

Scientific knowledge is meant to be applied. It would, I think, be admitted now that a scientific statement is not true, or false, but meaningless, if it cannot in any conceivable circumstances be verified by crucial observations. To be true it must correspond to some genuine objective reality in the world we perceive and with which we have to deal. For the same reason a scientific statement is not true or false but meaningless if it cannot in any conceivable circumstances influence one's conduct. What we owe to a new scientific discovery is a new nexus in the chain of happening by which we can better foresee the consequences of our actions, and adjust our actions more accurately to attain our objects.

I put forward these more or less obvious considerations in respect of the discovery of Charles Darwin. Charles Darwin did not discover Evolution; the fact of organic evolution had been guessed at by philosophic writers from the time of the ancients; Darwin, it is true, brought together the general arguments in favour of organic evolution more completely and more cogently than had been done before. But what really convinced Darwin and his contemporaries that evolution was a fact, was that he put forward an intelligible theory as to how it came about. In the theory of Natural Selection Darwin revealed the logical nexus between the facts of an animal's or a plant's life history, and the gradual modification of the specific type. Thereby he pointed the way to the deliberate improvement of our domestic animals and plants and of man himself.

I have emphasized this distinction between the mere recognition of the fact of organic evolution and the discovery of its cause, because in the application of biological ideas to Sociology and History this distinction has been very widely overlooked. Darwin himself never undertook the application of biological principles to Sociology and History, chiefly I believe, because he was repelled by the atmosphere of prejudice and credulity which surrounds human affairs. Spencer on the other hand was at home in an atmosphere of prejudice and credulity; his influence on historians and sociologists has been very great, and very prejudicial to science; for to Spencer evolution was everything, and Natural Selection counted for ~~everything~~ very little. According to Spencer evolution took place equally well without Natural Selection, by the inherited effects of use and disuse, and other educative agencies; evolution applied equally and meant the same thing in the inorganic as in the organic world. In fact an idea which had become concrete, definite, and pregnant with meaning in the hands of Darwin, became vague, diffused and practically meaningless in those of Spencer, and in ^{to} their application of human affairs.

In justification for these statements, which may strike some of those present as extreme, let me refer you to the articles on Darwinism and Sociology, and Darwinism and History in the Centenary volume, Darwin and Modern Science. I believe that anyone reading critically these able articles will be forced to the conclusion, that this great principle of biology

has scarcely been applied in those human studies of which it should be the corneo stone. Let me also refer to the Encyclopoedia Britanni article on Sociology by Benjamin Kidd, in which by a reckless and imaginative use of the term Natural Selection, and complete disregard of the facts of Selection, the birth and death rates, every modernist prejudice of the 19 century in England and America, is satisfactorily proved to flow inevitably from the ultimate nature of things. As a final illustration let me refer to Friedrich Nietzsche a sincere eugenist, whose ignorance of Darwin appears to be entirely due to his reliance upon Spencers exposition of the subject.

So far I have only treated Darwins discovery of Natural Selection as a clear, definite, and concrete hypothesis which may be true or false. The evidence for its truth I cannot discuss this evening: I can only express the opinion that modern research has not weakened but very much strengthened the evidence in its favour.

Let us consider then Man as conceived in the light of this principle. Man, a living animal, whose peculiarities physical, mental, and moral, are due to the forms of selection to which his ancestors have been exposed, and ^{are} ~~one~~ being modified in the direction indicated, by the birth rates, or rather the natural rates of increase or decrease of different sections of the population.

This animal is really one of exceptional interest to the biologist: for large sections of mankind have changed their environment in a remarkable manner, during the ^{last} ~~first~~ 100 generations or so. Sections of mankind have become civilised.

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Now it is just in species which are changing their environment that we should expect natural selection to be most rapid, and its effects to be most marked. Moreover, all stages of the change may be examined, some races being quite recently civilised, others for 100 generations or more: and civilisation, as its name implies, is a matter of degree, it is evident that the environmental change is more marked in the towns than in the country.

Now we should expect in any animal which is becoming adapted to the new dangers and needs of a changed environment, that those groups in which the adaptation first took place, should find themselves in a permanently advantageous position. That the Ancient Egyptians for instance, or whoever else, first succeeded in the hazardous experiment of civilised life, should have spread with increasing civilisation all over the globe, so that human history would be the history of one expanding civilisation: and this expectation is much strengthened when we consider that a civilised people always has the inestimable advantages of numbers, equipment, and organisation, when compared with a people of less advanced culture. In the main this expectation is curiously falsified. To some extent, it is true, the civilised people do show a permanent advantage: the extinction of the aborigines in Australia, the South Seas and North America is taking place involuntarily by reason of the diseases introduced by any settled European community.

Diseases such as measles and tuberculosis, which cause such a moderate death rate in this country, are far more fatal to many

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native races, which have not acquired towards them such comparative immunity as we have done for many centuries. Excessive craving for alcohol, too, seems to be a weakness to which civilised people, among whom alcohol can be obtained freely, tend to become immune. Total prohibition, if rigidly enforced, merely retards this progress towards immunity from drunkenness, and paves the way for more violent excesses, when the artificial restriction breaks down. If I have time I hope to give other instances, bearing not on the death rate but on the birth rate, in which selection among civilised peoples has given them an advantage in their own environment.

But aside from these particular examples, the failure of past civilisations is their outstanding feature. Time after time energetic and intelligent races have raised themselves to a high level of culture: they have far surpassed their ancestors in their arts and industries, in their science and education, in the organisation of society: they have become numerous and wealthy, but after a while their institutions have decayed, their frontiers have been invaded and they have revealed incapacity and worthlessness in place of courage and energy. Here is a problem for the biologist: a problem of which the historian is weary.

Geology became a science when geologists began to interpret the records of the rocks in terms of changes now taking place on the earth's surface. Let us apply the same method, and see what light modern vital statistics can throw upon the evolution of civilised society.

There is only one outstanding fact in modern vital statistics,

to which I wish to draw attention. It is sufficiently astonishing from the biological point of view. The birth rate increases as we descend in the social scale. This fact is now well established for a wide range of civilised countries. It has long been suspected but only recently thoroughly proved. Spencer who was an adept at smothering an inconvenient fact, developed a theory of Individuation and Genesis, by which in so far as the individual improved, he was the less likely to have offspring. Needless to say no foundation has been found for this surmise; but the fact which it was designed to explain is more glaringly apparent than ever.

Setting aside for a moment the cause of this extraordinary state of affairs, it is worth while glancing at its probable consequences. In the first place it indicates the relatively rapid destruction of all innate qualities which may distinguish the professional man from the artisan, and the artisan from the unskilled worker, for the change in birth rate is very strongly marked throughout the whole range of what are called the working classes. This evidently indicates the destruction of all qualities or abilities which tend to the social advance of the individual, and the multiplication of all disabilities of body or mind which tend to keep a man down to a humble station. This is the most obvious effect to be anticipated, and it clamorously associates itself with the decay of past civilisations.

Another interesting effect is that each family tends to rise in the social scale. Each man is on the whole in a better position than his ancestors, he looks back to them rather with shame than pride, owing to their humble position, or despised

occupations. Preferably he ignores their names and callings. He is educating himself to fill a higher role, and hopes to educate his children for a better position still. Innumerable ~~un~~unconscious reflections of this state of affairs may be seen in the popular literature of the 19th century, but apart from its effect on contemporary art and manners, a population of this kind will be of a very definite political temperament. To them social ambition is ~~moral~~ ^{normal}. The career open to talent is what they want. Closed professions will be thrown open, and privileges abolished in such an age. Will this consideration throw any light upon that European movement which is called liberalism?

A third effect of this peculiar distribution of reproductive activity is that by it the rich become richer and the poor poorer. The obvious remedy for this is to tax the rich and endow ~~publ~~ public charities for the poor. This is what is done in what is nowadays called Socialistic Legislation. I am not going to criticise Socialism in theory, but the particular class of legislation of which I am speaking is certainly aimed principally at making adequate provision for the children of the poor. In so doing it, like the Liberal movement, makes it easier for the poor to multiply and harder for ~~the~~ ^{them better off.} rich. It tends slightly to ease the pressure to which it is due. But do not let us blame the Social reformer, Liberal, or Socialist for the dysgenic effects of his action. Let us rather seek for the cause of the anomalous distribution of the birthrate which has made the Liberal and the Socialist necessary.

In this connection it is worth while noting that the argument of Ricardo, so influential ~~with~~ ^{with} modern social reformers, that

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prolificacy of labour will necessarily reduce wages to the level of ^{bare} subsistence, rests upon the presupposition of the dysgenic birth rate. For if Ricardo had assumed instead that the capitalist was compelled by nature to multiply without limit, he would have been led to a population of small proprietors as the necessary outcome of the social system. This instance is of interest as showing that the relative prolificacy of the poor could be taken for granted early in the 19th Century, long before the social reforms to which it is sometimes ascribed.

The symptoms which in modern society seem to be logically connected with the dysgenic birth rate were not unknown to the civilisation of ancient Rome. There also we hear of the extinction of patrician and senatorial families, of frequent promotions of the nouveaux riches, of the gradual abolition of all privileges except those of wealth, and of immense gratuitous distributions of corn, meal or money to the impoverished multitude. At Rome, Antioch, Alexandria and Byzantium at any rate, a free ration of corn was distributed for several hundred years.

Of all the causes and supposed causes of fertility or infertility, those which are of a heritable nature have received the least share of attention. Consider the age of marriage for example. This is an immensely influential factor. From ^{modern} ~~most~~ statistical data I find that the age of greatest fertility among married women is 18; fertility falls off rapidly during the twenties; 100 brides of 30 may be expected to bear children equivalent to about 38 brides of 20; by 35 the probable family is again halved, being only one fifth of that of brides of 20. For men the influence is less direct: I do not know of any evidence

which shows any early or rapid falling off of fertility, but judging merely by the ages of the women they marry the group of men ~~varying~~^{marrying} from 40 to 45 may expect only 40 per cent of the children of any equal number of men varying from 20 to 25. Age of marriage then is one important factor, what are the causes of early marriage? I suggest that the real reason for the differences in the age at which men marry lies in differences in temperament. The passionate, the imprudent, the optimist will, other things being equal, marry young: I believe any one who knows a young man intimately could give a fairly reliable guess as to whether he will marry early, late or not at all.

Another important factor is the deliberate limitation of offspring. Among the ancients infanticide and abortion, and among moderns the prevention of conception is recommended by those who dread the increase of the population. People differ immensely, and by temperament, in their attitude towards these means. Among savages some practise infanticide with reluctance, some with indifference. Among moderns some feel it wrong to interfere with the course of nature, others eagerly advocate the use of contraceptives. I think there is good historical evidence that these moral feelings are inherited, and that races have evolved an immunity to those particular means of child limitation to which they have been long addicted.

The ancient Arabs, a people of magnificent personal character, practised female infanticide freely. From many instances it is clear that the act was one of duty, towards the tribe. Since every man must have a mother, those who practised infanticide with the greatest reluctance must have been more and more fully represented in each succeeding

generation. From such selection a change of moral feeling is to be anticipated: and in the seventh century we find the disciples of Mohammed, long before he had any ambitions of world conquest, before he was a person of any political importance, when he was an excentric religious teacher in the pagan city of Mecca, we find the disciples of Mohammed solemnly taking oath to abstain, among other things, from infanticide. What had seemed a duty to their predecessors seemed to them a thing that must be hateful to God. They felt in their hearts that it was wrong.

I suggest that in this case you have an indication of the effect of Natural Selection upon a moral quality of mankind. You have the evolution of the conscience.: if you like the evolution of immunity to a disease. I suggest that one of the points which gave strength to Mohammed's teaching, which made the Arabs listen to him with respect, was that in this matter he appealed to their innate feelings of right and wrong, and that on this point their older pagan beliefs were contrary to their newly evolved moral instincts.

Let me give another illustration. As you know feticide or abortion was widely practised by the Greeks and Romans, and it so happens that we can trace the course of moral opinion upon this practice. In the 5 century B.C. Plato and Aristotle, men of the highest moral standing, universally respected in their age, both advocated feticide: Plato for eugenic, Aristotle for economic reasons. Five centuries later the atmosphere had changed somewhat. "The great fertility," says Pliny, "of some women, may justify such a licence." Seneca is more

severe. He gives special praise to his mother Helvia, because she had never at any time practised an abortion, as did so many other women of her class. Pass on a century or two more); what to Plato was loyalty and justice, what to Pliny was an excuse, is a damnable sin to Tertullian. Again a new religion endorses a change of conscience, of which we can see the causes, and can trace among the pagan writers the steps of its advance.

Now if once it is admitted that fertility and infertility are to a large extent heritable, either as qualities influencing marriage and the age of marriage, or as moral qualities conferring antipathy towards the current means of limiting population, the existence of the dysgenic birth rate is open to a rational explanation.

In his Hereditary Genius, Galton discusses the extinction of Peerages, and puts forward convincing reasons for deciding that marriages with heiresses are responsible for a great many extinctions. More recently a biometrical study has been made of the peerage statistics, which ~~says~~ ^{shows} that the number of children born by a woman is distinctly correlated with the number born by her mother. Two things are to be noticed about an heiress, ⁽ⁱ⁾ ~~one~~, that she comes generally from a relatively infertile stock; ⁽ⁱⁱ⁾ ~~two~~, that she is in a position to make a socially advantageous marriage. From these two facts, then, Galton explained the relative infertility of certain ennobled families.

In 1913 a short note appeared in the Eugenics Review by a writer named Cobb. He pointed out that the principle on which

Galton explained the extinction of peerages, really explains the whole dysgenic birth rate, for of families of equal ability in any social class, the smaller families will start life with the greater educational and social advantages, and will on the average remain in, and marry into a higher social class, while the larger families will remain in a lower social class or sink still lower in the social scale. This argument seems irrefutable: and consequently it must be admitted that among many good qualities, infertility plays its part in selecting those who rise socially. Marriages in the upper social classes tend to unite in one stock ability and sterility, while in the lower social classes incapacity and fertility are constantly intermingled. ~~||~~ This is an explanation which I think must be very carefully born in mind, whenever we speak of the dysgenic birth rate. Some people who have grasped the main fact are in the habit of talkink of riches causing infertility, or poverty causing fertility. The reverse is the case, fertility causes poverty, while infertility may allow the estates of four houses to be concentrated on a single grandchild. It is an explanation which may be of the widest possible application: careful historical inquiry can alone determine the limits of its application; I can only ^{now} throw out a few indications.

The dysgenic birth rate and its social consequences have been traced to a peculiarity of our civilisation which may be concisely staed as the social advantage of small families. In the modern instances with which we are familiar, this social advantage is essentially financial, but similar consequences would follow whatever were the cause of the

smaller families enjoying the social advantage. In the same way if the social advantage lay with the larger families, the whole system would be reversed. The upper classes would become fertile, the lower infertile. The highest ability would multiply most rapidly. The average quality of the race would steadily improve, and incidentally property would naturally tend to be well distributed. Now, scanty as the records of uncivilised peoples are, there are sufficient remains to indicate that certain barbarous peoples have exactly fulfilled these conditions. And curiously enough they are the barbarians who have from time to time overrun, destroyed, rejuvenated and restored the ancient civilisations which have so constantly suffered from internal decay. Of the European Nordic race we can perhaps judge best from the Icelandic Sagas, but there are one or two notices of antiquity which bear on the point. Among the Homeric Greeks we find Telemachus complaining that he is the only son of an only son; why was he complaining? Because he had no relatives to take up his quarrel. If his father had not returned so opportunely he would have lost his kingdom, and have stood as a famous example of the disadvantage of small families. Tacitus, too, makes ^a the pregnant remark in the Germania, ["] The more numerous are a mans relatives and kinsmen, the more comfortable is his old age: nor is it here any advantage to be childless."

But the best evidence is to be found in the Sagas or biographies of famous Icelanders, in which it will be seen at every stage, how great was the social advantage of an extensive kindred, and how large the families of the nobles

were.

Nor should I omit mention of the Arabians, those barbarians of the south, whose virtues made possible the great civilisations of Babylonia and Islam. Like the Norse their social system rested on kinship rather than on wealth, like the Norse the majority could boast in their pedigrees of a noble origin, indicating in both cases the high fertility of their noble families. An Arab saying illustrates this strangely, for the Arabs boasted that their women alone could bear children after the age of 45, and of Arabs only the ~~noble~~ ^{noble} Koreish could bear after the age of 50.

There is then historical evidence of at least two types of society which recognise class distinctions. The one may be described as barbarian culture. It is a social system based on birth and kinship, it is characterised by the blood feud, and by the cherishing of pedigrees. The large families have a social advantage, and the ruling families are the most prolific. The second or civilised type of society is based upon wealth, the small families have a social advantage, the upper classes are the least fertile, and the average level of ability is steadily deteriorating. Societies of the second type have in the past always decayed so far as to be overrun by barbarian invaders. These brief illustrations give some idea of what I mean by a biological view of history: it presupposes the biological view of man, a living animal for whom success in the struggle for existence means merely to leave numerous offspring. I have put forward a case for your consideration: a case for the systematic study of human

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history by biologically trained students, a case for
the institution of a ^{genetic} ~~scientific~~ history of equal importance with ~~the~~
economic history, industrial history, social history, political and
constitutional history. There are facts, perhaps the most
important facts of history, which are susceptible to a bio-
logical interpretation; there are problems, the most menacing
problems before our civilisation today, the solution of which must
be based upon the biological study of history.