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The Economic Journal, Vol. 17, No. 67, September 1907

SOCIAL IMPROVEMENT IN THE LIGHT OF
MODERN BIOLOGY.

DURING the last six or seven years great progress has been made in the study of heredity among plants and animals. In 1900 the principles enunciated by Gregor Mendel nearly forty years earlier were rediscovered, and since that time, through the labours of Mr. Bateson and other biologists, they have been successfully applied to the solution of many hitherto intractable problems. Two books of a popular character describing the progress made have recently been published by enthusiastic workers in this field, Mr. Punnett¹ and Mr. R. H. Lock.² The general drift of modern doctrine has in this way been rendered easily accessible to laymen and, among others, to those who study, with a view, if possible, to improving the conditions of social life. The question I propose to raise in this article is, What light does biological science in its present stage of development throw upon their special problem?

That question the biologist himself has not only already asked, but is already tentatively endeavouring to answer. At the close both of Mr. Punnett's and of Mr. Lock's books it is suggested, in no uncertain terms, that the whole point of view from which social reform is at present regarded is mistaken. Hygiene and education, the panacea of the popular politician, are, suggests Mr. Punnett, "fleeting palliatives at best, which, in postponing, but augment the difficulties they profess to solve. . . . Permanent progress is a question of breeding rather than of pedagogics; a matter of gametes, not of training."³ Mr. Lock is even more emphatic; and the views of these writers on the practical, though not, of course, on the theoretical, side are substantially in agreement with those of Professor Karl Pearson.

Now, opinions of this order expressed by scientific workers

¹ *Mendelism*, by R. C. Punnett.

² *Recent progress in the study of Variation, Heredity and Evolution*, by R. H. Lock.

³ *Mendelism*, p. 81.

are necessarily of great interest, and demand careful attention. It is well, however, to beware of too great deference to authority. There is a region in which the biologist is master; but there is another in which he is merely fellow-student. When he seeks to apply biological knowledge to social questions, it is in the latter, and not in the former, capacity that he is speaking. For, while in respect of these questions biology furnishes some essential data, there are other data, no less essential, which it does not furnish. It is not, therefore, to the biologist as such, but rather to the student of society, that the duty falls of gathering these data together, of relating them to one another, and of evolving from the whole some light and guidance for statesmanship. It is for that reason, and not with any design of intruding amateur opinions upon the domain of biology proper, that I am venturing to submit the considerations that follow.

At the outset one important line of demarcation may be laid down. The search for ways of social amelioration is a mixed problem of ends and means. It involves the questions: *both* what kind of society is good, either absolutely or relatively, to some other kind, *and* by what means is the desired kind of society most likely to be brought about. The former of these questions is wholly ethical. It turns exclusively upon the determination of values. No positive science, whether it be economics, chemistry, physics, biology, or any other, touches it in the smallest degree. Positive science tells us what effects given causes tend to produce; it does not tell us what effects are good. Before the social reformer calls biology to his aid he must have decided on quite other grounds at what end he desires to aim. The help biology affords him is of necessity confined to the question of means.

Suppose, then, that the social reformer has decided what kind of society he wishes to produce. His reference to biology will concern three points: first, can the qualities of subsequent generations be improved by changes in the environment of the present generation, unaccompanied by any other change; secondly, can they be improved by changes in respect of parentage, unaccompanied by any other change; thirdly, in actual practice, when these two classes of change cannot be really separated, what course ought a statesman to pursue?

I.

The answer to the first of these questions turns in part upon the old problem of the inheritance of acquired characteristics.

The dominant view at the present time appears to be that the germ-cells that will ultimately form the offspring of a living being are distinct at the outset from those that will form the body of that being. "It is a reversal of the true point of view to regard inheritance as taking place from the body of the parent to that of the child. The child inherits from the parent *germ-cell*, not from the parent body, and the germ-cell owes its characteristics, not to the body which bears it, but to its descent from a pre-existing germ-cell of the same kind. Thus the body is, as it were, an off-shoot from the germ-cell. As far as inheritance is concerned, the body is merely the carrier of the germ-cells which are held in trust for coming generations."¹ If this view be sound, it would appear that those definite characteristics of an organism whose appearance is determined by the presence of definite structures or substances in the germ-cells cannot be directly affected by ancestral environment. It is only characteristics of an indefinite quantitative kind, such as may be supposed to arise from the intercommunication of the germ-cells with the other cells of the body and the reception of fluid or easily soluble substances from them, that can be affected in this way. It is the dominant view among biologists that this latter class of characteristics is, relatively to the other, of small importance.² Whether or not the *variability*, *i.e.*, tendency to spontaneous variation, in the germ-cells themselves, is affected by environment is a question in regard to which little is at present known.

The general bearing of the theory I have been describing upon our problem is sufficiently plain. It shows that the *original properties* of a child are not likely to be affected to any important extent by the circumstances in which the parents' lives have been passed. "Education is to man what manure is to the pea. The educated are in themselves the better for it, but their experience will alter not one jot the irrevocable nature of their offspring."³ And "Neglect, poverty, and parental ignorance, serious as their results are, (do not) possess any marked hereditary effect."⁴

So much is biological fact; and, up to this point, the sociologist is silent. When, however, Mr. Punnett and others proceed

¹ Wilson, *The Cell in Development and Inheritance*, p. 13; quoted by R. H. Lock (p. 68).

² Lock, *Variation and Heredity*, pp. 69 and 70.

³ *Mendelism*, p. 81.

⁴ Eichholz. Evidence to the Committee on Physical Deterioration, Report, p. 14. Cf. *ib.* p. 46. Dr. Eichholz's view appears to be formed *a posteriori*; and not to be an inference from general biological principles.

to the inference that permanent progress is a matter of gametes and breeding, and cannot be brought about in any other way,¹ they have entered the field of general philosophy, and the task of criticism begins. The central point is this. *The entity which biology declares to be unaffected by ancestral environment is a different entity from that to which the conception of progress applies.* The original properties of the next generation are determined by the nature of the germ-cells that produce them, but the goodness to which the social reformer looks is goodness of concrete men and women and not of original properties. In the formation of these concrete persons original properties do, indeed, play a part, but not a predominant part. Other elements are also of great importance, and among them ancestral environment is included.

It is included in two ways. First, it acts directly. The environment of the mother during pregnancy is environment also for her unborn child. There are acquired diseases of the mother by which, apart altogether from original properties, the embryo in the womb can be infected. There are strains to which the mother can be subjected, in factory work and so on, through which its character can be greatly modified. In short, as medical men are every day declaring, the circumstances of the mother, during the pre-natal life of the child, may exercise an enormous influence upon his future well-being.

But ancestral environment also acts indirectly. It is obvious that the current environment actually enjoyed by a living being co-operates with his original properties to form the sum of his qualities. Ancestral environment plays a part because it reacts upon current environment. Though education cannot influence new births in the physical world, it can influence them in the world of ideas²; and ideas, once produced or once accepted by

¹ Cf. *Mendelism*, p. 70.

² An interesting comparison can be made between the process of evolution in these two worlds. In both we find three elements, the *occurrence of, propagation of and conflict between mutations.*

In both worlds the *kind* of mutations that occur appear to be fortuitous, and cannot be controlled, though in both it is sometimes suggested that the tendency to mutate is encouraged by large changes, and particular kinds, of environment. In both with every increase of *variability* the chance that a "good" mutation will occur is increased. Hence, *ceteris paribus*, environment that makes for variability is a means to good. Thus, of local government, Professor Marshall writes: "All power of variation that is consistent with order and economy of administration is an almost unmixed good. The prospects of progress are increased by the multiplicity of parallel experiments and the intercommunion of ideas between many people, each of whom has some opportunity of testing practically the value of his own suggestions." (*Mem. to Commission on Local Taxation*, p. 123. Cf.

a particular generation, whether or not they can be materialised into mechanical inventions, may remodel from its very base the environment which succeeding generations enjoy. Nor are these reactions confined to ideas. "Any change that affords to the workers of one generation better earnings, together with better opportunities of developing their best qualities, will increase the material and moral advantages which they have the power to offer to their children; while, by increasing their own intelligence, wisdom, and forethought, such a change will also to some extent increase their willingness to sacrifice their own pleasures for the well-being of their children."¹ Those children, in turn, being themselves rendered stronger and more intelligent, will be able, when they grow up, to offer a better environment to their children, and so on. The effect goes on piling itself up. Changes in ancestral environment start forces which modify continuously and cumulatively the conditions of succeeding environments, and through them the human qualities for which current environment is in part responsible. Hence, Mr. Punnett's assertion is unduly sweeping. Progress—not merely permanent, but growing—*can* be brought about by methods of social reform with which breeding and gametes have nothing whatever to do.

II.

The second question that I distinguished was: Can the qualities of subsequent generations be improved by changes in respect of parentage unaccompanied by any other change? There is no doubt about the fact that characteristics of parents which have not been acquired—natural endowments, so to speak—do tend to be inherited. That this is the case is a fundamental principle of the Mendelian school, and it is confirmed by the statistical investigations of Professor Karl Pearson and his

also Booth, *Industry*, V., p. 86, and Hobhouse, *Democracy and Reaction* pp. 121—3).

The *propagation* of mutations, on the other hand, does not proceed in the same way among ideas as among organisms. Among the latter the fertility of mutated members is not, but among the former it is, affected by their adaptation or otherwise to successful struggle. Animals that are failures and those that are successes are equally likely to have offspring. But among ideas, those that fail are likely to be barren, and those that succeed to be prolific.

Still more marked is the difference between the character of the *struggle* that takes place between mutated members in the two groups. In the physical world the process is negative; the failures are cut off. In the world of ideas it is positive; successful ideas are adopted and imitated. It is for this reason that a successful experiment diffuses itself so much more rapidly than a successful "sport."

¹ Marshall, *Principles of Economics*, 645.

followers.¹ Our question, therefore, resolves itself into one of practice: is our knowledge sufficient to enable this fact to be successfully utilised for purposes of social improvement? Man is the most complex of animals, and the study of inheritance in man, particularly on the mental side, has not been carried far. It is difficult in the concrete to distinguish characteristics which have been from those which have not been acquired. The task of determining what are "unit characters" in regard to human qualities has scarcely been touched; and on the problem how far different unit characters are or may be correlated practically nothing has been done. We are thus surrounded by so much ignorance that the utmost caution is essential. Mr. Doncaster has well observed: "In this direction empirical rules and common sense must still be followed, until the time shall come when science can speak with no uncertain voice."² More recently Dr. Galton has lent the weight of his authority to this opinion: "Enough is already known to those who have studied the question to leave no doubt in their minds about the general results, but not enough is quantitatively known to justify legislation or other action except in extreme cases."³

This does not mean, however, that no use at all should be made of the knowledge that we already possess. There *are* extreme cases. Not a few medical men are urging that propagation among the obviously unfit, those afflicted with definite hereditary taints, the imbeciles, the idiotic, the sufferers from syphilis and tuberculosis, should be authoritatively restrained. No doubt our procedure in the matter should be rigorously guarded. But occasions frequently arise when such tainted persons, whether on account of crime or of dementia, are compulsorily passed into governmental institutions. It appears that sterilisation can be affected in either sex by a simple operation that carries few incidental ill-effects.⁴ Has not the time come when, with due safeguards and under proper restrictions, this method of social improvement could be recognised and employed?

¹ An interesting enquiry into the inheritance of ability as indicated by the Oxford class lists and the School lists of Harrow and Charterhouse has recently been published by Professor Schuster (Dulah and Company, 1907). It should be observed that the value of his results is in some measure—it is not possible to say in *what* measure—impaired by the fact that the possession of able parents is apt to be correlated with the reception of a good formal and, still more, informal education. Professor Schuster argues (p. 23) that the error due to this circumstance is not likely to be large. (Cf. also Karl Pearson, *Biometrika*, Vol. III. p. 156.)

² *Independent Review*, May, 1906, p. 183.

³ *Probability the Basis of Eugenics*, p. 29.

⁴ Cf. R. R. Rentoul, M.D., *Race Culture or Race Suicide*, Chapter XX.

III.

In the last paragraph I have trespassed somewhat upon the ground covered by my third question, the general question, namely, of right governmental action. There is, however, much more to be said under that head. First, it will be well to set out the dominant factor in the present situation. This has often been expressed in general terms. It is illustrated in detail by Mr. Heron's recent statistical enquiry with regard to the Metropolis. Selecting various districts, he found the correlation between the number of births per 100 wives and various indices of social status. The indices chosen were the proportion of occupied males engaged in professional occupations, the number of female domestic servants per 100 families, the number of general labourers per 1,000 males, the proportion of the population living more than two in a room, and the number of paupers and of lunatics per 1,000 of the population. In every case a low index of prosperity and a high birth-rate were found to go together. Against this result there had to be set the fact that a low index of prosperity was also accompanied by a high rate of infant mortality. Investigation, however, showed that the excess of mortality was not sufficient to balance the excess of births; and the conclusion emerged that "The wives in the districts of least prosperity and culture have the largest families, and the morally and socially lowest classes in the community are those which are reproducing themselves with the greatest rapidity." Furthermore, a comparison between the conditions of 1851 and 1901 brought out the startling fact "that the intensity of this relationship has almost doubled in the fifty years."¹

It is important to see to what precisely these facts amount. The sum and substance of them is that the so-called lower classes are reproducing their kind as compared with the higher classes to an extent much more than proportionate to their numbers. This is true of male and female parents equally, for, of course, each

¹ *The Relation of Fertility in Man to Social Status*, pp. 15 and 19. In the case of the United Kingdom it is necessary to add to these tendencies the selective influence of migration. Our immigration laws being less severe than those of most countries, the less fit of the world's emigrants are tempted to come to England, while only the more fit among Englishmen find it easy to migrate elsewhere. (Cf. Rentoul, *Race Culture or Race Suicide*, p. 102.) From a patriotic point of view this is, of course, regrettable; and, from a more general point of view, it might be argued—by a patriot—that the good of the world is diminished when the best people go to countries which have not the best governmental institutions.

class tends to marry within itself. It has still, however, to be decided to what extent evil consequences are involved. On one point, indeed, there can be no doubt. So far as children born among the lower classes are moulded into finished persons by a relatively bad environment, it is bad for the community that the proportions so born should grow. This injury, however, is mitigated, and might conceivably be removed, by State action designed to better the dwellings, food, education, and training enjoyed by poor children. We are thus driven to a second point. Does a relatively high rate of reproduction among the lower classes necessarily imply such a rate among bad original properties? If it does so the evil is evident, for, as we have seen, the quality of finished persons partly depends upon their original properties. But is there reason to believe that bad original properties and poverty are closely correlated? Extreme poverty is, no doubt, often the result of feckless character, physical infirmity, and other bad qualities of finished persons. But these themselves are correlated with bad environment in childhood. Is there any proof that that correlation is inadequate to account for the facts? Is it certain that the original properties of the poor as a whole are worse than those of the rich?

That this difficult question ought to be answered in the affirmative is frequently assumed without an attempt at argument. That such a course is unwarranted I am fully persuaded. Nevertheless, a tentative affirmative answer seems to me correct. For, if we consider the matter, it is apparent that among the relatively rich are many persons who have risen from a poor environment, which their fellows, who have remained poor, shared with them in childhood. Among the original properties of these relatively rich presumably there are qualities which account for their rise. A relatively high reproductive rate *among those who have remained poor* implies, in a measure, the breeding out of these qualities. It implies, in fact, a form of selection that discriminates against the original properties that promote economic success. How far the qualities based on these original properties are *good in themselves* seems to me doubtful. But they are certainly a means to good. By adding to wealth they make for happiness, and happiness is an important element in well-being.

Confronted with these facts, the statesman may seek a remedy by attacking directly either environment or parentage. In the two former sections of this paper it was shown that, *if no other change occurred*, an interference with environment might produce good

results, whereas an interference with parentage, except in extreme cases, could scarcely, with our present knowledge, be expected to do so. The practical importance of these conclusions is, however, much diminished by the fact that the hypothesis of no other change occurring is unreal. An attack on environment is likely indirectly to cause a change in parentage, and an attack on parentage to cause a change in environment. It is not safe, therefore, to determine upon any policy without enquiring whether its indirect effects are opposed to, and, if so, are likely to outweigh, its direct effects.

In respect of direct interference with parentage, considerations of this order go far to strengthen the case against that policy except in extreme cases and in a negative manner. Even if it were certain that, say, the overt artificial selection of husbands and wives could be conducted in such a way as to improve the original properties of future generations, the burden of proof upon its advocates would still be heavy. Could they successfully meet the objection that such an arrangement, by its action on the environment of moral ideas, family life, and so on, would injure the total content of consciousness by more than the accompanying improvement of gametes would benefit it?

The problem of direct interference with environment demands fuller investigation. Recent discussion of it has fallen into two parts. On the one hand, the present trend of our social policy is condemned upon the ground that it counteracts natural selection where the operation of that force is beneficial. On the other hand, a new social policy is advocated, designed to affect parentage beneficially *through environment*.

The negative aspect of the discussion has been forcibly set out by Mr. Punnett and Mr. Lock. The attempts to promote social reform that are at present most in vogue are, these writers suggest, not merely useless but injurious. The reason for this is that, while directly bettering that part of conscious life which turns upon environment, they indirectly worsen that more fundamental part that turns on original properties. Our present practice, according to Mr. Punnett, aims, broadly speaking, at raising the standard of the less fit and attempting to bring them closer by such means to those who are richer in natural endowment.¹ This practice, adds Mr. Lock, "is in almost every case the worst possible. . . . A steady breeding out of intelligence is taking place. Recognising that intelligence is

¹ *Mendelism*, p. 80.

an important factor in national greatness, we proceed to remedy this defect by endeavouring to reduce the infant mortality among the less desirable classes, and by offering every inducement to the production of large families by the said lower strata of society.”¹

In this indictment there is, no doubt, a considerable element of truth. Improved hygiene and free medical treatment certainly make it easier for the children of the poor to survive and to become parents. It is possible, too, that such things as free education and other gratuitous aid to children remove in some degree the economic check to marriage among poor persons. But there is not in this sufficient ground for an out-and-out condemnation of existing policy. Will anyone venture to estimate quantitatively the extent to which the general level of original properties is lowered by the influences to which I have referred? Mr. Lock's reasoning implies that, if *any* lowering takes place, the bad effect produced thereby *must* in the end outweigh any good effects upon finished people for which an improved environment may be directly responsible. I cannot accept that view. The direct and indirect effects must be balanced against one another in each particular case, and the question which of them is *in general* likely to be greater is one which, with our present knowledge, it appears to me impossible to determine.

Furthermore, the present system, on its economic, as distinguished from its medical and surgical side, can easily be worked in such a way as to remove the stimulus to child-bearing which, in some forms, it might afford to the poorer classes. When State provision is made for ill-nourished or ill-clothed children, that provision may be coupled with such treatment of the parents as will ensure that they are not placed in a better position than they would have occupied if they had had the same number of children and had been left to provide for them unaided. A policy of this kind can be carried out by the exaction from these parents of a sum equivalent, not to the cost of what the State does in fact do for their children, but to what they might have been reasonably expected themselves to do for them. Under this plan—and it can be applied in all manner of detailed ways—the community is enabled to improve the environment, and hence the quality, of its children without in any way lessening the economic check upon reproduction among the poor.

Leaving this negative criticism of current practice, I pass in conclusion to two important constructive proposals that have

¹ *Variation, Heredity and Evolution*, pp. 287—8.

recently been brought forward. The purpose of both of these is to affect parentage beneficially by "altering the economic incidence of child-bearing." The more practicable, if less ambitious, of the two was set out by Mr. W. McDougall in a paper entitled "A Practicable Eugenic Suggestion," read before the Sociological Society.¹ The proposal is that, among classes of persons whose "civic worth" has been approved by some definite objective test, such as success in the Civil Service examination, salaries should be so arranged as to increase at marriage and at the birth of each child. It is suggested that the more important Government servants and University professors, amongst others, should be remunerated upon this plan, and it is pointed out that the scale might be so constructed that the aggregate cost involved would not be raised above its present level. The scheme is, of course, drawn on a small scale, and might not effect any great result. So far as it goes, however, it has, in my opinion, much to recommend it.

A more sweeping change has been advocated by Mr. Sidney Webb. He observes that, for the great majority of the community, the cost of bearing and rearing children is a very serious matter indeed. It, therefore, carries with it a strong prudential check upon parentage, a check, moreover—and this is the point—which is *differential* in its operation. It diminishes the families of the prudent and far-seeing; but it scarcely affects the idle and the thriftless, the drunken and the profligate. "The grave fact that we have to face is that, under our existing social arrangements, it is exactly these people, and practically these only, who at present make full use of their reproductive powers."² Hence, it is argued, if the cost of parentage were diminished all round, the better members of the working classes would be stimulated to have more children, while the worse members would be left much as they are at present. "In order to put a stop to the adverse selection that is at present going on, we must encourage the thrifty, foreseeing, prudent, and self-controlled parents to remove the check which, often unwillingly enough, they at present put on their natural instincts and love of children. We must make it easier for them to undertake family responsibilities. For instance, the arguments against the unlimited provision of medical attendance on the child-bearing mother and her children disappear. We may presently find the Leader of the Opposition, if not the Prime Minister, advocating the municipal supply of milk to all infants, and a free meal on demand (as already provided by a far-seeing

¹ *Sociological Papers*, vol. iii., p. 53 *et seq.*

² *Decline in the Birth-rate*, p. 19.

philanthropist at Paris) to mothers actually nursing their babies. We shall, indeed, have to face the problem of the systematic 'endowment of motherhood,' and place this most indispensable of all professions upon an honourable economic basis. The feeding of all the children at school appears in a new light."¹

I am not prepared to discuss this large proposal in detail. The following points may, however, be noted. First, Mr. Webb's plan, while increasing the proportion of children borne by prudent members of the working classes relatively to imprudent, would also increase this proportion relatively to the children of the professional and upper classes. So far as social status may be taken as a rough test of good or useful original properties, this result would prove injurious. Secondly, the scheme would encourage hard and mercenary marriages. This would prove injurious in two ways. It would mean (a) that an increased proportion of children were born to parents of a hard and mercenary character; (b) that an increased proportion of children were brought up in a hard and mercenary environment. Thirdly, the wastrels of the working classes are, after all, a small proportion of the whole. When it is desired to alter the proportion of births as between a large and a small group, is it not advisable to direct our attack upon the latter rather than the former? Could not Mr. Webb's end be obtained more thoroughly and with less risk by negative measures in restriction of the families of the submerged tenth rather than by positive measures in stimulation of those of the working classes in general? In the light of Poor Law history, it is difficult to contemplate without misgiving any large movement in the direction that he recommends.

IV.

It is not necessary for me to summarise the conclusions arrived at in the three preceding sections. They are all tentative and provisional. The problems with which they are concerned touch the province of the biologist, the economist, and the ethical philosopher. It is the biologist whose contributions to their solution have in recent years afforded the largest results, and the promise they afford for the future is still larger. The privilege of the statesman is to welcome and to use them. He will need, however, to remember that they are data and not precepts. As data they must be mastered by, they must not master him.

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¹ *Decline in the Birth-rate*, by Sidney Webb, pp. 18, 19.