cause (heredity) or it may be due to education--we simply cannot at present separate the two influences. Furthermore, intelligence is the feature of our mental life which seems most susceptible of educational alteration and improvement.

SCIENTIFIC SUCCESS AND OPPORTUNITY

The hereditarians delight in bringing forth the cases of men who have succeeded despite great handicaps. But in all these cases any of a thousand and one environmental factors enter in as moulding influences, and of these influences only a negligible number can be traced; and particularly so if the investigator is not particularly desirous of discovering them. It seems to the present writer that it would be much better to take a random group of successes, say a number of scientists of a certain period, rather than to select striking individual cases. In any group of great scientists, there should be, according to the doctrines of the extreme hereditarians, a far greater number of self-trained men, for the portion of the population receiving the advantages of a higher education are few, and since--in keeping with hereditarian concepts---such influences are of relatively slight importance,--then the enormously larger untrained portion of the population, by sheer virtue of its size, should make a proportionately larger contribution to the number of these men. Of course, it might be said that those parents who are capable of giving their children these advantages are the ones who also endow their children with superior hereditary talents. This may be true, but it serves to put the problem in a position where it is incapable of solution---for if the successes are declaredly the beneficiaries both of birth and opportunity, how are the two influences to be resolved, to which must the greater weight be attributed? And that the whole matter is still in a state of uncertainty is just what the hereditarians deny. They have a positive case which they seek to uphold. That light may be thrown on the problem by certain modes of investigation and suggestive indications be derived is probably, perhaps even certain; but the method of biographical investigation is not one of these. The extreme hereditarian at least, must prove his case. And if it can be shown by a survey such as previously suggested, that the majority of successful scientists did receive education beyond the ordinary, then we will feel justified in saying that environment is an important element---i.e. that it does not play the insignificant role assigned to it by Galton or Pearson--or at least that biography does not favor the extreme hereditarian case. In a problem of this sort unprejudiced sampling, not special selection, is the only legitimate device to employ.

And what results does such a sampling yield us? The method of making the sampling was as follows; twenty-five years of records of the Annual Reports of the Smithsonian Institution--volumes 1908 to 1932 inclusive--were taken and the "lives" of all the scientists whose biographies were included therein, were examined. The brief biographies in these volumes, one or two appearing each year and being in length from half a dozen to a couple of dozen pages, deal with the life and work of scientists who had died in the year previous to the publication of the Annual. These records are particularly useful for the purpose we have in mind for they lay stress upon the early training of the scientists under discussion. To secure uniformity, the odd names of scientists of earlier times (i.e. those scientists of a previous generation who had not died during the quarter century under consideration but who were discussed anyway) were omitted; also inventors, and several essays which dealt only with the "works" of the individual concerned and not with his "life." Some thirty odd satisfactory records were obtained.

It was assumed, unless the contrary were definitely stated or unless other details of the "life" made the assumption doubtful, that those who received higher educations were enabled to do so as a result of support by their parents. This assumption is surely justifiable for if the university training they had received was owing to their own efforts, their

biographers would hardly have omitted such an important item of information, particularly since these little biographies lay such stress on personal items of this sort. Other scientists are considered as environmentally favored if they received opportunities and advantages beyond the ordinary even though they may not have been university men. Those who had to earn their own livelihood and were forced to acquire their scientific knowledge during their leisure hours are classified as self-made men; likewise those who worked their way through College. In the case of one or two characters it is seen that they worked for a while and then went to university later. In the absence of information, it is assumed that these ones were self-supporting and hence they are classified as "self-made". To the same category belong those whose training was paid for by scholarships and fellowships. (Of course those who received fellowships far along in the course, after they had received much training, the expense of which was borne by others, are not included in this group.)

Again, what were the results of this mode of biographical research and classification? What men were self-made--i.e. successful in despite of disadvantages, by virtue of their innate ability-- and what ones received educational opportunities? The latter group were probably hereditarily favored as well; but, as previously intimated, this in no way changes the fact that in their case, the environment was excellent and if a much greater number of these favored sons succeeded than is the lot of the general populace, the burden of proof is on the one who denies to this nurture a large influence.

The results were overwhelmingly in favor of the environment. Four and a half scientists were found to have received an unusually high education for every one who created his own education. Deliberate training seems to have been a highly important item. In many cases, the training seems to have been of a particularly high order, the individual going on from his B. A. to his M.A. or Ph.D. or M.D. without having to want for funds. Often the training was received in a number of different laboratories, the scientist traveling long distances in order to study under the greatest authorities and teachers.

It was deemed best, in order that the reader might judge for himself, simply to put down the names of these scientists in chronological order, the half-dozen scientists who might be classified (in the opinion of the present writer) as "self-made men" are indicated by asterisks; the twenty-seven who were subject to the best of educations are left unstarred. In the case of many of these latter, the quotations will make it evident to the reader that their was also an excellent heredity. This is not denied; it is merely suggested that the training was likewise excellent--so can one say to which the success was due? Can either factor be ignored?

The dates refer to the year of the annual in which the biography appeared, not to the time of the death of the scientist which was usually in the year previous.

1908, Article by Andre Broca entitled, "The Work of Henri Becquerel." In this essay Broca shows that Becquerel was raised from childhood to be a physicist. The training was deliberate and of the most excellent. As he says, "He was raised for physics and by a physicist." Later on, he speaks of Becquerel's graduation from the Ecole Polytechnique."

1909----Paper by Ph. Glangeaud on "Albert Gaudry and the Evolution of the Animal Kingdom." Gaudry received much of his training from his father. It might be said that Gaudry's father had a natural inclination to an interest in intellectual things and that this characteristic descended to his son by inheritance. Or it might be said that his father's influence made Gaudry a paleontologist. It is difficult to see just how the two factors are to be separated. Certainly it is for the extreme hereditarian--he who maintains that environment is of vanishingly small importance--to prove his case. The extreme environmentalist is, of course, confronted with the same necessity. At any rate, Gaudry does seem to have been a fortunate young man. To quote Glangeaud: "Born in 1827 at St. Germain-en-Laye, Albert Gaudry was the son of the president of the Order of Barristers of Paris, an intelligent amateur of the natural sciences. At the age of twenty, the young man, who, with his father, had traveled about the environs of Paris and who visited the principal deposits and fossils described by Cuvier, showed an irresistible liking for geology and paleontology. In 1850 he was attached to the geological laboratory of the Museum of Natural History, where he labored under the direction of d'Ontigny, his brother-in-law, and Cordier. In 1852 his first works.....gave him the title of doctor."

1909----For this year there also appears the biography of Charles Darwin. He, however, died 1882 and hence does not come under our present grouping. But it is worthy of note that a more deliberately trained or more fortunately circumstanced scientist than Darwin never lived. He is the greatest scientist of all time. He attributed his success to his opportunities.

1910----Article by Alfred Goldsborough Mayer, "Alexander Agassiz - 1835-1910." Mayer wrote: "The great English statistician Galton found that men who attain eminence in science are nearly always sons of very remarkable women, and Alexander Agassiz was no exception to this rule. His mother was Cecile Braun, the daughter of...a geologist of note....Cecile Braun was a woman of culture and an artist of exceptional ability, and she was the first who labored to illustrate the works of Louis Agassiz....." "He entered Harvard College and graduated in 1855 with the degree of A.B., and then studied engineering, geology, and chemistry in the Lawrence Scientific School, obtained one B.S. in 1857 and another in natural history in 1862." Apparently Louis Agassiz, the father of Alexander Agassiz though a great scientist himself, and though Alexander's mother was an exceptional woman, yet believed that his son would be much benefited by being deliberately educated for we see Alexander Agassiz continuing his studies under expert supervision for seven years after he had received his B.A.

----W. W. Campbell "Sir William Huggins, K.C.B., O.M." In this essay Campbell shows that Huggins was so fortunate as to receive an education such as is the lot of less than one man in several million. "His father was in commercial life and was able to provide the son not only with a good education, but the financial means to follow astronomy in a private capacity, unattached to a university or established observatory. His early education was received in the City of London School and he later studied the languages, mathematics, and various branches of science extensively under private tutors."

1911----Biography, by C.J.M., of "Robert Koch, 1843-1910." We always tend to think of Koch as being the best example of a self-trained scientist. This is correct. He did, almost entirely by his own efforts, make himself a thoroughly skilled bacteriologist. It is to this unusual technical ability that his great success was due. But it must not be forgotten that he was a graduate from one of Germany's best medical colleges, Gottingen,

From the age of nineteen to twenty-three, the years of early manhood, when one's adult career is determined, Koch associated as a student, with scientists of great name. And up to nineteen he had received a "Gymnasium" training.

-----"Sir Joseph Dalton Hooker, O.M., G.C.S.E., F. R. S. 1817-1911" by Lieut. Col. D. Prain. (Also see article by E. Ray Lankester in the Smithsonian Reports for 1918.) Here we read: "The most distinguished son of a distinguished father, Joseph Dalton Hooker was born at Halesworth, in Suffolk, on June 30, 1817. Early in 1820 his father was appointed by the Crown to fill the Chair of botany in the University of Glasgow, a post which he held until, in 1841, he became a director of the Royal Gardens at Kew. As a consequence Hooker was educated in Glasgow, passing through High School to the University, from which he obtained the degree M.D. in 1839." Following this opportunity for travelling was given to Hooker, the most important being his voyage of several years as a Ship's Doctor. It was to this great voyage that Hooker owed much of his later ability. Both Darwin and Huxley were "made" by exactly the same experiences--by the unexcelled opportunity for the study of natural history which a long sea voyage of years duration gave them. That these voyages were their "making" was the conviction of these three men. Without this training, would any of the three have arisen above the status of good, routine scientists? Darwin and Hooker had excellent ancestral "backgrounds" but they also had excellent training.

1912----Charles Nordmann "Henri Poincare." "There have been few more brilliant "natural" students than Henri Poincare. Yet he too was presented with opportunities beyond the ordinary. His mathematical genius may have been innate, but it was aided to full growth by environment. Nordmann writes: "We should also recall his brilliant school days; his wonderful faculty for assimilation; he followed all the mathematical courses of the Ecole Polytechnique without taking a single note."

1913----Prof. G. Bruni "The Work of J. H. Vant Hoff"

"Jacob Henry Van't Hoff was born August 31, 1852, in Rotterdam where his father was engaged until 1902 in the practice of medicine. His ancestors had for centuries held the positions of aldermen and mayor of the little village of Groote Lind near Rotterdam. He descended therefore from one of the ancient families of those austere and sturdy Dutch burgesses which the paintings of so many artists portray, gathered in civic councils, in learned assemblies, and in companies armed for the defence of the Fatherland. The external traits of this strong race were reproduced in his countenance, and in his character were found its best moral endowments.

"The beginnings of his scholastic career were modest; he attended the elementary schools and took his secondary school work in his native town. His parents seem not to have had great confidence in his future. It is certain, at all events, that at first they did not approve of his desire to devote himself to the study of pure science--the subject toward which he felt himself drawn. He was obliged to commence by registering at the Polytechnic School at Delft, where at the end of two years he took his final examination and obtained the diploma of technologist.

"After having thus satisfied his family by securing a professional diploma, he finally obtained the permission he so much coveted to devote himself to scientific study, and registered in 1871 at the University of Leyden, the oldest and most famous centre of education in the Netherlands. There he studied mathematics and physics but devoted himself more especially to Chemistry. In 1873 he went to Bonn, where he worked for two months in the laboratory of Kekule and did his first experimental

work. (We shall see later what influence his stay in Bonn was to have on the development of his idea.) He remained for a short period in Paris where he frequented Wurtz's laboratory. (We shall soon see what a deep impression was made upon him rather by the works of Pasteur than by the ideas of Wurtz.)

"Returning to his native country, he took up his studies at Leyden again and in September, 1874, published a paper in Dutch in which he stated fully and succinctly and all the essential portion of the stereochemical theory....."

"The following year we find him in search of an occupation which should be suitable to his taste and, above all, would permit him to continue his chosen studies...."

These quotations from Brune's essay are, perhaps, excessively long, but it seemed desirable to make clear the exact opportunities which were presented to Van't Hoff, for his is a case of a young man who had to overcome the opposition of his parents and as such, is likely to be chosen by the hereditarians as an example of a man over-coming handicaps; but we see that, on the contrary, everything favored Van't Hoff and that it was only after many years of preparation by experts that he turned his hand to the task of earning his living.

1914 # Pierre Germier "Sketch of the Life of Eduard Suess." Here at last is a character whom we may say succeeded despite handicaps; and if we wished to be conservative, perhaps, we should hesitate to say this: "He was educated for commercial life, but early displayed a bent for geology." (Article in the Encyclopaedia Britannica.) Germier writes: "His father was a trader, a large wanderer, like so many others of his race. Indeed, if one would understand, Eduard Suess, this origin must never be forgotten. He was the man called to show and explain to us the face of the earth; to lead us, as by the hand, along all the shores and in the labyrinth of all the mountains of the planet, to make us citizens of a humanity greater than all the nations and more enduring than all histories; this man was a splendid type of that old race, that nation elect to whom universal supremacy was at one time promised, and whom we now see wandering without respite along sorrowful ways, moving across the continents and the oceans of the earth."

"The young Eduard studied first at Prague, then at Vienna, and of early attracted attention through his taste for the study of fossils; minerals and rocks, a study which soon became an irresistible passion. In 1852, then only twenty years old, Eduard was appointed assistant at the Hofmineralenkabinett in Vienna, a kind of practical school of geology and mineralogy installed in the buildings of the Hofberg. His scientific career was begun."

Insofar as Suess created his own opportunities, he is correctly classified as a self-made scientist; but he was by no means left uneducated by his father, and if he made his own advantages, at least he had no particular disadvantages to overcome in doing so.

1915----A. S. Eddington "Sir David Gill (1843-1914)" "David Gill was born at Aberdeen on the 12th of June, 1843. His family had long been associated with that city, where his father had an old established and successful business in clocks and watches of all kinds. In due course he entered the Marischal College and University, Aberdeen. At that time J. Clerk Maxwell was a professor there, and his teaching had a great influence on the young student." After Gill had received his education, the

death of his father necessitated his assuming the responsibilities of his father's business. This work temporarily arrested his studies, but it had its uses for "his natural mechanical genius" was increased by the work he did with these instruments of time-measurement. His skill in handling astronomical apparatus was due in no small degree to this early training. Finally he was able to dispose of the business and to resume his astronomical work.

However great may have been Gill's "natural genius" it is evident that it was much fostered by an excellent education.

-----"Walter Holbrook Gaskell, 1847-1914," by J. N. Langley. "He came up to Cambridge in October, 1865, when he was not quite eighteen, as a member of Trinity College. In his third year he was elected to a foundation scholarship and proceeded to the B. A. degree in 1869, being twenty-sixth wrangler in the mathematical tripos. After taking his degree, he studied for a medical career and in the course of his preliminary scientific work, he attended lectures on elementary biology and physiology given by Michael Foster. Foster led a considerable number of his early pupils to a scientific career. He first aroused an interest in scientific problems and then, some times gradually, sometimes suddenly suggested that there was no better course in life than that of trying to solve them. Gaskell was influenced in the latter way." At Foster's suggestion he later dropped his medical work and tried his hand at research in physiology, studying in Ludwig's laboratory, "the most important school of physiological research in Germany or elsewhere."

1916---*---Essay by William Healey Dall on "Theodore Nicholas Gill." This little biography treats of a man whose early advantages of education were much beyond the ordinary, but who had to become self-supporting in youth, who instructed himself during these years, and who later was enabled to completely renew his studies because of a fellowship. Gill is classified as a self-made man, but his earlier advantages must not be omitted from consideration.

Dall writes: "He was the son of James Darrel and Elizabeth Vosburgh Gill. His father was the son of a merchant of St. Johns, Newfoundland, descended from an old Devonshire family. His mother came of old New York Dutch stock.

"The boy received the rudiments of education from his mother, and at the age of eight was sent to the Mechanics' Grammar School on Crosby Street then a highly esteemed educational establishment."

"A year later his mother died, the father gave up housekeeping and his son was placed in charge of a private tutor at Greenville, N.Y. He received a very thorough training in Latin and Greek, the father having ambitions that the son should eventually become a clergyman."

His father moved to Brooklyn and "young Gill was recalled from Greenville and sent to a private classical school in the city.

"His love of nature and instinct for collecting developed early and it is perhaps not merely a coincidence that, in coming by a ferry from Brooklyn and daily passing the great Fulton fish market, his attention should have been especially drawn to the study of the fishes of New York." "The young man decided to study law but continued his study of ichthyology. At this time Gill's father remarried and soon had a second family, the support of which left him no means of assisting his son Nicholas. So the young man had the arduous task of earning his living by his efforts in a law office while at the same time investigating and learning more on the sub-

ject of fish. His work was of sufficient significance to enable him to secure a small scholarship. With this as his only resource, he abandoned his legal activities and went in unreservedly for science. Insufficient funds handicapped him for years, but his scientific pursuits were continued with unabated zeal. With the passage of time, his ability gained its just recognition and his ever-increasing contributions to science secured the appreciation justified by their worth, so that the financial troubles which had so long beset him and which had retarded his progress, were overcome.

1917----"In Memoriam---"Edgar Alexander Mearns, 1856-1916," by Charles W. Richmond. "Edgar Alexander Mearns, son of Alexander and Nancy Reliance (Caswell) Mearns, was born at the home of his grandfather (Alexander Mearns), at Highland Falls, near West Point, N.Y., September 11, 1856. His grandfather, born a few miles from Aberdeen, Scotland, in 1786, came to New York in 1805, after making several perilous voyages at sea. He settled at Highland Falls, about the year 1815, where Alexander his son, one of several children, was born in 1823. Doctor Mearns's father died in 1873, but his mother, who came of New England stock, is still living."

"Edgar Mearns manifested a remarkable interest in birds and animals at a very early age, and this taste was fostered by his father, who bought him a large illustrated book on the native birds. He took great pleasure in looking at the pictures---he was only three years old at the time---and his mother spent hours teaching him their names and histories, and he soon developed a wonderful knowledge of the subject for one of his years. As he grew older, his father gave him a gun, and they would shoulder their arms and wander through the fields together, close companions. He was taught to set box traps in these early years, and if there was no one on hand to go with them to inspect them, he would steal out alone to see what the traps contained. As a schoolboy, he was often tardy as a result of lingering in the woods in search of specimens. Every natural object interested and attracted him.

"Young Mearns was educated at the Donald Highland Institute at Highland Falls, and subsequently entered the College of Physicians and Surgeons of New York, from which he graduated in 1881. At the outset of his medical career, he became personally acquainted with several of the young naturalists of the time, E.P. Bicknell, A.M. Fisher, C. Hart Merriam and others, some of whom were attending the same routine of studies. He and Dr. Fisher chanced to share the same room at a boarding house at this time, and it was here that the budding young Linnaean Society held its early meetings."

In this account of the early years of E. A. Mearns, the forces of environment and heredity seem to be inextricably intertwined. Richmond speaks of the child's interest being "fostered" by his parents. Is it not equally possible that the interest was created by them? Certainly careful instruction in such early years is a rarity. Possibly scientists could be produced at will by such a process. Furthermore, young Mearns's later years were very favorable. It is quite true that he himself did much to make the intellectual contacts which so stimulated him; but had he been mucking in a coal mine or working long hours on a farm instead of attending an educational institution, the making of these contacts, however much he might have contributed to their development, would have been impossible.

-----"William Bullock Clark." "Clark's ancestry was of the best; but a more deliberately and carefully educated scientist never lived. Clark studied in the best universities, under the best instructors and amidst the most favorable circumstances, until he was a man of almost thirty. Like Vant Hoff, he had long years of expert training behind him before he turned to the task of earning his livelihood.

"William Bullock Clark was born at Brattleboro, Vermont, December 15, 1860. His parents were Barna A. and Helen (Bullock) Clark. Among his early ancestors were Thomas Clark, who came to Plymouth, Massachusetts in the ship Ann in 1623 and who was several times elected deputy to the general court of Plymouth Colony; Richard Bullock, who came to Salem, Massachusetts in 1643; John Howland, a member of council, assistant to the Governor and several times deputy to the general court of Plymouth Colony, who came to Plymouth in the Mayflower in 1620; John Tilly, who likewise came in the Mayflower; and John Gorham, captain of Massachusetts troops in King Philips War. Among later ancestors were William Bullock, Colonel of Massachusetts troops in the Indian and French War, and Daniel Stewart, a minuteman at the Battle of Lexington in 1775.

"Clark studied under private tutors and at the Brattleboro High School, from which he graduated in 1879. He entered Amherst College in the autumn of 1880 and graduated with the degree of A.B. in 1884. He immediately went to Germany and from 1884 to 1887 pursued geological studies at the University of Munich, from which he received the degree of doctor of philosophy in 1887. Subsequently, he studied at Berlin and London, spending much time in the field with members of the geological surveys of Prussia and Great Britain. "Following all this training, Clark became an instructor in geology at Johns Hopkins University. From this position, he rose steadily until he attained to the headship of the department.

Clark had great ancestors; but they were no greater than the marvelous education which he received. In his case would it not be folly to consider environment as "hardly counting at all by comparison with heredity?"

1918----No biographies given for this year.

1919---*---"Richard Rathbun" by Marcus Benjamin. This character forms a rather marked contrast with the preceding one, for unlike Clark, Rathbun went to work at a very early age, whereas the former was about fifteen years older before he commenced to support himself. Rathbun later went to College, at the age of nineteen in fact so we see that returned to his studies after only a short period of commercial work. Since, however, he had already done satisfactory research in geology before coming back to academic work, and since this research was conducted during the period of his relationship with a firm of contractors, it is very probably best to classify him as one of the self-made scientists.

Benjamin writes: "Richard Rathbun was born in Buffalo, New York, on January 25, 1852, and there studied in the public schools until he reached the age of fifteen years, when he entered the service of a firm of contractors, with which he remained for four years, acquiring a thorough knowledge of business methods, that was of special value to him in later years.

"At that time attracted by the specimens of fossils that abound in western New York, he began the study of paleontology to which he assid-

The collection in the museum of the Buffalo Society of Natural Sciences was made by him and he was appointed curator of that subject with charge of its collections by the society.

"In 1871 he met Charles Fred Hartt, then professor of geology at Cornell University and a pupil of the elder Agassiz, who persuaded him to give up his business pursuits and devote himself to science. Young Rathbun accordingly entered Cornell and followed the regular academic course with the class of 1875, specializing however, in geology and paleontology!"

-----"A great Chemist: Sir William Ramsay," by Ch. Moureau.

If Ramsay's hereditary endowments were beyond the ordinary certainly his opportunities were no less so. It was his lot to be taught by the best of instructors and to work in the best of laboratories.

"Of Scotch origin--he was born in Glasgow in 1852---Ramsay's hereditary influences were most favorable. In his family were chemists and doctors of note, and one of his uncles, Sir Andrew Ramsay, was a well-known geologist. Thus, as he himself liked to recall, Ramsay was descended from ancestors well above the average intellectually and in scientific pursuits, and he was well aware that he owed to them his calling and his ability as a chemist.

"Having begun his studies in his native city, Ramsay went to complete them in Germany, at first at Heidelberg, with Bunsen and afterward in Tübingen, in the Fittig laboratory...."

Ramsay may have attributed his ability to his ancestors but in the light of his biography it would appear that he might well have been advised to have given some share of the credit to his teachers and to his surroundings.

1920-----The Annual for this year contained no biography.

1921-----"William Crawford Gorgas," by Robert E. Noble. Gorgas's educational record is rather prosaic, but though unremarkable, it was none-the-less thorough and complete. "He was educated in private schools until he entered the University of the South, graduating with an A.B. degree in 1875. Deciding to study medicine, he entered Bellevue Hospital Medical College, graduating in 1879."

1922-----No biographies given for this year.

1923-----Article by A. Van Maanen on "J. C. Kapteyn, 1851-1922." Van Maanen is a little short on intimate material concerning his subject, but Kapteyn appears to have received an excellent advanced education. His father ran a well-known boarding school. There were fifteen in the family several of whom acquired a scientific standing of note among their countrymen. We read: "From 1869 to 1875 Kapteyn was a student in the University of Utrecht, where his principal teachers were Buys Ballot and Grinwis.."

-----"Sir James Dewar, F.R.S., LL.D.," by Sir James Crichton-Browne. This account of Dewar lays stress upon environmental influences. "In his tenth year occurred an accident which probably colored his life. While skating on a winter's day, he fell through the ice and when rescued walked about in his wet clothes till they were dry, so that his family might not learn of his misadventure. The result of that was that he had a severe attack of rheumatic fever, which crippled him for two years and left him with a damaged heart. The heart trouble incapacitated him for the active life to which he had been previously disposed and permanently cut

him off from strenuous games and exercises, but in no way impaired his constitutional energy, which remained intact and unsurpassable until his death. It was in these two years when he was laid aside free from schooling, with only a modicum of private tuition and cut off from other boys of his age, that his natural gifts had a favorable opportunity for spontaneous growth. He browsed unconfined on the wholesome pastures of English and Scottish literature, drank deeply of Burns, and above all, began to think for himself and to create; and creation is the essence of all genius. With the help of the village joiner, he made for himself several violins, one of which, wonderfully expressive in its tones, was played at the celebration of his golden wedding in 1921.

"When twelve years old Dewar, still a pale and delicate boy, went to the Dollar Academy, a Scottish secondary school of High repute, of which he always spoke of gratefully, and there he resumed the ordinary routine of the education of the period. It was a little incident at Dollar, the discovery in the garden of Mr. Lindsay, the master with whom he was boarded, of an old and half-buried sundial, in the erection and orientation of which he took some part, what inoculated him with a taste for exact science; but it was not until he went to the University of Edinburgh, at the age of seventeen, that his apprenticeship to science really began. There he soon diverged from the accustomed literary course and plunged, as it were instinctively, into mathematics, physics, and chemistry. In this congenial element, his ability was speedily recognized by two of his professors, Guthrie Tait and Lyon Playfair, the latter of whom made him his class assistant.

1924----Th. Mortensen, "Herluf Winge (1857 - 1923)" "Herluf Winge was born March 19, 1857, the son of C.G. Winge, an official in the Navy Department, and wife, born Monster. From his earliest boyhood he was, together with his brother Oluf, two years his senior, deeply interested in zoology, especially in mammals and birds, and above all, in osteology. He made collections of all sorts of bones and trained himself in their identification, and in recognizing and correctly interpreting all sorts of fragments of bones and teeth, a training which became of the greatest importance to the work of his manhood. He entered the University of Copenhagen in 1874 (from the 'Bogerdyd' school) and, of course, at once eagerly devoted himself to a thorough study of zoology.

"In 1881 he took his master's degree in Zoology; from 1883 -85 he was voluntary aid at the Zoological Museum. Later he received an appointment as assistant, and then vice-inspector, which last continued to be his position and occupation until death."

Certainly a scientist who can continue his studies until he receives his M. A. degree, and then follows this with two years of further study by serving as an unpaid aid, has been fortunate far beyond the ordinary.

1925----"Sir Archibald Geikie." by Sir Aubrey Strahan. This discussion by Strahan indicated that Geikie's educational circumstances were highly satisfactory though he was by no means as superlatively favored in this respect as others, say William Bullock Clark, had been.

"Interesting to us is the revelation of the inner thoughts as a boy who, in obedience to a natural bent and rather to the alarm of his father, made geology the occupation of his life...

"A dormant love of geology was roused accidentally soon after he left school. The finding of a fossil plant in a block of limestone in

Burdiehouse Quarry set his active mind speculating on the relics of past ages that were entombed in the crust of the earth, and from that moment, the rocks and fossils became increasingly the subject of his thoughts. He made the acquaintance of Robert Chambers, afterwards known to be the author of the 'Vestiges of Creation' and of other geologists, and read every book of geology he could lay hands on, deriving, however, a great stimulus from the enthusiasm and literary charm of Hugh Miller's 'Old Red Sandstone' than from some more informing works. But, more than by any book, he was inspired by his own study of rocks near Edinburgh, with their abundance of fossils and of evidence of ancestral volcanic outbursts.

"Though the boy's bent was clearly indicated, his father found it difficult to believe that a study of geology could provide a livelihood. He arranged, therefore, that young Geikie should become a banker, after a preliminary training for two years in a lawyer's office. The interruption was brief for the boy's heart was among the hills of Midlothian and far from the office. He was out in the field again long before the two years had elapsed. Determined, however, to pursue literary studies in addition to science, he matriculated at Edinburgh University in 1854 as a student of Humanity (that is Latin)....."

Shortly after this financial difficulties necessitated the termination of young Geikie's studies. A firm foundation had, however, been laid and Geikie's future progress by self-instruction was an inevitable continuation of a course already marked out.

Perhaps with justice, we may take exception to the concept implied in Strahan's statement, "A dormant love of geology was roused accidentally, etc." Since Strahan gives no reason for his belief that Geikie possessed a "dormant love of geology" it might well be assumed, and with much better cause, that Geikie's interest in geology was created by his experience in the quarry. In the absence of evidence one way or another the latter assumption is the logical one, because it is the simplest and most direct.

-----"Ned Hollister" biography by Wilfred H. Osgood. This essay indicates that though Hollister never attended College, yet in every other way he was the recipient of good fortune, and the educational influences brought to bear on him were of the most beneficial imaginable.

"His forbears were of English blood, one of the better known of them being Lieut. John Hollister, who came to America in 1642 and was later prominent in the colonial affairs of Connecticut....(His father and mother) belonged to that class of well-informed, prosperous and independent people which makes nations grow, engaged mainly in farming or local business, connected with farming. Their home was one in which nothing essential was lacking, and while the great outdoors was always at hand, it was supplemented by the social and educational advantages of the village and by the proximity of two large cities--Chicago and Milwaukee.

"Ned's formal education was confined to the public schools of Delavan, where he had the usual high-school training but failed actually to graduate, a collecting trip having conflicted with the last few days of the school year. Although he did not go to college, early associations were made by which his natural tendencies received all that was necessary to give him an understanding of scientific method and an appreciation of absolute accuracy exceeding that of many college-trained men.

One of the first of the profitable contacts was with Prof. Ludwig Kumlien, of Milton College, in the small town of Milton, Wis., not far from Delavan.

1926----- "William Bateson," by T. H. Morgan. Bateson handled his opportunities remarkably well, but it still remains that these chances were extended to him. How many men who might have done just as well were denied the suitable conditions experienced by Bateson? Of these men we hear nothing.

"William Bateson was born in 1861. He was the son of Rev. W. H. Bateson, D.D., master of St. Johns College, Cambridge. After Rugby school he went to Cambridge, where he took first class honors in both parts of the natural science tripos, receiving his degree in 1882. He was elected to a fellowship in St. Johns."

-----"H. Kamerlingh Onnes, 1853-1926," by F. A. Freeth. This account by Freeth indicates that whatever Onnes's innate talents may or may not have been at any rate he received an unusually long training under the greatest of teachers. As a youth, he attended a school in that town (Groningen), of which J. M. Van Bemmelen, who later became professor at Leyden, and whose name will always be remembered in connection with colloid chemistry, was principal.

"In 1870 Onnes became a student at the University of Groningen and from 1871 until 1873 he worked under Bunsen and Kirchhoff at Heidelberg. He remained in Groningen until 1878."

1927, # "Charles Doolittle Walcott" by George Otis Smith. The year 1927 yields two scientists to swell the ranks of those whom we shall classify as self-made. Of Walcott, Smith writes: "Leadership is not an accident; the position of Charles Doolittle Walcott among his fellow scientists is subject to scientific analysis...ancestry and environment as well as self-determination, explain....."

"The future scientists interest was early stimulated by his environment. Local geological conditions provided highly stimulating conditions for the young Walcott. Finances did not permit of a college education for his father, who had held a high place in the community, died when Charles was only two years old. Walcott's self-training gave him the knowledge and record necessary to secure an appointment on the Geological Survey. Once completely immersed in this work of his heart Walcott steadily advanced, unspectacularly but surely. He finally became director of the survey. The high scientific standing to which he attained is testified to by his election as President of the American Association for the Advancement of Science for 1923-24.

Though circumstances favored Walcott, it may be said that in the main, he created his own opportunities and equipped himself by his own efforts to take advantage of these opportunities.

----# "William Healey Dall" by C. Hart Merriam. Dall, in common with most naturalists, developed an interest in natural history when so young he was unable to recall the date. "He received much profit from this book, so much indeed that he paid a personal visit to its author Dr. Gould." The young boy was much encouraged by the personal assistance of the gracious and obliging and obliging doctor.

"A little later, when employed in the office of the Indian warf, where he did boy's work for wages, he kept a book in his desk and at odd

times when unoccupied with his regular task, copied scientific books which he then thought he would never be able to buy.

"The next factor in shaping his zoological career was work in the museum at Cambridge, where he fell under the magnetic influence of Louis Agassiz...."

1928-----Biography by Sir James Walker on "Svante Arrhenius"

This year provides a very effective contrast with the one preceding for the two characters dealt with in the Annual for '28 were the recipients of an extraordinary fine training.

Of Arrhenius we read: "Young Svante was educated at the cathedral school of Upsala, and was fortunate in the fact that the rector of the school was a good teacher of physics. He left at the age of seventeen with a good record in mathematics and physics to enter the University of Upsala, where he soon passed the candidates examination, admitting to study for the doctorate. "Finding conditions not to his liking, in this university---the manner of the distribution of emphasis on the subject matter did not appeal to him---he with a fellow student repaired in September 1881", to Stockholm with the intention^{OF WORKING} in the laboratory of Erik Edlund, professor of Physics to the Swedish Academy. Edlund gave them a hearty welcome and began by assisting them. "The account goes on to relate Arrhenius's work on his doctorate and his succeeding studies and laboratory associations, all of them very beneficial to the developing youth.

-----"Theodore William Richards," by Gregory P. Baxter. "Childhood was passed under stimulating surroundings....by a wise decision on the part of his parents, Richard's early education up to the time of entering college was obtained at the home from his mother-----At Haverford College, under Professor Lyman B. Hall he laid a firm foundation for his future work in chemistry....after graduating with high honors he entered Harvard College as a senior specializing in chemistry. As a senior at Harvard his time was devoted to completing under Professors Cooke, Charles L. Jackson, and Henry B. Hill, the fundamental preparation necessary for advanced work in chemistry. "He studied as a graduate student under Cooke.

"After receiving the doctor's degree at the age of twenty, Richards spent the following year as holder of a travelling fellowship in study at German universities under Jannasch, Victor Meyer, Hempel and others. His plan of devoting half the year abroad to intensive study in one institution followed by half a year of peripatetic study was one which he always advocated afterwards to students with a similar opportunity as offering the greatest good for the time available.

1929-----Article by Bailey Willis on "Thomas Chrowder Chamberlin," 1843-1928. This essay is a capital bit of biography. The influences which molded the boy and made the man are well presented.

"From his father, who practiced farming during six days and preached biblical philosophy every seventh day, Thomas appears to have inherited his intellectual capacity. He himself said: "I was brought up on theological philosophy, but it was not the Calvinistic predestination. Individuality, personality, responsibility are so strongly ingrained in me that I cannot get rid of them" Evidently the father, like the son, was, within his own sphere, an independent, earnest,

"That he outgrew that restricted sphere of religious tradition, Chamberlin attributed largely to his environment as a boy. In a note on 'little things' in his life, he comments humorously on the fact that his birthplace was on the Shelbyville Moraine, an intimation of his future interest in glaciation. More seriously he describes the influence of all outdoors upon the growing farmers' boy.

"The most fascinating things of those days---to a boy of naturalistic bent---were the migrations of the birds, the spring migration in particular. The prairies were usually burnt over in the fall and were often black and bleak during winter when not covered with snow, but as the spring advanced, the grass began to make them grey and green, the buttercups and violets began to give them color, then birds in uncounted flocks came from the south, fed upon them, and passed on. Bleakness and blackness gave place to color and life. No poor soul born in these days of wire fields and wire fences ever sees sights like these."

"A limestone quarry, which he worked with his brothers for stone for the house that replaced an older log cabin, introduced the boy to the rocks and also to 'snails' and 'snakes' (Trenton fossils). Having been taught genesis in its most literal terms, he found in these vestiges of creation no questions except as to how the great snakes (orthoceratites) got down beneath the layers.

"To the prairies the skies came down equally on all sides and the boy lived in the centre. He watched the northern lights and looked for shooting stars. He grew alert but not inquisitive or inquisitorial."

In this essay we are particularly concerned with the matter of artificial educational influences, the deliberate rather than the natural intellectual forces; so it is of importance to note that Chamberlins stimulating natural surroundings were supplemented by a college training followed by a course in normal school. Following this he became a high-school teacher, continuing his geological studies while so occupied. In 1873 he became a member of the Wisconsin State Geological Survey. This was the commencement of his active work in the field of geology.

1930----"Jesse Walter Fewkes," by John R. Swanton and F.H.H. Roberts, Jr. "In 1871 he entered Harvard and he graduated four years later with honors in natural history, besides being elected to membership in Phi Beta Kappa.

"In 1874, while he was still an undergraduate, two papers on electrical subjects were printed by him, but the year before he had come under the influence of Louis Agassiz in the latter's school at Penikese Islands, Buzzards Bay, and the experience probably led him to turn his attention wholly to zoology. At any rate, he took up graduate work in natural history and, after receiving the degrees A.M. and Ph.D. in 1877, he continued zoological studies at Leipzig under Rudolph Leuckart between 1878 and 1880. Later he spent several months in Naples and at Villa Franca on the south coast of France as holder of the Harris Fellowship." And other advantages of a like nature could be enumerated.

Fewkes' case speaks for itself. Comment would be superfluous.

"George Perkins Merrill" by Charles Schuchert. Merrill was as much a self-made scientist as Fewkes was an education-made one. Of all the characters with whom we have dealt, Merrill is probably the one who had the greatest handicaps to overcome. Merrill himself wrote: "The home being somewhat crowded, I lived for several summers with my grandfather at Minot, and after I had become of sufficient age to be of value, worked for three summers on the neighboring farm of my uncle. I was educated in the town schools of Auburn and Lewiston Falls Academy, situated in Auburn, afterward known as the Edward Little High School. I early became quite independent, at first doing small chores for the neighbors, then working for my father, when at school acting as janitor of the building, and in later years, from eighteen to twenty-one, working in the shoe factories. My education up to the time I was twenty-one was necessarily scrappy, but in the winter of 1876 I entered the University of Maine (then the small and struggling Maine State College), working my way as in previous years and graduating in chemistry with the degree B.S. in 1879."

Schuchert gives us a note concerning Merrill's heredity: "Merrill's father, Lucius Merrill, a carpenter and cabinet maker, was a descendant of Nathaniel Merrill, who settles in Newbury, Massachusetts, in 1633, and who is stated to be one of the Huguenot de Merles who were driven out of France at the time of the massacre of St. Bartholomew. The name "Merrill" being a corruption." On his mother's side, Merrill's ancestry was undistinguished.

The hereditarian might point silently to the case of Merrill, merely observing that it requires no comment. But one swallow does not make a summer.

1931 # Forest R. Moulton on "Albert Abraham Michelson." This essay by Moulton---perhaps the best biography despite its brevity, in the series, and on perhaps America's greatest scientist--reveals an unusual character whose ability is most fairly classified as innate more than educationally created, but it is all a matter of degree for the latter influence is not without its importance.

Moulton writes: "No scientist of the present day has had a more romantic life than that of Michelson. As a small child his parents brought him from Strelno, Germany, where he was born on December 19, 1852. His school days were spent in San Francisco, California. In 1869, at the age of seventeen years, he made a journey alone across the continent to Washington in order to apply personally to President Grant for an appointment as a cadet in the United States Naval Academy at Annapolis, Md. Since genius has a habit of recognizing its kind, he received the appointment. He graduated in 1873 and became a midshipman in the United States Navy. " Later he taught at Annapolis. He soon achieved a high scientific standing, a position which he retained for forty years by an uninterrupted series of remarkable researches.

1932----There were no names included in this year's Annual.

And so the tale is told. It should yield its own story. No comment should be necessary to point the moral. Heredity or environment, which? It is to be noted that no effort was made to demonstrate in this essay that environment is of greater importance than heredity. Least of all did we attempt to prove that environment is of the greatly preponderating force. But in the light of these biographies, can nurture be considered as a factor of but negligible value? The percentage of the population which receives a higher education is excessively

small, a small fraction of one per cent; and yet twenty-seven out of thirty-three successful scientists were the fortunate recipients of this advantage, some of them to an extraordinary degree.

THE FAILURE OF WOMEN

An Illustration of the Relationship Between Achievement and Opportunity.

There is one aspect of the problem of equality which has been insufficiently treated by students of the subject. Neither side of the question has appreciated the significance of this point at its full worth. Neither side has confronted it squarely. It is usually not dealt with at all. And when it is touched upon, the matter is examined hastily. It does not receive the careful study it deserves.

This "aspect of the problem of equality" is the relationship between achievement and opportunity as illustrated by the historical failure of women.

If, as the extreme hereditarians claim, success is a necessary consequence of the possession of inborn capacity for achievement, if the hereditary recipients of the pre-efficients of greatness must necessarily---environmental disadvantages notwithstanding---rise to the heights,---then why have women failed? Women form fiftyper-cent of the human race and they have contributed from their ranks, less than five percent of the "great men" of history. Relative to their representation in the population, their failure has been complete.

Here the believers in the omnipotence of heredity are faced with a difficult problem. If environmental advantage or disadvantage is of negligible value, if heredity is everything, then how can we account for the lack of success of women? For the staunch hereditarian it would almost appear that there was only one course open, only one position to adopt---namely, to claim and to prove that women as a group are naturally the mental inferiors of men. To essay such an attempt as this would be biological hardihood. The boldest hereditarian must give pause when confronted with a problem of this magnitude. And yet it is an issue which is inescapable. The difficulty is a lion in the path of the hereditarians. The method which they adopt is not so much that of attempted conquest, as rather that of dodging the issue by the adoption of an ingenious line of reasoning. Given the hereditarian premises, that achievement owes itself entirely to heredity and not in the least to opportunity; and it becomes an incontestable conclusion that, on the whole, the failures are the biologically inferior. Indeed, this conclusion is not so much a deductive inference from the premises as, rather, simply a re-statement in negative form of the fundamental postulates; i.e. it is not an inference from the premises but the premises themselves. If, the proposition is seen to be fallacious when cast into the negative form, then in its positive role, it must be no less so. If it can be shown that the failures are not the biologically inferior then the major part of the hereditarian theoretic structure must collapse. Yet, for all this, the hereditarians admit that women are the equal of men, they admit that women have failed----and still they maintain their case of the superiority of natural, as opposed to acquired, ability in the production of success. In the vernacular, how do they get that way? We shall see.

But, of course, it is true that no hereditarian assigns everything to germ plasm and nothing to environment. Nevertheless, the most extreme advocates of heredity approximate very closely to this position; and from these extremists to the least, there is only a

difference of degree, not of kind. Whether, on this subject one adopts a higher or lower position on the scale of opinion, it follows in any case that there must be a definitely indicative correlation between failure and inborn inferiority. Must we then attribute to women an intellectual status below that of men ?

Previous quotations must have made it plain that some hereditarians do adopt an extreme position on this question. But in order to consolidate the evidence on this point, two more quotations will be given. They are not random samples. They have been chosen as illustrating the lengths to which some hereditarians go, yet, even at that, the writers chosen are not in the ultra-wing of the hereditarians. There exist many who go further than they.

Edwin Grant Conklin writes: "It is still popularly supposed that mentality is dependent upon education, and that in general peculiarities are due to environmental differences. Many philosophers of the seventeenth and eighteenth centuries taught that man was the product of environment and education and that all men were born equal and later became unequal through unequal opportunities....(but) the old view that men are chiefly the product of environment and training is completely reversed by recent studies of heredity. The modifications which may be produced by environment and education are small and temporary as compared with those which are determined by heredity."

F.H. Hankins: "Those who approach the question from the standpoint of biology and eugenics are more emphatic than the educators, psychologists and psychiatrists in the opinion that heredity is vastly more important than environment in the determination of the relative success of the individual. Galton concluded from his study of twins that one might almost question whether nurture counted for anything at all by contrast with nature. He found that twins that were identical remained astonishingly alike in physical, mental and moral traits in spite of differences of education and experience; those that were not identical grew less alike in spite of similarity of home training and education; Thorndik's study of twins likewise indicated the prepotency of hereditary factors....Pearson finds from many studies having to do with a great variety of mental traits that the measure of relationship for inheritance is at least seven times as great as the measure for environmental factors."

Having adopted their position, the hereditarians found themselves confronted with the necessity of explaining away the failure of women. The method most frequently used in the presence of this problem seems to be that of ignoring the matter. But it is a difficulty for which such treatment is ill-suited; so some have tackled the question, displaying considerable ingenuity in the device which they adopt. This device is owing in part to a suggestion of Havelock Ellis. Some degree of the indebtedness is contracted with the race mongers. The whole thing is simply the suggestion that the male is more variable than the female, that among the ranks of men will be found a greater number of mentally deficient and a greater number of geniuses. The excesses and the deficiencies of the male mutually compensate for one another, to that the average intelligence of the male is equal to that of the female; and at the same time, we have the uppermost rungs of the ladder of intellectual grading entirely occupied by men; and thus we have equality of man and woman and also a monopoly of greatness for man. This doctrine comes as close to being a case of having one's cake and eating it as could be imagined. And best of all, there is avoided the necessity of accounting for the failure of women by an appeal to environmental influences.

This device----or argument, if you will---is not entirely a novelty to the Nordicists. It has been suggested by the proponents of the Nordic doctrine that the black race is about equal to the white, but the top edge of white ability slightly exceeds that of the black, and it is to this numerically insignificant number of better brains, that the white race owes its marked superiority; i.e., racial and national achievement owe nothing to the "mob," the hoi polloi, but are entirely a product of the activity of a few great men. As Carlyle put it, "History is the biography of great men."

From this reasoning, the idea was not long in forthcoming that if we damped (by assumption) the amplitude of the oscillation of variability in women, then the innate abilities of women would be restricted to a narrow range, the band of masculine ability humping out a bit on top and suffering a compensating bulge on the bottom---thus the averages were reduced to equality while still leaving the males almost complete possession of those pre-efficients upon which all greatness is dependent and to which all achievement is due.

This matter of variability is discussed by Irwin Edman. He considers it to be probable that the intelligence of men is more variable than that of women. But a statement such as this must, in the absence of evidence, count for little. He does not even refer to the results derived from intelligence testing. He writes. "The common suspicion that in general women's abilities are less than those of men has seemed to gain strength from the greater number of geniuses and eminent persons there have been among men than among women." He quotes J. McKeen Cattell:

"I have spoken throughout of eminent men as we lack in English words including both men and women, but as a matter of fact, women do not have an important place on the list. They have in all thirty-two representatives in a thousand. Of these eleven are hereditary sovereigns, and eight are eminent through misfortunes, beauty or other circumstances. Belles-lettres and fiction--the only department in which woman has accomplished much---give ten names as compared with seventy-two men. Sappho and Joan d'Arc are the only other women on the list.

It is noticeable that with the exception of Sappho--a name associated with certain fine fragments---women have not excelled in poetry or art. Yet these are the departments least dependent on environment, and at the same time, those in which the environment has been perhaps as favorable to women as to men. Women depart less from normal than men--a fact that usually holds for the female throughout the animal series; in many closely related species only the male can be readily distinguished."

To inform us that in the subject of literature or in art in general, women have received as favorable an opportunity as men, is to indulge in a manifest absurdity. For what work is a more thorough education required than that of literature? What pursuit demands greater culture? Who can write literature without a wide experience of the world, without having had contacts? And does Cattell suggest that here women have had as great an opportunity as men? R. H. Quick, the distinguished educationalist, in no way exaggerates when he speaks of women being forced, in the past, to acquire their education by stealth. As Lester Ward writes: "In literature, which is an art, it is essential to be grounded in the rules of grammar and rhetoric, and if one is to be a poet those of versification etc., must be added." He is here attempting to argue that the scientist needs as much education as the literary artist. And surely Cattell does not mean that women have re-

ceived the same educational advantages as men. What does he mean then? His statements can only be interpreted as saying that opportunities of publication or publicity of a similar nature, were equally given to women as to men. But the product must exist before it can be exhibited. And as a matter of fact, after all this, it is just in letters that women have achieved their greatest success - i.e., just in the field in which they have received the greatest opportunity. And if here their success has been much less than that of men, so have their opportunities been correspondingly limited. Considering the repressive influences to which women have been subject their literary achievement seems remarkable. One might make out a fair case to prove that in proportion to their opportunities women have ~~received~~ shown greater literary skill than men.

The whole variability argument is of the nature of question begging. Those who advance this suggestion do so because they assume that environment is of much less importance than heredity; and since they are not prepared to assign a lower intellectual status to women, they are obliged to accept the only escape which offers itself, that escape being the variability hypothesis.

But is there any factual evidence to support this belief in the greater variability of the male? If we do not accept the hereditary assumptions can the variability hypothesis be independently derived from other sources? Is it a legitimate induction from the naturalistic evidence of the case?

It would appear that exactly the contrary is true. Instead of receiving support from a recourse to factual evidence the hereditarians are completely confuted by independent data so secured.

This data and the conclusions resulting therefrom, must for the hereditarians be undeniable; for it is derived from the font of all wisdom---L.M.Terman and his intelligence testers. Evidence derived from such a source comes, as far as the hereditarians are concerned, laden with the sanctity and irrefutability which is ordinarily accorded only to the pronouncements of mathematicians and eminent divines. The method employed to secure these results, results so antagonistic to the hereditarian system, cannot be impugned by the hereditarians themselves without seriously weakening their entire case; for it is the same mode of investigation which has produced so much of the data employed by the hereditarians to establish their doctrines.

But indeed this is not all; for the pride and joy of the hereditarians goes much further in his statements, declaring that want of opportunity, not lack of natural endowment explains the failure of women. That intelligence tests establish the intellectual equality of men and women, that the range of mental variation of men is no greater than that of women and that environment, not heredity, explains the failure of women---this is the gist of his discussion.

He writes: "Accordingly our data, which for the most part agree with the results of others, justify the conclusion that the intelligence of girls at least up to fourteen years, does not differ materially from that of boys either as regards the average level or the range of distribution. It may still be argued that the mental development of boys beyond the age of fourteen years lasts longer and extends farther than in the case of girls, but as a matter of fact, the opinion receives little support from such tests as have been made on men and women college students.

"The fact that so few women have attained eminence may be due to wholly extraneous factors, the most important of which are the following: (1) The occupations in which it is possible to achieve eminence are for the most part only now beginning to open their doors to women. Woman's career has been largely that of home-making, an occupation in which eminence, in the strict sense of the word, is impossible. (2) Even of the small number of women who embark upon a professional career, a majority marry and thereafter devote a fairly large proportion of their energy to bearing and rearing children. (3) Both the training given to girls and the general atmosphere in which they grow up are unfavorable to the inculcation of the professional point of view, and as a result women are not spurred on to try deep-seated motives to constant and strenuous intellectual endeavor as are men. (4) It is also possible that the emotional traits of women are such as to favor the development of the sentiments at the expense of innate intellectual endowment." (*Italics the present writer's.*)

It will be seen the difference of achievement between men and women is attributed by Terman almost entirely to environmental influences. The only qualification which he admits to his environmentalism is that it is "possible that the emotional traits" of women prevent them from utilization of their intellectual powers to their best advantage; in other words, their natural intelligence is equal to that of men but another inborn trait, their temperament, interferes with the operation of their intelligence and reduces its effectiveness. At the best, Terman plainly considers that the detrimental influence of temperament, if it exists at all, can only be of slight weight.

And are women too much inclined to subordinate intelligence to their emotional desires? Have we evidence that there is insufficient

control of the obstructive operation of a more active and irritable emotional system ? Or is this theory simply an artificial patch for the purpose of repairing defects in the original theory, i.e. in the conception that success is due almost entirely to innate capacity and owes little to external advantage ?

Consider such fields of intellectual endeavor as chemistry, physics, mathematics, astronomy. In these studies the emotional element enters in to such a negligible extent that we may say that reasoning power alone is the determining factor in the achievement of success. The very nature of the subject matter of these studies excludes the possibility of emotional bias serving to act as a handicap. Why then, have no women succeeded in this work ? Is it because of lack of opportunity ?

And in other intellectual work such as poetry, novel writing, and religion, the emotional factor should actually be to the advantage of women. Relatively to men is the number of women poets of any quantitative importance whatsoever ? True, many more women have succeeded in poetry than in science, but have not the opportunities been correspondingly greater ? And with the increase of the opportunities has there not been a corresponding increase in the proportion of women poets ? Is not the success of women as novelists of a like nature with their achievements in poetry ? And for the same reason ?

In the matter of religion, the investigations of Havelock Ellis are very much to the point. Examining a dictionary of religions published near the close of the last century, he found an account of some six hundred sects, and only seven of these were founded by women. And these sects have not prospered. As one writer says: "Ask a Mohammedan what he thinks of the proposition that women are more religious than men and, unless he is of the new liberal school, he will retort that they are incapable of the depth of religious feeling which all men experience."

Whatever variation of native ability there may be from one individual to another it seems certain that women, as a group, are equal to men in intellectual power. And yet they have succeeded in adding no more than an insignificant handful to the galaxy of our historical figures. Only one explanation presents itself: they failed because they were denied opportunity. And where they have succeeded it is because here they were given advantages, elsewhere denied. Their success has varied in direct proportion to their opportunities. The relationship of opportunity and achievement is here in accordance with Mill's "law of concomitant variation." Opportunity is the cause, or an indispensable part of the cause, which produces achievement.

RACE , SOCIAL CLASS, AND INTELLIGENCE

In this discussion we shall use intelligence as meaning: innate mental strength as distinct from acquired capacities.

Is there a correlation between race and intelligence ? between social standing and intellectual standing ? The "Nordicists" believe the former, the eugenists the latter. The proponents of Nordic superiority plead with us not to let our race be mongrelized by the intermixture of such racial strains as the southern European and the Negro. The eugenists on their part warn us of the dangers attendant upon the dysgenic tendencies of the race, the tendency for the upper classes to contribute less than their share of the children who will form the next generation, and for the lower classes to contribute a share in excess of their present proportion. Since the upper classes are the intellectual superiors of the lower classes, and the lower, of course, the mental inferior of the upper, it follows as a logical consequence that this "unfavorable" differential fertility will result in a general decline in the intelligence of mankind. But is social position a reliable guide to intellectual powers ? Does it give any sort of an indication at all ?

Perhaps it is best to say, prior to our discussion, that the consensus of opinion appears to be that all attempts at a correlation of race and intelligence or class and intelligence, have failed to be any more than suggestive. That such a relation may exist is not denied, for our present knowledge suffices even less to justify a negative answer to the problem; but at any rate, to judge by majority views, the question is at present unanswerable. The heredity mongers, either the Nordic propagandists or the eugenists, are building upon a foundation much too weak to support the superstructure of social policy, which rests upon it. The racial purists (really the Nordisists in a slightly different role) are in a like case.

The problem is essentially one of determining whether any great "groups" of humanity are observably possessed of less or greater talent than others. Whether these groups are racial or social in nature will be found not really to effect the problem we are raising is psychological and not ethical....peoples, races, may share the same customs and culture and yet differ more or less in intelligence. There has been a strong tendency to treat all racial stocks as inferior to the European partly because the present European has assimilated and outdistanced more primitive races, and partly because today the lower races...fade before his advance. Boas (1901, 1911) and other anthropologists do well, therefore, when they point out social, economic and physical reasons for race predominance." Hunter, who writes this goes on to point out that the relationship of civilized peoples to simpler peoples has usually been for purposes of exploration and profit, the contact not being of such a nature as to give the natives an opportunity to benefit by the relationship. Also he speaks of the civilizations of the Aztecs and the Incas, as indicating the capacity of the Indian to rise to heights of civilization. And yet, despite such statements as these, Hunter concludes by deciding that the White possesses a "significant superiority" of innate intelligence to the Negro, and that the Indian, too, is quite definitely inferior to the white. This opinion is based upon data secured from Intelligence Tests. But what about his own previous remark? What about the civilizations of the ancient Indians ? Apparently Hunter considers Intelligence Tests to be so dependable that their results over-ride all other evidence. He writes: "Very significant beginnings have already been made with particular reference to a comparison of whites and

-The problem

and negroes in this country. This work...indicates a significant superiority of the white over the black in general intelligence, i.e. in learning capacity or ability to adjust to novel situations. Investigations....reveal a significant difference between white and Indians in ability to score on tests of general intelligence. "The use of the phrase "ability to adjust to novel situations" indicates that Hunter considers the tests as a guide to inherited ability. After all this Hunter ends up by telling us that the problem of the comparative intelligence of races is one "in whose solution scientists have only started."

Hunter's admission that comparative psychology of races is just in its infancy is duplicated by the confession of E.L. Thorndike that of the detailed significance of the heredity belonging to each of the races and sub-races of men, little or nothing is known. But, in common with Hunter, despite his modest avowal of ignorance he proceeds to present what he considers to be some very positive knowledge. Though little is known there is apparently a "general direction in which the truth may be considered to lie." Of this direction, and the reasons therefore, he writes: "The first fact to note is that racial differences in original nature are not mere myths. For example, the colored pupils in the high schools of New York City represent probably at least as good a selection intellectually from the offspring of Negroes and Negro-white crosses as do white pupils from the offspring of pure white matings. Any superiority of the white to the colored pupils is almost certainly equalled by the difference between the white race and the Negro race. Yet the white pupils are demonstrably superior in scholarship. The differences in environment do not seem at all adequate to account for the superiority of the whites.....The second fact to note is that the differences in intellect due to race, though real, are in general small.....The third fact of importance is the overlapping....even when the average of one race is, say, ten per cent more gifted than the average of another, there will still be about nine out of ten of the inferior race who will surpass the worst representatives of the superior race, and about four out of ten who will surpass the average man of the superior race. There is, then, hardly a more stupid way of getting individuals of superior original nature than to choose them by race. The variation of original individuality within one race is too wide."

The concluding sentences of this quotation from Thorndike clearly indicate that he is no bigoted Nordic. He writes without prejudice. Yet this by no means elevates his statements beyond criticism. For one thing, the position which he adopts seems to visibly fluctuate within the course of a paragraph. Thus his claim that our knowledge of comparative racial psychology is more characterized by ignorance than any other trait hardly agrees well with the confident assertion that "white pupils are demonstrably superior" to the Negro student. And from the statement that the differences of environment are not adequate to account for the discrepancy in ability, the reader would be led to infer that the white pupils were so markedly better than the Negro that environmental differences (which Thorndike tacitly admits to exist by his use of the expression "the differences of environment," etc) can only partly bridge the gulf; innate racial differences must be called upon to account for the rest. But then he has told us that "differences due to Race are small". Surely he does not deny that the Negro student simply by virtue of the membership in the race to which he belongs is handicapped relatively to the white scholar. And would this not suffice to account for small differences? E.L. Thorndike's argument reduces to a complete dependence on the reliability of intelligence tests as

Of particular value on this subject is the opinion of L.M. Terman, America's pioneer intelligence tester, who is still acknowledged as the leader in the field of mental measurement. In The Measurement of Intelligence, he gives his opinion, one which in the main accords with that of Thorndike, except that he perhaps goes further. After discussing the cases of two boys definitely deficient in intelligence, their I.Q.'s being 77 and 78, he says that these "represent the level of intelligence which is very, very common among Spanish-Indian and Mexican families of the Southwest and also among negroes. Their dullness seems to be racial or at least inherent in the family stock from which they come. The fact that one meets the type with such extraordinary frequency among Indians, Mexicans, and Negroes suggests quite forcibly that the whole question of racial differences in mental traits will have to be taken up anew and by experimental methods. The writer predicts that when this is done, there will be discovered enormously significant differences in general intelligence, differences which cannot be wiped out by any scheme of mental culture. "It will be observed that Terman, though evidently inclined to agree with Thorndike in conferring superiority on the Caucasian race, considers that probably great differences will be discovered. Thorndike seems to think that the differences are small, but that they have already been discovered."

J. W. Gregory says : "Professor Royce regards the Negro as backward from circumstances quite innate in his mental constitution; and despite the exaggerations of the Nordic school, there appear to be reliable grounds for the conclusion that the Negro is less efficient than the European in the qualities that secure success in modern life." The qualities of which Gregory speaks are , primarily, individual ambition and the capacity for cooperation. What the evidence for this opinion is, Gregory neglects to tell us. He does not here suggest that the Negro is in any way the intellectual inferior of the white, and with all due respect to Professor Royce's capacity for philosophic verbiage, it remains true that his authority on the subject under discussion is not particularly great.

Even Irwin Edwin, who does not agree with the Nordacists, admits that there is a "large class of psychologists and anthropologists who are inclined to regard racial differences as intrinsic and original." This is true, particularly of the psychologists, yet the number of scientists who still support the old Scotch verdict of "not proven" is much greater still.

Let us look at some of the evidence and opinion on the other side.

George A. Dorsey unhesitatingly declares that the Nordacist literature is "bunk, pure and simple." The perpetrators of writing of this sort are victims of sheer prejudice, they draw "false and misleading inferences from intelligence tests and from pseudo-biology and ethnology." These remarks to be found in Why we Behave Like Human Beings (p.119) are repeated in substance, with reasons attached, in his essay on "Race and in Whither Mankind". He quotes T. H. Morgan to the effect that on the question of heredity in man we have no evidence comparable in quantity or quality to that which we possess on the subject of heredity in the lower animals and in plants. Some facts suggest that extreme disorders of certain sorts in humans might possibly be reduced by eliminating the hereditary strains in which these are found; but nothing certain is known, and there is no ground for suggesting sterilization of relatives of these defective or disordered humans. And he (T.H.Morgan) goes on with, "Least of all should I feel any assurance in deciding genetic superiority or inferiority as applied to whole races by which is

meant not races in the biological sense but social or political groups bound together by physical conditions, by religious sentiments or by political organizations....if it is unjust to condemn a whole people, how much more hazardous is it, as some sensational writers have not hesitated to do, to pass judgment as to the relative inferiority or superiority of different races.

"If within each social group the genetecist finds it impossible to discover, with any reasonable certainty, the genetic basis of behaviour, the problem must seem extraordinarily difficult within groups in contrast with each other where the differences are obviously connected not only with material advantages and disadvantages resulting from location, climate, soil, and mineral wealth, but with traditions, customs, religions, taboos, conventions and prejudices. A little goodwill might seem more fitting in treating these complicated questions than the attitude adopted by some of the more modern race-propagandists."

Dorsey presents one of the primary objections of most anthropologists to the conception that race and culture are related, and this is that, as far as the three sub-races (Nordic, Alpine, and Mediterranean) of the white race are concerned, there is no such thing as a genuine physical race. Within each sub-race there are a certain limited number of extreme types, who are marked off as representing the racial "Type", and these extremes may be contrasted with and distinguished from, in their physical characteristics, certain extreme representatives of another sub-race. But in each sub-race the number of individuals who can be selected for this contrast is very small. The great bulk of the natives of each sub-race show many of the characteristics of races other than their own and lack many of the "distinctive" physical traits of their own racial group; and on the whole, the people of one race blend with the people of another race, physically, and mentally. There is no such thing as a pure race (or sub-race), so to consider "one race" say the Nordics, superior to another, say the Mediterranean, is to say something which is almost meaningless. Dorsey's case, however, hardly serves to confute the argument of the race propagandists on the question of the claimed superiority of the white to the Negro, except insofar as it shows that at present all conclusions on the subject of racial psychology must be suspect. And when we realize that the Nordacists are guilty of raising "possibilities" to the status of "established facts in the matter of sub-races" then we may well wonder if the proponents of white superiority are not indulging in the same practice.

What H. S. Jennings has to say on the subject of "Immigrants and Environment" is equally applicable to the Negro problem: "It is particularly in connection with racial questions in man that there has been a great throwing about of false biology. Heredity is stressed as all-powerful, environment as almost powerless; a vicious fallacy not supported by the results of investigation. We are warned not to admit to America, certain peoples now differing from ourselves, on the basis of the resounding assertion that biology informs us that the environment can bring out nothing whatever by hereditary characters. Such an assertion is perfectly empty and idle; if true, it is merely by definition: anything that the environment brings out is hereditary, if the word "hereditary" has any meaning. But from this we learn nothing whatever as to what a new environment will bring out. It may bring out characteristics that have never before appeared in that race. What the race will show under the new environment cannot be deduced from general biological principles. Only study of the race itself and its manner of reaction to diverse environments can give us light on this matter." Unite these fundamental biological principles stated by Jennings with the investi-

gations of Klineberg (previous referred to) which demonstrated that southern Negro children increased their I.Q. (the constancy of which had been hitherto regarded as being established) by moving to New York, and we are presented with a combination of no slight importance. Evidently racial reactions are not fixed by heredity, but are plastic, particularly so in infancy, and the child's intelligence owes itself much to environment. It may be true that innate factors set a limit to possible improvement, that this is probably true we have elsewhere admitted, but apparently this limit is much higher and much less susceptible of determination than the intelligence testers, eugenists, Nordicists and white propagandists have supposed.

When the reliability of the present intelligence tests as criteria of in-born intelligence has been established beyond cavil, then we may admit that the white race is the mental superior of the black, that one group or class is "better" endowed than another; but until this has been done, we must, in common justice and common science, regard the entire matter as quite unsettled, as unproven. And we must go further and say that whatever differences there may be, these differences must be of a low order of magnitude or otherwise even our present investigatory powers would have sufficed to disclose them. And if the question be ever settled what guarantee have we, except that supplied by our vanity and conceit, that we will not be found to be the under-dog? As Thorndike expresses it, nothing could be more stupid than to select intelligence on a basis of racial difference. A social policy possessed of any claim for justice must, in the absence of secure evidence, one way or another, consider one race or class as the intellectual equal of any other.

IMMIGRATION

Believers in group equality will probably have different opinions on the subject of immigration than those who consider their own race to be superior to all others. This is specially true of the North American continent where the Nordacists and eugenists abound in profusion. The terrible, terrible danger of a decline in the germ-plasm of America, due to the admission of foreign elements into our country, is unceasingly dinned into our ears by certain types of enthusiasts. But even the believers in equality who refuse to discriminate against the southern European are somewhat abashed at the problem of the Oriental. After having rejected the Nordic doctrine, and after having maintained the immigration selection should be individual, the question confronts us: what then shall we do about the Chinese and Japanese?

This has always been a difficult matter. Opposition to Oriental immigration is, relatively speaking, of some antiquity. On this Miss C.F. Ware writes: "The first federal restrictive measures on immigration in the United States were directed against Chinese coolies; American vessels were forbidden to transport them in 1862 and they were excluded from entry in 1882. In singling out the Chinese for exclusion the United States joined a movement which was becoming general among Europeanized countries, on the grounds that diversities in race and culture and the extremely low standard of living of the vast masses of potential Chinese immigrants was a menace. Canada followed the American exclusion act with a restrictive measure in 1885 in the form of a special head tax." In brief, the governments of the United States and Canada adopted about the same opinion on the subject as was taken by laymen interviewed during the Congressional Investigation of 1876, the laymen of whom R. Mayo-Smith scathingly said: "Most of the witnesses had no economic notions at all, or, if they had any, they were of the most rudimentary and popular kind. To many of them, the very presence of a Chinaman in any productive employment seemed conclusive evidence that he displaced a white man; that he would work for low wages made him a direct competitor with the Caucasian; and that he sent his savings back to China constituted a dead loss to the state. They forgot that in a new state, there might be room for both Mongolian and White; that the presence of one body of laborers often creates a demand for other kinds of labor; and that the wealth produced by the Chinaman remained in the state whatever he might do with his surplus wages."

The one "serious charge" which received definite substantiation was that the Chinese did not become nationalized, they remained quite unassimilated. Apparently association with American whites had affected their cultural attitudes not at all. And even this censorious criticism, which Mayo-Smith for all his liberality of attitude considers a legitimate objection, is not so looked upon by others. Of this, Alexander Goldenweiser says: "Current Americanization theory is based upon a belief in the desirability of cultural uniformity. These beliefs are not warranted by history. Cultural diversity, the coming together of different outlooks and traditions, have always fostered greater objectivity, a liberal attitude toward men and things, a toleration of standards and habits other than our own, a greater cultural vitality and creativeness."

One other objective to the Orientals is no more difficult of refutation than the non-assimilation charge. That is the criticism that the Chinese or Japanese takes home the money which he has made in America

and spends it in China or Japan. This he has a perfect right to do. He has produced goods or given services in return for his wages, and, in the words of Smith, the wealth he produces remains in the state. He has given value for wages received, and so is indebted to nobody or under obligation to no one as far as the disposal of his money is concerned.

The argument from "The standard of living" is much more valid. Where there is any large body of native work, men doing quite unskilled labor, then the interests of these men is definitely menaced by the influx of foreigners possessed of low standards of living for these foreigners are prepared to sell their labor at a much lower price than the native workman. The native worker must then either accept lower wages or lose his job; for unless he offers to do the same work at the same price as the foreigner, he will be undersold by the foreigner who will get the job which the native was attempting to secure or to hold. It is for this reason that labor organizations have frowned upon all immigration, and especially upon immigrants from countries possessed of low standards of living. For the same reason, the capitalist has welcomed immigration. To him, it means cheap labor, lower production costs. And, of course, of all immigrants, the Chinese are the greatest offenders in respect of low living standards.

To any one of labor sympathies the "standard of living" objection to Oriental immigration must possess real weight. Yet under some circumstances it is by no means valid. And that under other circumstances it is valid constitutes a condemnation of American treatment of its own people; for if the native labourers of this continent are so ill-educated as to be able to do no more skilled work than recent immigrants from China, then indeed they have been denied a training which, considering our standard of living, every human being has a right to receive. Also, at a time of rapid expansion, of construction of transportation systems, of the building of great, new equipment--at such a period as this, cheap labor is necessary for the growth of the country, and our native white labor force should be at least possessed of sufficient skill as to enable them to do work of the more complex sort, leaving the rougher and more menial employment to the new-comers. When circumstances are of this sort, it is to the benefit of all to have as cheap labor as can be obtained. It must be admitted, however, that the period when we might expect such conditions has either passed or lies in the distant future.

There is one objection to Oriental immigration which outweighs all others in the minds of some and that is the matter of mixture, of miscegenation, of producing a nation of half-castes, by the marriage of white and oriental, by legitimate and illegitimate births of children of mixed Mongolian and Caucasian parentage. Our opposition to this, however, is, as far as the average person is concerned, one of sheer prejudice. If a white-yellow hybrid suffers from no defects, physical or mental, then we are without ground for denying the right of an Oriental to marry a Caucasian. What, then, is the effect of racial intermixture? Here again we are in the presence of a problem which despite disclaimers to the contrary on the part of the eugenically inclined, is still unsolved. In his Race as a Political Factor J. W. Gregory seeks to prove that mixture is fraught with undesirable consequences. Thus he quotes Major Lenoard Darwin, President of the Eugenics Society, to the effect that "interbreeding between widely divergent races may result in the production of types inferior to both parent stocks: and that this would be the result of miscegenation."

ation is, at all events, a common belief." Unfortunately for Darwin's case, argument from "common belief" has no value whatsoever, in the court of science; it is a mere appeal to common prejudice, the error of Argumentum ad hominem the logicians call it. Gregory then quotes James Bryce as writing that "hybrid stocks, if not inferior in physical strength to either of those whence they spring, are apparently less persistent, and might---so at least some observers hold---die out if they did not marry back into one or other of the parent races." It may be undesirable for a scientist to be dogmatic, but when he carries his modesty to the extent done by Bryce, where a single statement is qualified and weakened in half a dozen ways, the final result borders on to being worthless. Just what value can an assertion possess if its proponent qualifies its force with an "apparently," follows this up with "so at least some observers hold," then concludes with a "might," after which we finally reach the declaration itself? Argument of the "I might even venture to suggest" type shows so much uncertainty and self-weakness that its utterance is hardly worth the effort.

Gregory also seems very reluctant to commit himself. He seems to wish to inculcate his ideas in the mind of the reader and yet at the same time to avoid stating his opinions with sufficient definiteness to give hostile anthropologists anything to criticize. The best he can finally do is to give a statement from C. B. Davenport which expresses his own verdict: "To sum up, then, miscegeneration commonly spells disharmony---disharmony of physical, mental and temperamental qualities; and this also means disharmony with the environment. A hybridized people are a badly put together people, and a dissatisfied, restless, ineffective people. One wonders how much of the exceptionally high death-rate in middle life in this country is due to such bodily maladjustment and how much of our crime and insanity is due to mental and temperamental friction." And the reader is left to "wonder" just how valuable a statement can be which commences with "one wonders."

And Gregory and Davenport are by no means alone; Henry Pratt Fairchild, writing on "Racial Composition of the Population", apparently agrees with them. He says: "With reference to the relative value of pure and mixed races, we lack conclusive evidence. On this point, however, it appears that certain assumptions are justified. These assumptions are taken from biological analogies and are supported by the fact that race is a biological matter. In other words, we feel certain that the basic principles of heredity which run through the entire realm of lower organisms must also hold for man. The facts that cross-breeding among plants and animals are well established. The most important of these, for the purpose in hand, is that the indiscriminate inter-breeding of the varieties of a species produces a mongrel type. This is true even though each separate variety may be a highly developed type. So it seems wholly probable that the indiscriminate mixing of the races of men in a human population, even though the particular races are the finest on earth, is essentially a process of mongrelization. The result will be a generalized primitive type. There is much to be said for the mongrel, as every one knows, who has ever loved a yellow dog. He is tough, he can stand a lot of punishment, and he is not particular about his standard of living as the high-bred pup. But no one would maintain that the yellow dog represents the highest product of canine evolution."

Let us see just what the merit of this argument may be. He first demonstrates that a mixture of races produces a mixed type. Stated in this way, it is seen to be a truism; but Fairchild eschews the adjective

"mixed" and prefers "mongrel"---for this term is one for which there is an emotion of distaste. Having thus appealed to our prejudices, he carries it still further by speaking of a "mongrel" as a yellow dog. And do we want the future population of the word to be a collection of "yellow Dogs" ? Of course not ! Ergo, racial intermixture must be prevented. And what is the worth of such an argument ? Is the mongrel inferior to other dogs ? What do we mean by inferior ? Most mongrels are hardy, physically vigorous and more resistant to disease than thoroughbreds, and they are more intelligent. But, of course, they do not "look" as well ! As well as what ? a dachshund ? a bulldog ? Who wants to look like a bulldog ? But we will all look like bulldogs unless racial intermixture takes place ! Even a greyhound looks like a freak. If we were not told that it was a pure-bred animal and cost a lot of money, we would not think much of its appearance. Depend upon it that if the physical type of the future is mixed, then to such a type, pictures of us will be a source of amusement and laughter. And the eugenists and "mixturists" (instead of our racial purists) will tell of the horrors of inbreeding, of specialization---the bowlegs, the freaks, the mentally eccentric, which will result from failure to mix properly.

We are also told (above) that "The result will be a generalized, primitive type". This too, sounds bad. That adjective "primitive", strikes hard upon our ear. But one of the greatest of our physical anthropologists, G. Elliot Smith, regards the "primitive type" in an entirely different manner than Fairchild. Smith writes: "In many respects, man retains more of the primitive characteristics, for example, in his hands, than his nearest simian relatives; and in the supreme race of mankind many traits, such as abundance of hair, persist to suggest pith-eccoid affinities, which have been lost by the more specialized negro and other races. Those anthropologists who use the retention of primitive features in the Nordic European as an argument to exalt the negro to equality, with him, are neglecting the clear teaching of comparative anatomy, that the persistence of primitive traits is often a sign of strength rather than of weakness. This factor runs through the history of the whole animal kingdom. Man is the ultimate product of that line of ancestry which was never compelled to turn aside and adopt protective specialization either of structure or mode of life, which would be fatal to its plasticity and power of further development." So Elliot Smith appeals to "the history of the whole animal kingdom" to prove that the "generalized, primitive type" is the most highly desirable, and he tells us that specialization can never be reversed; whereas Fairchild appeals to the "basic principles of heredity which run through the entire realm of lower organisms" to prove that the generalized, primitive type is highly undesirable, and he warns us that "the process of race mixture can never be reversed." It is certainly all very confusing. And incidentally, just to help things along, it might also be pointed out that not only does the "supreme race of mankind" possess an "abundance of hair" as Smith says, but also the Australian aborigines are the favored (?) possessors of this same trait.

However one looks at it, it remains a fact that racial mixture is going on today and at an every increasing rate. Permitting the entrance of orientals into North America would accelerate this process; but there is no known method of retarding it. At national boundaries and in great sea-port cities, there is an every growing half-caste population. Only by a complete prevention of racial contact--an obvious impossibility--can this intermixture be prevented. Edwin Grant Conklin considers it to be an established fact of science that in a century or two there will

be only one race. The process is increasing exponentially. Conklin writes: "In human species the only absolute barrier to the intermingling of races is geographical isolation. Every human race if fertile with every other one, and though races and nations and social groups may raise artificial barriers against inter-breeding, we know that these artificial restraints are frequently disregarded and that in the long run amalgamation does take place; and in general the further amalgamation progresses the faster it goes. In Australia and New Zealand, after little more than a century's contact with white races, there are about as many 'half-castes' as there are full-blooded aborigines. In the United States, one quarter of all persons of African descent contain more or less white blood; there are about eight million full blooded negroes and two million mulattoes, and during the past twenty years, the latter have increased at twice the rate of the former. In Jamaica, where there are about seven hundred thousand blacks and fifteen thousand whites, there are about fifty thousand mulattoes. A similar condition prevails wherever different races occupy the same country. Even the Jews, who were long supposed to be peculiarly separate and distinct people, have received large admixtures of Gentile blood in every country in which they have lived.

"Whether we want it or not, hybridization of human races is going on and will increase. Partition walls between classes and races are being broken down; complete isolation is no longer possible, and a gradual intermixture of human races is inevitable. We are in the grip of a great world movement and we cannot reverse the current, but we may to a certain extent direct the current into the more desired channels.....

"It is race mixture which makes the problem of immigration so serious. Generally immigration is regarded as merely an economic and political problem, but these aspects of it are temporary and insignificant as compared with its biological consequences. In welcoming the immigrant to our shores, we not only share our country with him but we take him into our families and give him to our children or our children's children in marriage. Whatever the present antipathies may be to such racial mixtures we may rest assured that in a few hundred years, these persons of foreign race and blood, will be incorporated in our race and we in theirs."

Is not our objection to racial amalgamation a mere prejudice. For those who believe in "higher and "lower" races, there is some justification for objecting to the contamination of the superior by the inferior, the dilution of the richer blood by the poorer. But that only sets back the prejudice a step, for as we have seen there is no scientific justification for exalting one race hereditarily above another. Arguments which depend for their support on racial grading --(in which grading the race of the one writing always stands at the top of the scale)--are resting the weight of their case on a split reed.

Labor must be protected from the competition of those whose standard of living is low. On this point the interests of labor must not be sacrificed to those of capital. But there is the other side of the case. This argument is equally applicable to members of the white race whose living standard is equally as low as that of the oriental, The Chinese or Japanese must not be discriminated against. And frequently the admission of "low-paid" labor is to the advantage of everybody concerned. Under these circumstances, the oriental has the same

right as the member of any other race or nation.

The broad view on this matter is well expressed by Alexander Goldenweiser: "Any policy which discriminates against one group in favor of another is prejudiced and unjustifiable....The suggestion that travel or the residence of individuals within national boundaries should be restricted by legislative process, would evoke general protest; sharp tongues would refer scathingly to times of slavery. But no sooner is the problem shifted to relations between nations than an equally unjustifiable restriction upon the freedom of movement and residence of individuals is advocated. If immigration is to be controlled, it should be by means of inter-national agreements which take into account the interest of all nations involved. Such control should not take the form of legislative enactments. As far as the law is concerned, free immigration should become the watchword."

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In this thesis there has been attempted an analysis of scientific opinion and arguments on the subject of the innate equality and disequality of men. The views of various authorities, and the reasons they adduce in support of those views, have been presented and contrasted. Conclusion has been drawn that we have, as yet, insufficient evidence upon which to base a definite decision. The existence of variation of constitutional capacity appears to be very probable, but whether this is more or less influential than environmental forces is incapable of the determination. The latter forces are considered as being factors of much greater importance than is attributed to them by the extreme hereditarians. Furthermore, and most important for the subject of sociology, it is indicated that this uncertainty with regard to individual difference is multiplied many fold when group differences are considered. Indeed in the latter case there is absolutely no secure evidence, one way or another, and our social policies must be framed in recognition of the fact that variation of group ability is a quite unproven hypothesis.

A STUDY OF EQUALITY, INDIVIDUAL
AND SOCIAL.

A Thesis submitted to the Department of Sociology
of McMaster University in partial fulfillment of
the requirements for the degree M. A.

By Walter Harwood.