

CHAPTER XIV

SOCIAL ASPECTS OF BIOLOGICAL RESULTS

“Without heredity no amount of natural, sexual, or reproductive selection would avail to progressively change, still less to differentiate, living forms.”—KARL PEARSON.

“The causes refer to our ancestors, our teachers, and the surrounding conditions of society, and with the causes must the responsibility be pushed backwards. The unhealthy parents, and not the immoral children, are responsible; the unfitted teacher, and not the misbehaving pupil, should be blamed; society, and not the criminal, is guilty. To take it in its most general meaning, the cosmical elements, with their general laws, and not we single mortals, are the fools.”—MÜNSTERBERG.

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As the general results of biological investigation must apply, *mutatis mutandis*, to man as well as to other organisms, we naturally look to Biology for some practical guidance in relation to human affairs. Thus what we have said in regard to the heritability of predispositions to disease may be of some practical utility. Similarly, the long discussion regarding the transmission of acquired characters has some practical corollaries. When all is said, however, we cannot but feel that the application of biological results is *only beginning*, and beginning with a tardiness which is a reproach to human foresight. There

can be no doubt that it would "pay" the British nation to put aside a million a year for research on eugenics, or the improvement of the human breed.

I may be permitted here to quote a notable passage from the foremost British experimenter on heredity, Mr. William Bateson (1905, p. 589):

"There are others who look to the science of heredity with a loftier aspiration; who ask, Can any of this be used to help those who come after to be better than we are—healthier, wiser, or more worthy? The answer depends on the meaning of the question. On the one hand, it is certain that a competent breeder, endowed with full powers, by the aid even of our present knowledge, could in a few generations breed out several of the morbid diatheses. As we have got rid of rabies and pleuropneumonia, so we could exterminate the simpler vices. Voltaire's cry, '*Écraser l'infâme*,' might well replace Archbishop Parker's Table of Forbidden Degrees, which is all the instruction Parliament has so far provided. Similarly, a race may conceivably be bred true to some physical and intellectual characters considered good. The positive side of the problem is less hopeful, but the various species of mankind offer ample material. In this sense science already suggests the way. No one, however, proposes to take it; and so long as, in our actual laws of breeding, superstition remains the guide of nations, rising ever fresh and unhurt from the assaults of knowledge, there is nothing to hope or to fear from these sciences.

"But if, as is usual, the philanthropist is seeking for some external application by which to ameliorate the course of descent, knowledge of heredity cannot help him. The answer to his question is *No*, almost without qualification. We have no experience of any means by which transmission may be made to deviate from its course; nor from the moment of fertilisation can teaching, or hygiene, or exhortation pick out the particles of evil in that zygote, or put in one particle of good.

From seeds in the same pod may come sweet peas climbing five feet high, while their own brothers lie prone upon the ground. The stick will not make the dwarf peas climb, though without it the tall can never rise. Education, sanitation, and the rest are but the giving or withholding of opportunity."

It seems to us that it may be useful to devote this chapter to an elementary discussion of the relations of Biology and Sociology, and especially to an inquiry into the bearings of biological ætiology on social problems.

Sociologists—that is to say, those who are engaged in the scientific study of the origin, development, structure, and functions of human societary forms—have admittedly a difficult task, and it is not surprising that they should look about for help on many sides. In recent years many writers on sociological subjects have appealed to biology for assistance and have used biological formulæ in their interpretations. The title of the admirable journal *Archiv für Rassen- und Gesellschafts-Biologie* is very significant. Let us try to *illustrate* at once the value and the risks of the sociological appeal to biology. Our point of view may seem very obvious to some, absurdly cautious to others ; it seems to us consistent with scientific method.

§ I. *Relations of Biology and Sociology*

Every one admits that in biology—the scientific study of the origin, development, structure, and functions of organisms as such—it is useful to appeal to physics and chemistry. Although it has not been possible, to our thinking, to translate the biological description of any vital sequence into physical and chemical terms, the methods of physical and chemical analysis have been very valuable in biological study, deepening it and broadening it, and enabling us to see more clearly what is distinctively vital, the autonomy of the organism. The utility of the analytic method has increased in proportion to

the completeness with which it has been possible to discriminate the numerous chemical and physical factors which contribute to the result which we call vital activity.

By analogy, then, it seems on *a priori* grounds legitimate to expect that biological analysis applied to the life and history of societary forms will be fruitful; and the few steady steps already taken in this direction are full of promise. But the analogy also suggests that the result of analysis in terms of lower categories will in the long run be to bring the distinctively social into stronger relief, and that certain progress in the utilisation of biological formulæ will depend on the relative completeness with which the biological factors operative in social activity can be discovered. A chemico-physical analysis of organic processes which left out electrical factors would be inept indeed; a biological analysis of social processes which left out, say, the "mutual aid" instinct would, we venture to think, be equally fallacious.

From time to time in biology some success in physico-chemical analysis has led to the fallacy which Comte called "a materialism"—the premature attempt to formulate the phenomena of a higher order of facts in terms of the categories of a lower order of facts, premature in that it attains an apparent success only by ignoring the most essential features; *e.g.* in this case, those distinctive peculiarities of self-regulation, adaptive response, and the like, which give organisms their peculiar apartness from all inanimate systems. It is impossible to argue the matter here, and it is impossible to tell what unification of descriptive formulæ may be in the lap of the future; but we are, we think, stating a matter of fact, not expressing a personal opinion, when we say that it is at present an inaccurate "materialism" to pretend that we can formulate any distinctively vital phenomenon in terms of mechanical (physico-chemical) categories. In recognising and appreciating the operation of the chemical and physical factors which contribute to the result

which we call the life of an organism, the biologist has so far simply brought the distinctively vital into greater prominence.

Similarly, in regard to the biological analysis of social sequences, there seems to us in recent literature some warrant for protesting against the "materialism" (in Comte's sense) of pretending that sociology is merely a higher department of biology, and a human societary group no more than a crowd of mammals. We have little faith in a biology which does not frankly admit that an organism is a new synthesis when compared with inanimate systems, and we have equally little in a sociology which does not consistently recognise that a human societary unit, however simple, is also a new synthesis as compared with the beasts of the field—a unity with a distinctive mode of behaviour, with a whole that is more than the sum of its parts ; in short, with a life and mind of its own.

The fallacy of regarding sociology as no more than a recondite branch of biology is not merely verbal, implying differences of opinion on the tedious question of the best definitions of these two sciences ; it involves a misconception of what human society is, a misconception which is discredited by the facts of history and experience. No one doubts that the life of a social group is made up of a complex of activities of individual persons ; but these are integrated, harmonised, and regulated in a manner as far beyond present *biological* analysis as the integration, harmonisation, and regulation of the chemical and physical processes in the individual organism are at present beyond *mechanical* analysis.

Nor is the "materialism" a theoretical fallacy merely ; it has its practical side. A cattle-breeder has been known to produce by careful selection a prize bull, almost perfect according to the physical standard aimed at, but with the serious vital defect of being sterile ; so preoccupation with a purely biological ideal might, in relation to the human race, result in consequences which were anything but advantageous socially. We venture

to say this although there seems at present much more danger of the converse practical fallacy of forgetting that the biological ideal of a healthful, self-sustaining, evolving human breed is as *fundamental* as the sociological ideal of a harmoniously integrated society is *supreme*.

In any case, it is useful to recognise that the biological and the sociological ideals are not synonymous. As a matter of fact, though the former should contribute to the latter, which should include it, the practical clashing of the two ideals is familiar and interesting. Sociologically regarded, illegitimate children do not appear to be very desirable; biologically regarded, they are often very valuable assets. Sociologically regarded, it seems quite consistent with progress that the trawling industry should flourish; but, what with pleasant food on the one hand and pleasant dividends on the other, we run some risk of forgetting what the biologist deplures, the elimination of the splendid physical type of the line fisherman and the threatened disappearance of one of the manliest of callings. Scores of similar instances will occur to every one.

The danger of trying to press biological formulæ into the service of sociological interpretation is complicated by the actual history of the sciences. It is well known that the sociological inquiries of Malthus as to human population influenced Darwin, Wallace, and Spencer, and that the concept of natural selection in the struggle for existence came to biology from above rather than from within its own sphere. The same is true of the fruitful idea of division of labour, of the general idea of evolution itself, and of others—they came to biology from the human social realm.

To keep to the concept of selection for a moment: it was applied to plants and animals, it was illustrated, justified if not demonstrated, and formulated; and now with the imprimatur of biology it comes back to sociology as a great law of life. That it is so we take for granted, but it is surely evident that in social

affairs, from which it emanated as a suggestion to biology, it must be re-verified and precisely tested. Its biological form is one thing, its sociological form may be another. Perhaps it requires to be corrected by other laws of social life which have meanwhile been recognised. Perhaps there may be other hints from human social life as to the factors in evolution, whose importance we shall not recognise until they have been projected upon the world of plants and animals and verified there. In any case, a formula borrowed from another science and applied to a new order of facts—even to those in regard to which it first arose as a suggestion—must be rigorously tested. Otherwise, both organic and social sciences resolve themselves into socio-morphic illusions.

§ 2. *The Chief Value of the Sociological Appeal to Biology.*

As it seems to us, the chief value of "the Appeal to Biology" on the part of students of sociology is threefold :

(1) The analysis of biological factors operative in social sequences may serve to bring into stronger relief what is distinctively social. Thus when we analyse out what is due to natural inheritance, we see more clearly what social heredity really is. When we analyse out the various forms of natural selection operative in mankind, we see how much or how little selection there is which cannot be expressed in that formula.

(2) The biological analysis may serve to show that certain features of social life have what we may call organismal main-springs, and become more intelligible when traced back to these. Thus the relative lack of fertility in fine human stocks requires biological as well as sociological interpretation. Again, no one can do justice to the social significance of sex or of play who does not know the biology of these. Or again, looking at this value from another side, the relatively simpler biological ideals, which must remain fundamental, *e.g.* of physical culture

and eugenics, may afford a useful touchstone for testing the validity of the more complex sociological ideals.

(3) The parallelism of the two sciences is such that biological conclusions and experiences may have great suggestive value to sociology, aiding in the discovery of sociological laws and indicating practicable possibilities of social evolution.

To illustrate this threefold value of the appeal to biology, and at the same time the risk that biology, used unduly as a support, may pierce the sociological hand, we propose in this chapter to consider a few biological generalisations and to inquire into their bearing on sociological problems.

§ 3. *Originative Factors in Evolution*

Variations.—Our biological knowledge of the nature and origin of those changes or variations which form the raw material of organic progress is still incipient; yet the little we know must be borne in mind in sociological discussions. There is general agreement that inborn variations—which give every organism its individuality—are the expression of changes in the intricate architecture of the germ-plasm. It is suggested that they are due (*a*) to the influences of the environing “body,” with its variable nutritive stream, on the germ-cells; (*b*) to the intricate permutations and combinations preparatory to and implied in fertilisation; and (*c*) perhaps to what may be called growth-changes in the germ-plasm as it is continued from generation to generation. We are sure that these endogenous or germinal changes, expressing themselves in development, supply the raw material of evolution on which selection operates, and we are not sure that there is any other source of raw material.

Compared with most organisms, man is a slowly reproducing, slightly varying, creature. In so far as deeply ingrained characters are concerned, a bodily change in the race by natural

inheritance is likely to be slow. Thus we are led to look for other than germinal origins of social variations; thus we are led to suspect that when a social evolutionary process—up or down—is rapid, there must be super-organic factors at work. The distinction between organismal and social variations is obvious. The distinction between inborn variations and acquired modifications (which may be very rapidly diffused) will be alluded to later on.

While the facts seem to suggest that most of the organic variations which occur in civilised communities are simply slightly novel combinations and permutations in that complex system of ancestral contributions which we call our natural inheritance, the recent work of investigators like Bateson and De Vries has led us to recognise that discontinuous or transilient variations are of not infrequent occurrence in organisms. A “new departure,” a remarkable change of organic equilibrium may suddenly appear, and may come to stay, especially if it be favoured by inbreeding or some form of isolation. It seems certain that a definite breed of cattle may arise in a single farm-yard, may be inbred until it attains dominant prepotency, and may after a while persist in its integrity in spite of occasional inter-crossing. If this be so, we can better understand how a particular human strain—such as “the Celtic type”—may be so prepotent that it persists as an important social factor in spite of much mingling of stocks. On the other hand, a genius is a transilient variation who usually does not come to stay, except as an immortal spirit embodied in literature or art.

The view that man has a range of psychical variability as large as his range of physical variability is small, does not seem to us supported by facts. The view that man's psychical variations are independent of natural inheritance is contradicted by careful investigations, such as those of Karl Pearson (1903). The useful fact to emphasise is that man, though slowly or slightly *variable*, is rapidly and exceedingly *modifiable*, and that

social organisation provides a means—an external heritage—whereby the results of modifications may be practically though not organically entailed. To this elementary distinction—necessary, however, for clear thinking—we must repeatedly refer.

By a “social variation” we mean a change in the organisation of a societary form, and it is not within the scope of this chapter to discuss its nature and origin. That is part of the task of the sociologist; and its accomplishment lies far ahead. It may not be presumptuous, however, to make this suggestion. A variation expressing itself in an individual organism is marked by changes in many individual units, and these changes have to be described and measured. But the origin of the variation was germinal, in the “immortal” germ-plasm which gives continuity to the chain of transient generations. Thus we are led to think that those social changes that really count must have their basis in that which is to societary forms what the germ-plasm is to generations of organisms, the *esprit de corps* (in the unrealisable full meaning of the phrase!) which gives unity to every societary form whether it be big or little.

Modifications.—Besides “variations” in the strict sense, there are other organic changes, technically known as “modifications,” or, more awkwardly, as “acquired characters.” They are definable as bodily structural changes acquired by the individual organism as the direct result of changes in function (use or disuse) or of changes in the environment, and so transcending the limits of organic elasticity that they may persist after the inducing conditions have ceased to operate. They are exogenous, somatogenic changes, as contrasted with endogenous, blastogenic changes. They are the direct results of peculiarities in “nurture,” as contrasted with inborn changes in the inherited “nature,” to use the convenient words with which Mr. Galton, following Shakespeare, has made us familiar. That they are, after all, reactions of the inherited nature to

new conditions of stimulus, both positive and negative, is obvious. Now, the important point is that we cannot with any certainty count these "modifications" as part of the raw material of evolution (progressive or retrogressive), for we have no good evidence to show that they can be hereditarily entailed as such, or even in any representative degree transmitted to the offspring.

It is admitted that some deeply-saturating modifications may, by affecting the nutritive stream, indirectly affect the germ-plasm, but there is no proof of the transmission of any modification as such. The evidence for this assertion will be found, for instance, in preceding chapters.

It is admitted that the organism—notably the human organism—is often extraordinarily modifiable, and that similar conditions may induce similar modifications on generation after generation, so that an appearance of heritability results.

Moreover, as Professors Mark Baldwin, Lloyd Morgan, and H. F. Osborn have pointed out, modifications that are effectively advantageous—adaptive responses, in fact—may have an indirect evolutionary importance, for they may serve as sheltering, life-preserving, or welfare-furthering screens until coincident endogenous variations in the same direction have time and opportunity to establish themselves. Thus a modificational change may be gradually replaced by a strictly variational, and, by hypothesis, heritable one. Then the screen or veneer may be done without.

If the conclusion of the majority of biologists be correct, that modifications are not as such transmitted, there are some obvious sociological corollaries. We have, in the progress of education, therapeutics, and hygiene, unceasingly striking evidence that the human organism is very plastic; but we cannot delude ourselves with the belief that its precise gains or losses are ever as such transmitted. Therefore, it has to be our practical endeavour that advantageous modifications be

re-impressed on each successive generation, and that detrimental modifications be avoided.

But the biological conclusion has to be in an important respect corrected for the social realm, in view of the fact that man has an external heritage of custom and tradition, institution and legislation, literature and art, which is but slightly or not at all represented in the animal world, which yet may be so effective that its results come almost to the same thing as if acquired characters were transmitted. They are re-impressed on the bodies and minds of successive generations, though never ingrained in the germ-plasm. It seems probable that not a few of the biologically and socially unfit are only *modificationally* veneered, or repressed, or arrested.

Moreover, while among plants and animals the organism is often largely a creature of circumstances, very thoroughly in the grip of its surroundings and mastered by them, it becomes otherwise as we ascend the scale of being. Increasingly we find the organism—be it bird or mammal or man—much more master of its fate, able to select its own environment in some measure, able to modify its surroundings as well as be modified by them. As we take a bird's-eye view of the course of evolution, must we not recognise the gradual emergence of the free agent—the operation of what has been badly called “organic selection”?

§ 4. *Social Aspects of Heredity*

We have defined heredity as the genetic relation between successive generations, and inheritance as all that the organism is or has to start with in virtue of its hereditary relation to parents and ancestors. All sociological talk that appeals to a “principle,” “law,” or “force” of heredity should be ruled out of court.

The hereditary relation is sustained by the germinal material, and the precise study of this physical basis has done much of

recent years to define the way in which generation is linked to generation. The fundamental fact of the continuity of the germinal material from generation to generation—the fact which is in biology like the first law of motion in physics—secures that persistence and continuity of organic kinship on which the possibility of a society depends. The peculiar way in which the germ-plasm accumulates within itself what we must regard as multiple sets of hereditary contributions, and becomes like a mosaic, or like capital growing at compound interest, is a fundamental fact for sociologist as well as for biologist. It is the organic condition of the social instinct.

The great generalisation known as Galton's Law of Ancestral Inheritance, according to which inheritances are on an average made up of a half from the two parents, a quarter from the four grandparents, an eighth from the great-grandparents, and so on, may require some adjustment as regards the precise fractions, and in relation to cases of inter-crossing, but the general fact seems to have been well established, and it is eloquent. Taking it along with Professor Karl Pearson's evidence that the inheritance of psychical characters can be formulated like that of physical characters, we are in a better position to understand what is called "social solidarity" and "social inertia." We are able to realise more vividly how the past has a living hand on and in the present, even to feel, perhaps, that there is a danger of fallacy in insisting too much on either past or future when we have to deal with the continuous stream of life. Mr. Galton's generalisation makes reversions, survivals, recapitulations, and the like more intelligible.

Very suggestive also is Mr. Galton's elucidation of Filial Regression—that there is a continual and necessary tendency to approximate to the mean of any stock. In proportion as two parents are divergent from the mean of their stock, will be the succession-tax levied upon their offspring, which will tend to approximate, up or down, towards the general level. This

is capable of statistical proof, and it follows from the broad fact that each parental contribution is a mosaic of inheritance, which, except in cases of very careful selection (for good or ill), must eventually be traced to a crowd of ancestors representing the average mediocrity of the stock.

Thus we have light thrown on the familiar facts that children of exceptionally gifted pairs are often commonplace, and that children of worse than commonplace parents are often very fair samples of the breed. More generally, we see, as Mr. Galton says, that there is a general and inevitable levelling-up and levelling-down, that a society biologically considered tends to move like a great fraternity. Just as the "Hereditary Genius" studies of Mr. Galton gave us a biological basis for pride of race and a respect for true aristocracy, so his Filial Regression formula is a message to democracy.

The facts of inheritance acquire profound sociological significance when we inquire into the relative rates of fertility in different sections of a population, and into the probabilities of the production of highly endowed types in these different sections. It seems to us that one of the most suggestive of biological contributions to sociology is that famous "Huxley Lecture" in which Mr. Galton indicated some of the probable practical corollaries of his statistical laws.

Man is a slowly varying organism, and he is peculiarly liable to have his inborn nature concealed by a veneer due to nurture, but there is no ignoring the fact that there are great differences in quality and quantity of hereditary endowment. As was long ago expressed in immortal parable, there are those who have ten talents, those who have five, and those who have only one.

Now, the differences in hereditary endowment—of strength or intelligence, of stature or longevity, of fertility or social disposition, have a certain regularity of distribution, so far as we can measure them at all. They conform to what is called the Normal Law of Frequency, which is always illustrated when

variations are due to the combined action of many small and different causes. Human variations, whether bodily or mental, may be registered on a curve of frequency, just like the variations of poppies or jelly-fishes—on the same sort of curve as may be illustrated by plotting out the marks round the bull's-eye in target practice, or the numbers which come to the top in so many thousand throws of the dice, or the marks in a competitive examination with a large number of candidates.

Let us briefly recall Mr. Galton's argument. If we take a precisely measurable quality like stature, we find that the average height of a large number of adult Britons is 5 feet 8 inches; above this line of mediocrity (R) there are taller men who may be arranged in groups, the means of which are separated from one another, by $1\frac{3}{4}$ inches; we may call these +S, +T, +U, +V, +W, and +X, till we end in giants of 6 feet 6 inches; we may give to the distance between the groups ($1\frac{3}{4}$ inches) the name "normal talent." Thus while the average adult has 39 "normal talents" of stature (5 feet 8 inches), the six groups above him, rapidly decreasing in numerical strength as we ascend, have respectively 1—6 talents more than mediocrity.

On the other side of mediocrity, there are of course groups of minus variations, groups which we may call -s, -t, -u, -v, -w, and -x, with 1—6 talents fewer than the normal equipment of 39; and the minus or left side of the curve exactly reflects the plus or right side. A giant of 6 feet 6 inches would belong to the small and very select sixth class above mediocrity (+X), while a dwarf of 4 feet 10 inches would belong to the sixth class below par (-x); and there are apparently as many of the one as of the other. Mr. Galton maintains that the curve holds good for any particular measurable quality taken separately, and that it also holds good when the qualities are grouped. "It can be employed to give a general idea of the distribution of civilisation, in so far as it is normally distributed . . . and the same for any group of normal qualities."

The next step in the argument is important and brings us into closer touch with social problems. Mr. Charles Booth, in his well-known demographic studies, has arranged the population of East London into grades of "civic worth," beginning with criminals, semi-criminals, and loafers, going on with increasing numbers to casual workers, intermittent workers, and thence to regular earners under 22s. a week, and so on. The results show "a fair approximation to the normal law of frequency." Again we have the groups, +S, +T, +U, etc., and the groups, -s, -t, -u, etc., forming the two sides of an approximately similar and symmetrical curve.

It is easy to say that one knows of this, that, and the other one who rose into class +T by sheer luck; and of this, that, and the other one who fell into class -t by the hand of God—a fire, a wreck, an explosion, and what not; but when we are dealing with large numbers, it does not seem that these exceptional exaltations and depressions of individuals are of vital moment. It is also evident that the standard of civic worth used by Booth is only one of many standards—that of economic production under present conditions—but to begin with we must measure by one standard at a time. We know that it would be individually unjust to put, say, Arnold's "scholar gipsy" on the minus side as a casual worker, but there are not many scholar gipsies.

The next step in Mr. Galton's argument might be described as a financial valuation of babies. Suppose we could import at the present moment ten legions of boys of sound physique and scouting intelligence, not crammed with intellectual fat like Strasburg geese with the physical analogue, but alert in understanding of methods and with unchecked inquisitiveness, what great national gain it would mean! It would be a good investment, and it is within reach every year, since far more than ten legions of this type of boy are being born annually in our midst. That they do not effect all they might do, is partly

because of mis-education, but also because there is a simultaneous appearance of an enormously greater number of boys who are emphatically *not* of this type.

Dr. Farr, the eminent statistician, tried to estimate the social money-worth of the average baby born to an Essex labourer, supposing him to live as long as and after the manner of his class. Allowing for cost of maintenance during the two helpless periods of infancy and senile infirmity, Dr. Farr came to the conclusion that the national value of the baby was about £5. If £50 be nearer the mark, it does not affect the argument.

“On a similar principle,” Mr. Galton says, “the worth of a +X-class baby would be reckoned in thousands of pounds. Some such ‘talented’ folk fail, but most succeed, and may succeed greatly. They found industries, establish vast undertakings, increase the wealth of multitudes, and amass large fortunes for themselves. Others,” he continues, “whether they be rich or poor, are the guides and lights of the nation, raising its tone, enlightening its difficulties, and improving its ideals. The great gain that England received through the immigration of the Huguenots would be insignificant to what she would derive from an annual addition of a few hundred children of the classes +W and +X.”

Now, however, comes the crux of the whole argument. By a method expounded in his “Natural Inheritance,” Mr. Galton has endeavoured to express in a standard table precisely how each generation of a classified population is derived from its predecessors. Keeping to the terminology that the groups above mediocrity are +S, +T, +U, +V, +W, +X, let us inquire with Galton into the origin of 35 male members of the very excellent grade +V (fourth above mediocrity, 1 in 300). (That these are not *mainly* due to marriages of +V-class parents is probably suggested by our everyday experience, and this observational conclusion is borne out by the statistics, which, in regard to some qualities, such as stature, can be made

very precise.) Mr. Galton's result is that of the 35 +V youths, six come from +V (fourth) parentages; ten from +U (third); ten from +T (second); five from +S (first); three from R, and *none* from below R.

But along with this very suggestive result, we have to consider the numerical strengths of the contributing parentages. When this is done, "we see that the lower classes make their scores owing to their quantity and not to their quality; for while 35 +V-class parents suffice to produce six sons of the +V-class, it takes 2,500 R-class fathers to produce three of them." Thus from the point of view of eugenics, if we wish to increase the number of +V-class offspring, the most profitable source is to be found among the more prepotent +V-class parents; they are three times more profitable than those of the next class, +U, and 143 times more profitable than those of class R!

Other Facts of Heredity.—One is tempted to linger over that mode of inheritance which is called true reversion, where ancestral characters that have lain latent for several generations suddenly find opportunity to reassert themselves. It is true that "reversion" has been a convenient "free toom" into which much rubbish has been shot. It is true that reversion has been terribly confused with arrests of development (usually of modificational origin), with the not uncommon variations in those numerous vestigial structures of which our body is a walking museum, with independent variations that "happen to hit an old mark in aiming at a new one" or simply suggest to the credulous a harking-back to a more or less hypothetical ancestral type, and even with the normal and everyday occurrence of filial regression. Yet it is undeniable that ancestral traits may remain long latent, apparently but never really lost, and that, in the intricate shuffling of the cards which is associated with the maturation and fertilisation of the germ-cells, they may suddenly find their appropriate liberating stimulus, and assert themselves once more.

A shepherd's cottage garden was swallowed up in a deer-forest and became a garden full of weeds ; generations passed and it was once more delved ; the long dormant seeds were reawakened and many old-fashioned flowers saw the light. So there may be a reawakening of almost forgotten flowers and weeds in that garden which we call our inheritance. Thus we interpret biologically what we cannot ignore in the body politic, the emergence of the old-fashioned type whom we—foxes without tails—think to dispose of under the label “reactionary” ; of the restless type “neither to haud nor bind,” who may be a Moses with reawakened nomad instincts capable of leading a people through the desert to a new Promised Land ; or, as is often the case, of the recrudescient vicious type, who, if he cannot be pardoned when we know all, can at least be the better dealt with the better he is understood.

Another aspect of heredity has an obvious sociological significance, the dark and intricate business of hybridisation or cross-breeding, in regard to which biologists are beginning to see some daylight. If we call mankind a species, we must admit that there are many sub-species or “elementary species,” and that within these again there are minor groups of more or less well-marked stocks, and that there are also somewhat divergent groups or varieties. As in the past, so still there is no small amount of exogamy or cross-breeding, and it is much to be desired that the whole matter should be carefully investigated. How far is it true that cross-breeding provokes an “epidemic of variations,” that it tends to induce “reversions,” that the older stock is prepotent over the younger, and so on ? According to De Vries it is very generally true of plants, that a retrogressive variety (*i.e.* one different from the parent species in the marked absence of some character) will, if crossed by a typical member of the species, produce offspring which return to the original type. Is there any analogue of this “false atavism or vicinism ” in human kind ?

One is tempted to speculate as to the possible sociological interest of Mendel's Law, if it should be found to obtain in the minglings of human races, but as yet we have not a sufficient basis of fact. As we have seen, the inbreeding of *hybrids* of peas, stocks, mice, etc., is followed by a splitting of the offspring into true-breeding types like the two parents of the hybrids. We may suggest that careful inquiry should be made as to the results of inter-marriage among Eurasians, for if Mendel's Law holds, there should be a sifting out of pure Asiatics and pure Europeans, both probably more desirable than Eurasians, fine mentally and physically as these often are.

There are still some who find satisfaction in pointing out that as human evolution is *par excellence* a psychical evolution, biological conclusions on the question of inheritance are irrelevant, since they are based on the study of measurable physical qualities. But those who would press this point must deal with Professor Karl Pearson's "Huxley Lecture" for 1903, "On the Inheritance of the Mental and Moral Characters in Man, and its Comparison with the Inheritance of the Physical Characters" (*Journ. Anthropological Institute*, xxxii. pp. 179-237). His method was to obtain for upwards of one thousand families impartial data as to *fraternal* resemblance in physical and psychical characters in school-children. His argument was, "If fraternal resemblance for the moral and mental characters be less than, equal to, or greater than fraternal resemblance for the physical characters, we may surely argue that parental inheritance for the former set of characters is less than, equal to, or greater than that for the latter set of characters." His conclusion, after many years of investigation, was that "the degree of resemblance of the physical and mental characters of children is one and the same," or, more concretely, "we inherit our parents' tempers, our parents' conscientiousness, shyness, and ability as we inherit their stature, forearm, and span." The psychical characters are

inherited in the same way, and at the same rate as the physical.

But one of the general points of this chapter may be illustrated here. In proportion as we succeed in analysing out the biological factors in our Natural Inheritance shall we see clearly what is meant by "Social Heredity." What do we mean by it? Not merely that facts of family and stock inheritance may have great social importance, whether they concern the history of a dynasty or the physical deterioration of a proletariat; not merely that great biological generalisations, such as Filial Regression, or the inverse ratio between rate of reproduction and degree of individuation, have direct sociological relevancy; not merely that there are probably obscure laws of periodic recurrence, such as "the law of generations"; we mean especially that complex process by which much of what is most precious to us appears to be sustained from generation to generation in a *social heritage*, by tradition, conventions, institutions, laws, and the whole framework of society itself. It is here that the biologist leaves off, and the sociologist must come in.

§ 5. *Directive Factors in Evolution*

Selection.—Passing now to the *directive* factors in evolution in contrast to those which are originative and conservative, we find practical unanimity in recognising the importance of *selective processes*. We use a plural phrase in protest against the persistent fallacy of taking a narrow and crude view of what occurs in many different modes, at many different levels, and with very varied degrees of intensity.

Variety of Modes, Levels, and Intensity in Selective Processes.—As Darwin clearly indicated, the phrase "struggle for existence" is to be taken in a wide and metaphorical sense. In point of fact, it is in operation whenever and wherever the degree of effectiveness of vital response is of critical moment,

not merely in helping *survival* at the time, but in strengthening foothold, increasing comfort, lengthening life, promoting reproductive success, and so on.

It may be a miserable squabble around the platter of subsistence, but it may be a gentle endeavour after well-being. It may be prompted by "love" as well as by "hunger," using both words in the widest sense; it may be other-regarding as well as self-preservative.

There may be struggle between foes of quite different natures, *e.g.* birds of prey and vermin; competition between fellows of the same kin, *e.g.* brown rat against black rat; opposition between the sexes (*cf.* courtship of spiders, in which the female often devours the male, and human competition between male and female doctors, clerks, etc.); self-assertion against the quite indifferent, often merciless "weather" of the physical environment. The phases of "struggle" are as varied as life itself.

Interference with Natural Selection.—Not a few sociological writers have echoed the warning of Herbert Spencer that modern hygienic and therapeutic methods interfere with the natural elimination of the weaklings whose survival consequently becomes a drag on the race, and there is doubtless some force in the argument, especially if we could confine ourselves to an entirely biological outlook. It appears to us, however, that the practical corollary that we should cease from interfering with natural selection, as the phrase goes, is as fallacious as it is impossible. (1) It seems a little absurd to speak of, say, the prevention of an artificially exaggerated infantile mortality as if it were an interference with the order of nature. (2) Much weakness which may readily become fatal is simply modificational, due perhaps to lack of nutrition at a critical moment; many weakly children grow up thoroughly sound; and even if we do keep alive some whose constitutions are intrinsically bad, we are at the same time saving and strengthening many whose intrinsically good constitutions only require temporary shelter.

One enthusiast over microbic selection says: "The higher the infantile death-rate which medicine so energetically combats, the surer is the next generation of being purged of all weakly and sickly organisms." But he omits to record the fact that the infantile maladies also affect the intrinsically strong and capable, and often weaken them, one might say, quite gratuitously. (3) Many of the microbic agents which thin our ranks are very indiscriminate in their selection, and even if we believed that in warring against microbes we are eliminating the eliminators who have made our race what it is—as the enthusiastic apologists for Bacteria declare—it is surely open to us to put other modes of selection into operation. It were a sad confession of incapacity if man could not select better than bacteria. (4) Finally, since we cannot keep to the biological outlook, is it ridiculously old-fashioned to plead that even when the physical constitution is miserable, the weakling may be a national asset worth saving, for its mental endowment, for instance, and for other reasons? *That the weakling is to be allowed to breed more weaklings if it can, is another matter.* Every one agrees that the reproduction of weaklings should be discouraged in every feasible way—in every way compatible with rational social sentiment.

Multiplication of the Unfit.—We have to face a more difficult problem when we consider the multiplication of the relatively unfit. It is, we suppose, true that these have now a better chance to survive and multiply than at any other epoch in the history of our race. Especially perhaps in Britain do the weeds tend to increase more rapidly than the flowers. It is impossible to ignore the seriousness of the outlook. If, as Professor Karl Pearson points out, 25 per cent. of the married couples in Britain produce 50 per cent. of the next generation, how much depends on the character of that 25 per cent. From the most diverse regions we have reports of the alarming increase of what not even the most optimistic can regard as other than undesirables. In a fine climate and in a period of cheap food

and high wages, the ratio of defectives—including deaf and dumb, lunatics, epileptics, paralytics, crippled and deformed, debilitated and infirm—is said to have increased from 5·4 per 1,000 above 15 years in 1874 to 11·6 in 1896. Particular statistics, such as these, may be open to criticisms, but there are scores of similar statistics from almost every civilised country, and there is no escape from the general result. As Emerson said, we are breeding men with too much guano in their composition.

A Host of Practical Suggestions.—Needless to say, many of the inquirers who have become impressed by the facts have not been backward in making practical suggestions, which might be arranged, if one had time, on an inclined plane. Some, more *trustful in natural selection than in any human device*, have taken up an extreme *laissez-faire* position, which, as human society is constituted, is quite untenable. The other day we passed by a rock village in Italy which was not so long ago in the direst sense *left to itself* when cholera broke out within it, sealed up, as it were, like a bee-hive diseased—but it is idle to talk of leaving natural selection free play in any civilised community. Others, going to the opposite extreme, have advocated what may be called surgical methods for both sexes to a degree that is more than spartan. Between these extremes we find all manner of suggestions. We need only refer to the marriage examination and certificate system which is being increasingly discussed—to much profit, it seems to us—in Germany; the segregation schemes which suggest that those obviously unfit who have to fall back on the State (*i.e.* the relatively fit citizens) for support should forfeit the right to reproduce, for which, again, there is much to be said; and the wise and gentle constructive eugenic proposals with which Mr. Galton has made us all familiar.

Probably every one who is at all aware of the facts will admit the desirability of giving attention to eugenics or the improvement of the human breed, positively, if possible, in the way of

increasing the numbers of the effective, or negatively, in the way of trying to reduce the multiplication of the unfit. Inquiry into these subjects is comparatively new, discussion of them is still rare, a superstitious attitude towards them is still very common—we cannot tell what may come about in a very gentle way when a conscience relative to these things is developed, or what might come about if some great social variation, *e.g.* in the direction of democratisation and pacification, should come about.

Meanwhile, convinced as we are as to the hopefulness of various forms of eugenic selection, we cannot but enter a protest against the impetuous recommendations of some who seem to adhere too exclusively to the biological—the breeder's—point of view, who sometimes do not hesitate to suggest methods of surgical elimination to an extent that is almost grotesque.

We would suggest the following cautions :

(1) We are far from being omniscient in regard to variations. Some deteriorative changes are well known, and history has given its verdict against them. Every one agrees that there should be no breeding from epileptics, paralytics, lunatics, and so on, but many other variations are unknown quantities. The unpromising bud may burst into a fair flower. Virchow's thesis of the pathological origin of some variations is not to be lightly brushed aside. There is an optimism of pathology. No one would propose to *encourage* the breeding of doubtful variants on the off-chance of an occasional genius, but the race owes much to weaklings none the less. A man belonging to a family which has been manufacturing cystin for three generations should not have children—he would not pass the German marriage examination—but in himself he may be a very valuable national asset. Some of the lists given by the social surgeons are quaint in their unpracticality ; thus one includes “a criminal taint”—as if that were a rarity, or as detectable as deaf-mutism—and another includes “pauperism.”

(2) Is there not much to be said in support of the view that many of the unfit are only *modificationally* unfit—simply ill-nourished plants in the crowded garden? Are we not apt to underrate the plasticity of human nature and the ready repressibility of hereditary items? Is there strictly speaking such a thing as a transmissible disease, apart from pre-natal infection? Is not a predisposition to disease the most that is transmitted? Are not many criminals mere anachronisms?—people out of time or out of place, who require not incarceration or worse, but only transplanting. Records of Jukes' families, or of the woman whose 709 descendants cost the state a quarter of a million are impressive, but one has to remember the modificational effect of social ostracism. One can hardly doubt that the high rate of criminals among illegitimate children—said to form one-tenth of the births in Germany—is artificially created. In passing we may note, as of interest, the formation of a League in Germany to protect not merely illegitimates, but their mothers.

(3) While it is undoubtedly true that strongly developed evil characters may have a great power of persistence even beyond the third and fourth generation, just as strongly developed good characters may have, is there not a tendency to exaggerate the consequent tainting of stock? Dr. Archdall Reid has expounded the tendency of the uncontrolled alcoholic type to work itself out, and the same is true of other types. If germinal selection expresses a reality, we should expect taints to be swamped, just as excellences often are.

(4) We do not know whether Mendelian phenomena of inheritance occur in man, but if they do, we should be slow to say that it is not possible to bring a clean thing out of an unclean. When an immune wheat plant and a non-immune are crossed, the resulting hybrids are all susceptible to rust. When these are self-fertilised, *i.e.* inbred, they produce seed from which appear "rusty" plants and immune plants in the ratio of 3 : 1.

It may be that there are *analogous* phenomena awaiting discovery in the case of man.

Our general position is that among civilised men the sentiments of solidarity and sympathy are too precious and too strong to admit of *much* social surgery, or of the more thoroughgoing methods of reproductive elimination, which moreover assume the possession of more science than is really available. On the other hand, there seems much to be said for restricting the reproduction of undesirables who fall back on the State for support, for some sort of marriage-tests, for developing a social prejudice against reproduction among the victims of markedly bad inheritance, for a fuller and deeper recognition of woman's rights both as to mating and maternity, for eugenic devices such as Mr. Galton has suggested, and so on. But there is one other suggestion we wish to try to express.

Militarism.—There is apt to be a vicious circle in our argumentation over this difficult problem. To uphold our national supremacy, it is said, we require, *inter alia*, a military organisation with alert scouting intelligence, not only among the officers but in the rank and file. We are ceasing to breed this alert scouting intelligence in sufficient numbers ; the nation is spawning incapables. We cannot relax one spine of our bristling national belligerence, for we have all our teeming millions to keep alive. But the question rises whether it is not in great part our pre-occupation with “Kriegspiel” that is responsible for that relatively exaggerated multiplication of the repressed and non-individuated, and for that relatively exaggerated infertility of the fittest, or of what we think to be the fittest. If we indulged in an era of “Friedenspiel,” which may be even now approaching like a long-delayed spring-time, might not the sociological changes that ensued solve the problem which biologically seems so hopeless ?

Statistics of what is often *called* “racial deterioration” are only too plentiful, and though they require more critical analysis

and more guarded treatment than they usually obtain, there is no gainsaying that there are grim facts behind them; and without trying to make a scapegoat of militarism, it is difficult to silence the thought that just as Napoleon reduced the physical stature of the French nation, just as the wars of the Roman Empire rooted out the best and left Rome to a mob who made gods in their own image, so we are now paying the biological bill for past wars. Apart from the multiplication of "the social precipitate" *inter se*, is there not a persistent deposit of more precipitate from above, and may not the deterioration, which the military examinations, for instance, reveal, be in great part due to the crushing burden of militarism itself? The suggested surgical methods to eliminate the "precipitate" from reproduction—if not from more—may be a little away from the point if the persisting social conditions are meanwhile securing a continuous deposit of more "precipitate."

If all the best heads in a deer-forest—such a dramatic illustration of reversed selection ("ob-selection") in many ways—are persistently shot down, the race of deer cannot keep up to the desired standard; if through militarism, and the spirit behind it, a human breed is being left for the greater part of its continuance to the less fit, it will not be surprising if history repeats itself, and "Vir" is replaced by a mere "Homo." When we contemplate any national decadence—that of the Roman Empire is at a convenient distance—we may interpret the facts *biologically*, as an American zoologist, Professor D. S. Jordan,* has recently done, in terms of the reversed selection which spoiled the human harvest, or *psychologically*, in terms of the changed ideas and ideals of the average man, or *sociologically*, in terms of variations in the organisation of the societary form; but, fundamentally, these interpretations must be capable of a unification, and this it is particularly the task of the sociologist

* See "The Human Harvest" (American Philosophical Society, April 1906; also separately, Boston, 1907, pp. 122).

to work out. What more pressing problem has he than that of discovering what factors are now threatening to bring about for us results analogous to those which led to the Decline and Fall of the Roman Empire? Preoccupation with the biological outlook—the breeder's point of view—will undoubtedly lead to fallacy upon fallacy, to the "materialisms" to which we have already referred; on the other hand, an ignoring of the biological point of view means a deliberate rejection of the order of facts which we can most precisely measure and test. Moreover, the commonplace is apt to be forgotten, that when changed ideas and ideals find physical embodiment in flesh and blood, they acquire, *ipso facto*, an inertia which no belated conversion on the psychical plane can ever do away with. Even Pasteur could not add "the cubit of stature" which Napoleon lopped off Frenchmen.

Relative Infertility of more Individuated Stocks.—Let us briefly refer to the other aspect of the fertility problem. The biologist accustomed to interpret great results in terms of selection and isolation acting on germinal variations, is not likely to be lacking in faith in what may be accomplished by attention to eugenics. But he finds it difficult to dispel the shadow cast by the fact of the relatively great infertility of what we believe to be types and stocks of high social efficiency. Over and over again, in the history of mankind, elect castes—true aristocracies—have arisen, only to disappear again in sterility, or in the course of inter-societary struggle. Even if the latter doom be averted by more evolved social organisation and racial pacification, how are we to face the fact of the dwindling fertility of what we believe to be the better stocks? It may be that the relatively recent diminution of the birth-rate among skilled workmen and the like is partly modificational or artificial, an adaptation to altered social conditions; but what can we say of the generally low fertility of the most individuated stocks?

The factors which make towards this result are probably

manifold. There are probably, as Spencer maintained, automatically working physiological and psychical factors which lessen reproductivity as individuation increases. It may be that hyper-nutrition, sexual vice, the frequent absence of love marriages, operate in the same direction ; it seems difficult to doubt that selfish celibacy and selfish non-maternity are in part to blame ; and there are all sorts of possible factors down

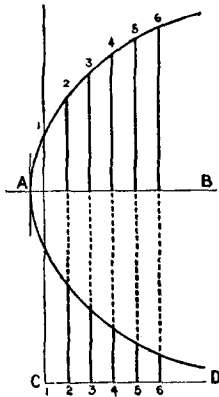


FIG. 42. DIAGRAM ILLUSTRATING THE RELATION BETWEEN REPRODUCTION AND INDIVIDUATION (from "Evolution of Sex")

Let the perpendiculars above the line A B denote the increasing degree of total individuation of a series of forms 1, 2, 3, 4, 5, 6 (say Worm, Fish, Frog, Bird, Man, Elephant). Similarly, let the perpendiculars from the line C D represent the rate of multiplication of the same forms. The curves joining the apices of the two sets of perpendiculars indicate, by their inverted symmetry, the inverse ratio of individuation and rate of multiplication.

to the marriage of heiresses who are often the sole survivors of a dwindling family. Dr. Ireland points to the significant fact that some of the high castes of India (Brahmins and Rajputs) who are most exclusive in their marriages do not show the usual dwindling tendency, which may be correlated with the circumstance that they are mostly poor and abstemious.

Is there any consolation in the thought that quality is always safe against quantity, that eagles need never fear the frogs who spawn, that an inheritance may persist socially even when a lineage becomes extinct biologically? Is there any warrant for supposing that the race can continue producing from new soil crop after crop of highly individuated types, each in its turn destined to die out as a penalty for its own efficiency? Is there any truth in the inference that failure in reproductive power is an expression of nature's verdict against dis-social isolation of privileged classes, against every self-contradictory denial of the solidarity of the social organism? In any case, is there not need for getting rid of a prudery of selfishness which keeps some of the fitter types from recognising that they have another contribution to make to the race besides their work?

It should be borne in mind that precise thinking on the subject of fertility is still very uncommon, that there is no general awareness that the details of our dwindling birth-rate are suggestive of disaster, and that very few have what may be called an awakened conscience on the subject. The most common-sense precautions are quite disregarded. Falling in love is out of fashion, and almost non-mammalian types grow commoner. In a sense, though it is a pity, it may be just as well that they should die out. And who, for instance, ever thinks of the wise Frenchman's saying, "My father was a farmer, I am a Professor, my son must be a farmer again"? But, apart from the slow diffusion of an interest in eugenics, perhaps the most promising line of activity is that of trying to promote social (including of course ethical) variations which may bring about more wholesome biological conditions.

Isolation.—The only other directive evolution-factor that biologists are at all agreed about besides selection, is isolation—a general term for all the varied ways in which the radius of possible inter-crossing is narrowed. As expounded by Wagner, Weismann, Romanes, Gulick, and others, isolation takes many

forms—spatial, structural, habitual, and psychical—and it has various results.

It tends to the segregation of species into sub-species, it makes it easier for new variations to establish themselves, it promotes prepotency, or what the breeders call “transmitting power,” it fixes characters. One of the most successful breeds of cattle (Polled Angus) seems to have had its source in one farm-steading, its early history is one of close inbreeding, its prepotency is remarkable, its success from our point of view has been great. It is difficult to get secure data as to the results of isolation in nature, but Gulick’s recent volume on the subject abounds in concrete illustrations, and we seem warranted in believing that conditions of isolation have been and are of frequent occurrence.

Reibmayr has collected from human history a wealth of illustrations of various forms of isolation, and there seems much to be said for his thesis that the establishment of a successful race or stock requires the alternation of periods of inbreeding (endogamy) in which characters are fixed, and periods of outbreeding (exogamy) in which, by the introduction of fresh blood, new variations are promoted. Perhaps the Jews may serve to illustrate the influence of isolation in promoting stability of type and prepotency; perhaps the Americans may serve to illustrate the variability which a mixture of different stocks tends to bring about. In historical inquiry into the difficult problem of the origin of distinct races, it seems legitimate to think of periods of “mutation”—of discontinuous sporting—which led to numerous offshoots from the main stock, of the migration of these variants into new environments where in relative isolation they became prepotent and stable.

Conclusion.—Our general position is that when we pass from organisms to human societies, the whole venue changes so much that we have to be very careful in our application of biological formulæ. (1) Thus, in regard to processes of selection, we have

to recognise the intervention of rational selection as an accelerant or as a brake on natural selection. (2) When a society deliberately sets to work to select discriminately among the individualities which make up its own body politic, we have to do with an infinitely subtler process than that observed when a breeder selects in his stock, or when the physical environment eliminates the ill-adapted members of a race. (3) There is in human affairs a much more prominent occurrence of inter-group, inter-societary, or inter-racial selection, which introduces fresh complexities, *e.g.* that in the conflict of races the apparent victors are sometimes, in some measure, conquered by the vanquished.

In all selectionist proposals we have to face the difficulty of agreeing what we are to select for. If selection processes are to succeed, they must be consistent. As to the negative ideal of trying to lessen the precipitate of undoubted incapables, all will agree; but the positive ideal of working towards evolution is necessarily vague, meaning different things to different people. It will be generally admitted, however, that if we are to avoid fallacious endeavour, our ideal must include "eutopias" and "eutechnics" as well as "eugenics," and that it must be not merely biological but distinctively sociological in its outlook.