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Social problems: their
treatment, past, present,
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DEPARTMENT OF APPLIED STATISTICS
UNIVERSITY COLLEGE, LONDON

Questions of the Day and of the Fray

No. V

**Social Problems: Their Treatment,
Past, Present, and Future**

[A LECTURE DELIVERED AT THE GALTON LABORATORY
FOR NATIONAL EUGENICS, MARCH 19, 1912]

BY

KARL PEARSON, F.R.S.

GALTON PROFESSOR OF EUGENICS

WITH SIX PLATES

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*Social Problems : Their Treatment, Past,
Present, and Future.*

IT will appear strange to commence an academic lecture by a confession of political faith, but I want to do so on this occasion. I desire to open my discourse by asserting that, notwithstanding the great activity of many of my brother professors in this and other Universities in a certain anti-socialism campaign, I find the only fitting term to describe myself politically is this very word 'socialist'. Nay, I will go further and state that, very possibly owing to some defect in my mental heritage or mental training, I have never been able to grasp any surer foundation for morality than the socialistic; for me the moral is the social, and the immoral the anti-social in conduct. And lastly—here there must be a great void in my intellectual equipment, for I have so often been told so—the feelings and emotions, which I should personally describe as 'religious', centre for me entirely round these social instincts and activities. Study—it may be incomplete and one-sided—has led me to the belief that the function served by political, moral, and religious institutions is the protection and furtherance of the growth of human societies. They have been developed in the natural history of human communities as factors which have assisted progress from herd to tribe, from tribe to petty state, and petty state to nation. The purpose of that evolution is beyond the field of science; it is now, and very possibly always may remain, beyond the boundary of human knowledge; it may be subject of aspiration, or of belief, or of dogma. The ultimate is not

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the problem of science ; we have the past and the present environments ; we have the great bulk of tradition—the knowledge and custom, the habits of expression and the mental view-points—which generation hands down to generation ; we have the great fact of heredity—the joyful boon or the sad burden of man according to his knowledge and use of it. These are the data of to-day, and the duty of science is to predict what will flow from them for human society in the future. The sociology of the future—nay, the very science of history in the future—will be a biological science. Human society has developed under those factors of environment, tradition, and heredity from the herd to the civilized nation. Can we learn the laws of that progress ? Can we interpret those laws so as to assist future progress ? Can we aid man to develop socially with less friction than in the past ? If we once grasp this great feature of human evolution—namely, that man, limited and inefficient as in the bulk he is to-day, was immeasurably more so in the past, then we shall also recognize all political, moral, and religious activities as factors contributing to the evolution of human society ; those who believe that our increasing knowledge of what tends to improve or impair the racial qualities of future generations, either physically or mentally, will enable us to foresee and in part control social evolution, are justified in calling themselves ‘ Socialists ’, whether it be from the standpoint of politics, morality, or religion. I do not see why we should drop a most expressive word because others attach different or possibly false values to it. Dr. Inge in his recent lectures on *The Church and the Age* has said : ‘ The consistent Socialist hates eugenics as much as he hates Christianity, because that science maintains that nature is more important than nurture ’ (p. 72).

Well, as a 'consistent Socialist' I mean in and out of season to preach to the inconsistent Socialist that nature is more important than nurture, and that no social changes can be stable which neglect this great truth. I do not see why we should lose all the emotional force, all the enthusiasm behind the idea that all politics must be socialistic, that all politics tend towards social welfare, because in the past and at the present so many political movements find no justification whatever in our growing knowledge of the laws of human development.

The long social development of man has naturally been marked by a growing development of the social instinct. But the growth in sensitiveness to pain and suffering which characterizes modern man in contrast to the callousness of the savage has not been marked by an equal growth in the knowledge of how effectually to promote social welfare. Nothing appeals to the young so much as a request to take part in social work ; nothing appears to gratify the social instinct in the old more than a bequest of be it a few pounds or many thousands for this or that charitable purpose. A hundredth part of the labour devoted to one, or of the immense funds expended on the other, might serve humanity better by investigating the directions and limitations within which permanent social improvement can be achieved. What are the racial forces at work ?—how can we modify or direct them towards furthering human evolution ?—these are, I believe, the problems of true socialism—the socialism of the future. The preliminary to any political reform must in the future be intensive social study. It is a hard statement, but is none the less a true one, that you cannot act socially, that is morally, without knowledge. If you follow your social instincts, if you obey your emotional cravings, under modern conditions, you may do good

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possibly in four out of five instances, but in the fifth instance the harm you will do will probably more than outweigh the whole good previously accomplished. I know it is very hard to believe that what you instinctively feel to be kind is cruel, and that what you instinctively feel to be cruel is in reality kind, but wider knowledge will show you that such cases do arise only too frequently.

We are far too apt to think in periods of thousands instead of hundreds of thousands of years. We look at Greek civilization, or Egyptian civilization, and say that physically and intellectually the men of those days were our equals. We are inclined to say that the growth has been one of accumulative tradition, and not of the evolution of a superior mental and physical type. But turn back a few hundred thousand years and consider whether palaeolithic or neolithic man was of a type comparable with our own. Consider the primitive races of to-day, and ask whether any amount of tradition would make them the equal of the higher races. Our views of the Red Indian are largely tinged with sentiment—study him dispassionately, and you will find his marked inferiority to the white man. The Japanese stands mentally and physically on a wholly different plane to the Aino. The Australian native is tens of thousands of years in all phases of development behind the white who has displaced him. And then the negro—that most difficult of all problems, which the white man, through his lack of knowledge to act socially, has brought and is still bringing upon himself—shall we say that the difference between negro and Caucasian is one of merely accumulated tradition? You cannot settle that problem in America, where remarkable negroes have indeed appeared, but where the question of white blood even in these leaders complicates the question. You must examine it in Africa, where,

after thousands and thousands of years of selective struggle with relatively small white interference, no civilization comparable with that of the European or the Asiatic has been evolved. Where our ancestors marked 'deserts' or 'cyncephali' on their maps of Africa, we know now that there have been teeming black populations for endless ages, tribe fighting tribe as Greek fought Greek, kingdom supplanting kingdom as rapidly as in our own European history. And what result is there to show? Nothing, absolutely nothing comparable with the products of the European and Asiatic struggles. What is the reason of the difference? A hasty judgement might at once say climate. Possibly this may be true indirectly, but we have to remember that the negro race has had the run of Africa from the Cape to Egypt; that we are not, indeed, certain where the original centre of negro development was, and that we cannot neglect the negroid types of Asia and the Pacific. Let us call to mind further that the scheme of evolution is comparable with highly differentiated branches springing from a common stem, and we shall recognize how the direction of a special racial growth may originally have been settled by environment, possibly even by climate, and yet it may now be hopeless to try to prune and train it in the direction of another differentiated and specialized branch. There is no natural equality of human races, any more than there is any natural equality of human beings; they are the product of their past evolution moulded by selection and heredity. As far as we can understand it, evolution is largely an irreversible process. Ape and man may be branches springing originally from a common trunk, but there is no evidence to show that any amount of selection now would enable us to pass from one to the other.

My studies on complete and incomplete albinism of the

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dark races have convinced me that with sufficient funds, dictatorial power, and longevity in the dictator, a very few generations would suffice to produce a race of negroes with white skin, yellow hair, and blue eyes. I do not believe that any funds or power or length of time would enable me to reverse the process. The white almost certainly had a dark-skinned, dark-haired, and dark-eyed ancestor, and he has lost something which it would mean reversal of selection to regain. In the Biometric Laboratory we have recently made as complete a study of the negro skull as lay in our power, and the main conclusions of that study appear to be the following :

(i) In those characters in which the negro skull is markedly differentiated from the European skull it is the negro which is the more variable.

In other words, it would appear that the selection which has produced the European skull has been far more stringent than that which has led to the negro.

(ii) There is for the best ascertainable characters a continuous relationship from the European skull, through prehistoric European, prehistoric Egyptian, Congo-Gaboon negroes to Zulus and Kaffirs.

The indication is that of a long differentiated evolution, in which the negro lies nearer to a common stem than the European ; he is nearer to the childhood of man.

I have told you that I think the pigmentation of the negro could be modified in a relatively short time to resemble that of the white ; I doubt whether the cranial changes would be nearly as simple, and those who assert that the intellectual differences are nothing or can easily be equalized by tradition and education are giving expression rather to hope and belief than to knowledge.

We do not give the child an equally authoritative voice

with its elders in the management of the household. And if the negro or any other race belongs to the childhood of man's evolution, we are justified, even for their own benefit, when we have suspended the stringent action of natural selection, in treating them as children. But in doing that we have ever to remember that the treatment of the child and the treatment of the slave are very different things. The latter connotes a relationship of irresponsible profit, the former one of paternal protection and sympathetic control. The fundamental idea of evolution, the survival of the fitter, involves essentially the inequality of the races of man. The peace of civilization, forced by the higher on the lower races, removes them from the very struggles which nature has designed as the rough-hewn stepping-stones to high estates. Can we be certain that in giving them our traditions and our environment we give them what will aid their upward course equally effectively? If we have grasped the very essence of the Darwinian theory, if we have followed the recent evidence provided for the relative parts played by nature and nurture in the case of man, we can hardly accept the position that our traditions and our environment will achieve much! If civilization suspends the action of natural selection among the lower races, then it will only achieve permanent results if it follows the lines of Nature herself, and organizes the social and economic conditions in such a manner that the physically and mentally abler individuals have a dominant fertility.

I may seem to some of you to have wandered very far from my topic—that of our own society and its social problems. But a little consideration will show you that it really is not so. Few of our countrymen realize to the full how their very existence does not depend solely on what is going on in these little islands. We depend for our

livelihood largely on the prosperity of a number of other societies, many of which consist of less developed races. Their racial progress is essential to our racial progress, and our degeneracy would be as grave a misfortune to them as to ourselves. As we need for our own social guidance a realization that man is subject to definite biological laws, so we need it no less emphatically in colonial and native race policies. Turn in every direction, and the same problem recurs. In India British rule has suspended the old struggle of race with race; have we organized India socially and economically so that the fitter races have a dominant fertility? In Australia have not our kinsfolk been fighting idle political battles when the great social problem—the problem which involves the very permanence of Australia as a white man's land—was the rapid production of a very numerous mentally and physically fit white population? And in South Africa what has been going on? Why, with suspension of the old tribal struggles there has been a rapid multiplication of the negroes, good and bad alike. Meanwhile Dutch and English squabble, and appear to overlook the chief social problem, namely, how to create a homogeneous white race, whose fertility shall markedly dominate that of the black. Look where we will, if we penetrate beneath the superficial politics of the moment we find great social problems which are really biological in character, and which carry us back to the fundamental factors of evolution, differences between man and man, perpetuated by heredity and depending, when natural selection is wholly or in part suspended, on relative fertility.

, If we recognize once for all that our narrower social problems, as well as our broader social problems, those of external policy, are essentially problems of evolution,

then is not their proper treatment largely summed up in the advice that man should strive with such intellectual powers as he possesses to grasp the nature of past evolution, with the view of furthering the work of present evolution? Francis Galton expressed this idea in 1883: 'Man has already furthered evolution very considerably, half unconsciously, and for his own personal advantages, but he has not yet risen to the conviction that it is his religious duty to do so deliberately and systematically' (*Inquiries into Human Faculty*, p. 394).

Now it appears to me that in those words of Francis Galton lies the difference between the past and the future treatment of social problems. The social problem in the past was solved, if solved at all, by allowing our sympathetic instincts full play; popular feeling was stirred by piteous descriptions of wrong and suffering, and the first, the obvious, but by no means necessarily the true remedy was adopted. This is not a fanciful description of affairs. There are many illustrations of its reality. There was terrible abuse of child labour in the factories. One remedy was obvious: Forbid the children to enter the factories. But if the children had no longer economic value in the factories, they were a drug in the homes, and as soon as the factory workfolk knew how—namely, in 1878—the children largely ceased to be. The same sort of cry has arisen with regard to infantile mortality. The death-rate of infants is high and the birth-rate dangerously low. A remedy for the latter evil could be found by decreasing the former. Whether or not it was on the whole the feebler infants who died, did not seem to enter the minds of those who proposed to keep up the population by decreasing the death-rate of infants. They looked round for the causes of the infantile death-rate, and they found or thought they had found it in the employ-

ment of mothers. In his inaugural address to the Conference on Infantile Mortality (1906) Mr. John Burns said :

‘I put forward this modest proposal, that no married woman be allowed to go to work three months before her confinement, and I would support a proposal that no married woman be allowed to resume work till six months after it.’

Dr. James Niven, the Medical Officer of Health for Manchester, commenting on these words, says: ‘It is manifest that the withdrawal of the mother’s care must be injurious not only to her infant but also to the rest of her children.’ That is an argument which would apply to a proposal to forbid all employment of mothers. Mr. John Burns demanded nine months only out of each eighteen. Now I have no idea how far there is a chance of Mr. Burns’s views being adopted. Judging by the legislation of the past, I think it quite conceivable that they may be proposed and sanctioned by our legislators. But if they be, then, assuming them to be unaccompanied by endowment of motherhood, as there was no endowment of childhood under the old factory legislation, so there will be even a still more disastrous decrease in the birth-rate.¹ Such is the old method of approaching social problems—a complete disregard, I think we may justly say an absolute ignorance, of the fundamental biological side of human life. There was not the least recognition that man was subject to the stringent laws of evolution, and that unless man, as Galton words it, ‘deliberately and systematically’ furthers evolution, he faces national catastrophe. We speak of ‘race suicide’ as if the mass of the people themselves brought this about. It would be more true to phrase it as ‘race murder’—race murder due to thoughtless

¹ And it will be a decrease again especially in the birth-rate of the fitter, for our investigations seem to show that it is the healthier mothers who are employed.

legislators. Hard environment rarely kills a race, it rises stronger for the struggle ; it is the artificial environment, the civilization which forgets the biological factors of human life, which leads to race-degeneracy and race-death.

If then the view I have to-night put before you be a correct one, you may be certain that no discussions of social questions—no political movements, for these always involve ultimately social problems—can be adequate which do not give due weight to the biological factors controlling human communities. Ask yourselves with regard to all proposed legislation—have its supporters considered its bearing on racial evolution? Have they questioned how it will affect the relative fertility of the fit and the unfit members of our society? It is perfectly right to alleviate suffering ; it is perfectly right to make life worth living for each member of the community who has social value. But there are many different ways of alleviating suffering ; there are innumerable methods of social reform ; and we may be perfectly certain that the easy method which does the obvious because it appeals to our social instincts, or because it satisfies the demands of the untrained majority, stands very little chance of being the right path, the one which will further racial evolution, amid the complex network of paths which cross and recross the forest of social reform.

Think for a moment of the chief factors in social evolution : The mass of men who dumbly bear the ill, or sharply cry out when the pain exceeds endurance ; do they understand social evolution? can they propose a fitting remedy? The philanthropist who *feels* their suffering and voices their ills ; has this man of all-dominating social instinct ever studied the biological laws which govern human life as all life? My experience seems to show me that his outlook on human life is generally very narrow ; he sees one feature of

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social difficulty, factory labour, employment of women, back-to-back houses, or drink, and he is apt to attribute all the ills of the community to this one feature. He again has no conception that Darwinism has revolutionized not only our theories of life, but must revolutionize our practical treatment of social evils. And lastly the politician, when he bids for power by appealing to the mass of men; has he any special insight that ensures the effectiveness, nay, the very safety, of his proposals for social changes? I very gravely doubt it; I see no school where he is provided with a preliminary training in the relative magnitude of the factors he has to deal with. I see no evidence in his handiwork that he has ever balanced nature against nurture, that he understands the social difference between increased fertility and decreased infantile mortality, or that he has ever measured what mars or makes for the racial efficiency of future generations.

How can we expect that he should do so? Is not our whole system of education carefully organized so as to exclude the study of living man? Dead literatures, dead philosophies, dead theologies, dead sociologies may all be studied in our Universities. Living sciences may be closely followed so long as they deal with inanimate nature or with lower types than man. But of a real living sociology which starts from a study of the biology of social animals, which knows what heredity means in human affairs, which cautiously measures each factor of environment and the social value of each type of human life, which seeks as its religion and as its politics to further evolution in man, of such a living sociology what traces are there in our Universities to-day? How many of our academic students are encouraged by their tutors and pastors, or even by the possibility of a degree, to take up courses leading to such a training?

How many select for themselves such a line of inquiry because they have political ambitions? Of a surety a student with political aims at Oxford or Cambridge would be encouraged to become president of the Union Debating Societies, while his academic hours would be spent, in the former case, in writing facile essays on everything but science, and in the latter case if he escaped the history tripos he would be doubtless advised that the study of man was involved in 'moral science' and political economy! When I think on these things, and realize how little the great renaissance of knowledge which followed Darwin's epoch-making works in the third quarter of last century has yet touched our study of social man, I sigh for a brief revival of the spirit of the younger Humanists, who in that glorious satire the *Letters of the Obscure Men* swept away the old educational absurdities of the fifteenth century. Will no University recognize that a school for politicians, philanthropists, and social workers is a primary need for real social progress, and that the spirit of that school when it is founded must not be that of August Comte or Herbert Spencer, but of Charles Darwin and Francis Galton—a spirit of inquiry, of observation, and of experiment, with the view of 'furthering evolution in man' as a religious duty?

I think I have said enough in this lecture of the spirit in which social problems must be approached in the future; it is wholly different from the spirit of the past. It demands elaborate study before legislative remedies are sought for social ills. It demands scientific knowledge to control our blind social instincts. It demands that the politician shall have insight into racial evolution, and shall consider the future of the race rather than the immediate desires of this or that class. It demands above all an

educated electorate not easily swayed by emotional appeal, and determined that its political leaders shall be subject to stringent selection—that only the fittest shall survive. Surely the first stage to this ideal future must be the establishment of schools in all our Universities where both by teaching and by research we may learn the laws which control human societies? From such centres the new social knowledge would gradually leaven the whole thinking part of our population.

Some of my audience may be inclined to remark: But we have a science of this kind; it is termed Sociology, and Professors even exist to demonstrate its principles. Well, I study with great interest certain sociological journals published in widely separated parts of the world, with a view of ascertaining whether they will provide us with what we need—insight into human evolution. Roughly, I find about a third of their space is devoted to lists of what other people, anthropologists, folklorists, economists, have written; another third to criticisms of what other people have published, and the remaining third to popular lectures or facile essays on social problems. Observation, measurement, experiment, are conspicuous only by their absence; talk, endless talk, governed apparently by the pre-Baconian conception that verbal disquisition can solve scientific problems. When I read sociology as it exists to-day, the sterile product of Comte and Spencer, I get no help at all in social problems. I am merely reminded of the words of Lord Kelvin:

‘When you can measure what you are speaking about and express it in numbers you know something about it, but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind.’

And again of Francis Galton himself:

‘Until the phenomena of any branch of knowledge have been subjected to measurement and number, it cannot assume the status and dignity of a science.’

In those words, *measurement* and *number*, lies, I think, the foundation on which the sociology of the future must be constructed. It will start from observation and experiment, it will measure and it will count, and its reasoning—as that of all true science based upon observation and measurement—will be mathematical in form. It will discard verbalism, as one by one each branch of knowledge which has become truly scientific has discarded it; it will place no faith in the mere statement of opinion; it will disclaim any belief in authority, however imposing, be it literary, be it political, or be it medical. ‘Nullius addictus jurare in verba magistri’—it will not be pledged to swear by the mere word of any authority.

Is there any novelty about such a claim? I venture to think none whatever, beyond that which inevitably arises when the world at large persistently forgets truth and has periodically to be reminded of it. Then there is friction, followed by heat and light, but it is not new flame, it is the same old fire as Prometheus gave man as an aid against unreasoning authority ages ago.

Leonardo da Vinci knew all about this truth when he proclaimed before 1500 that no human investigation could claim to be true science if it had not passed through the stage of mathematical demonstration.

What did the founders of our own Royal Society mean when, just two hundred and fifty years ago, they chose *Nullius in verba* as their motto? Why, when one after another of the observational and exact sciences has sought and found representation in its transactions and councils,

has sociology remained unrecognized? Can we doubt that the truth of this lies in the fact that sociology has not proceeded by observation and measurement, that it has not sought to apply exact quantitative methods to social problems—that, in short, it has delighted in mere verbal disquisition, and has trusted *in verba magistri*?

Now we shall be told that it is impossible to apply mathematical reasoning to sociology. Well, I remember that sort of argument being raised with regard to psychology—I think it was then termed ‘philosophy of mind’—it was pure verbalism and authoritative opinion. Then came Wundt in Germany and Francis Galton in England, and no doubt others elsewhere, and showed that the processes of the mind were capable of accurate observation and measurement. The result of that change was at once epoch-making—the door was thrown open to mathematical reasoning, and there is hardly an issue of a German, French, or English psychological journal to-day which does not illustrate the application of the calculus of correlation to mental processes. Psychology has thus become a true science in Leonardo da Vinci’s sense, and its full recognition as such by our own Royal Society is only a matter of years.

No doubt the change was unwelcome—nay, painful—to the psychologists of the old school. The new science demands special training; it no longer admits of the deduction of laws by the introspection of a single mind; *nullius in verba* it can now also accept for its motto. And the result? There has been more real progress in the last twenty years than in the previous two hundred!

I believe that every word I have said about the immediate past of psychology will apply with even intensified truth to the immediate future of sociology. It is about to become a true

science based upon observation, followed by mathematical reasoning. The time is coming when it will be recognized not only that the man in the street cannot give a satisfactory answer to each and every social problem, but that the man of education cannot do so unless he has been through the requisite training and applies it to appropriate data. We have learnt enough in the last quarter of a century to understand that we cannot, without special training, answer from our own individual experience chemical or physiological problems. Many of us, however, still think that the ten-times-more-complex social problem can be answered by sentiment, by letters in the newspaper, by hustings' argument, or by any other process of that *jurare in verba magistri*, which in the past has replaced and at the present replaces true social knowledge.

Social life and therefore social problems fall into that difficult group of facts which the Germans term *mass phenomena*. We have to deal with mass relationships, mass variations, and average results. The old mathematicians confined themselves to expressing functional relationships between quantities; they were hampered by a philosophy of causation which had little true application to biological phenomena. Francis Galton, having realized that the fundamental problem of sociology was the furtherance of evolution in man—that the study of man in society was a mass-phenomenon that demanded actuarial methods capable of dealing with heredity, environment, fertility, disease, and death in the mass—set to work to develop a new mathematical calculus. He suggested the first conceptions of correlation, the idea of a quantitative measure of relationship, which may take every intensity from complete independence up to absolute functional dependence. From that conception has sprung the whole modern theory of

statistics. That theory enables us at once to give due weight to each factor, economic, environmental, hereditary, or reproductive, that arises in the treatment of social problems. We can isolate those we wish to consider and measure their effect independently of others. There is no longer any excuse for not applying mathematical reasoning to social problems, and the future path of sociology—its transition from the *jurare in verba magistri* to the *nullius in verba* of our Royal Society—becomes clear. There is sure to be friction in the progress—the old sociologist will begin by saying that the claim is absurd, that the methods are foolish or the data idle; then he will come by night to the new school of workers for advice; afterwards he will use the new methods, and state that they are only modifications of old ideas, and that not they in themselves but their adapters were foolish. Finally—after ten to fifteen years, say—he will, quite casually, term the first memoirs which discussed social problems by the method of correlation as ‘epoch-making’. That has been the history of the new calculus as applied to biology, to craniology, to psychology, and to medicine, and I have little doubt that it will be so in the case of sociology.

But there is in the case of social problems a far more important factor than arises in the cases of craniology or psychology. I refer to public opinion. Will public opinion for a moment admit that social problems require special knowledge for their solution? Will it in the future weigh judgments as well as count them? I cannot say, but I feel personally certain that some of our most pressing social problems—those of inebriety, of tuberculosis, of the employment of mothers, of the fertility of the unfit, of the relative influence of different environments—I feel certain that no permanent solution of these problems will be found until they are

studied academically, before they are dragged into the political field and used as political cries. I want to see four or five university laboratories in this country alone working at these problems—each of our great towns presents material enough in all conscience for such work—and such laboratories will correct or confirm each other's researches and form centres for spreading higher knowledge among the thinking public.

But the first matter we have got to impress on the public is the extraordinary complexity and difficulty of all social problems. When men or women inform me that they know the right way to act in any of these grave social matters, I anticipate either the inspiration of genius or the rashness of folly. I know no better method of bringing this home to you than by illustrating the variety of pitfalls into which not merely politicians and social reformers, but even the men to whom the public looks for guidance in race hygiene fall as soon as they touch medico-social problems. In this matter the chief offenders are undoubtedly members of the medical profession. Nor is this wholly their fault; in the first place the public very unreasonably expects every medical man to be a trained scientist, whereas the amount of his really scientific training may actually be less than that of the clergyman or lawyer of the same parish; and in the second place the growth of medico-social statistics during the last ten or fifteen years has led to a demand for a specialized type of medical man with a specialized training which has not yet become a recognized part of any medical curriculum. The result is that medical men are often called upon to express dogmatic opinions where a little more training and knowledge would probably lead them to refrain from any answer at all. And the public is not a little to blame, for

the more dogmatic a medical man is, the more confidence the average patient has in his judgement.

If, therefore, my illustrations are taken chiefly from medical statements, it is with no intent to attack the members of a great profession, among whom I reckon many of my best friends, but rather to show you how, if logical method fails among men to whom we trust largely for our views on social problems, there can be no hope indeed of the opinion of the man in the street being of any greater value.

The first illustration I shall take will be that of the *School Clinic*. It is difficult to believe that such clinics cannot be of great national service; if the data obtained from them are carefully recorded, we shall know not only from what the children of the people suffer, but how much can be done to help them.

In a recent paper published in *School Hygiene* (May, 1911) Dr. R. Tribe gives a table showing the gain in weight of children suffering from anaemia and debility during their attendance at the clinic under his charge. I have reduced the table to a graph, which I show in the accompanying plate (Fig. I). Dr. Tribe writes as follows of these results:

‘The next table shows the average gain in weight of these children whilst under treatment.’

This can only be interpreted as suggesting that the treatment produced the change in weight. Otherwise, why refer to the changes in weight at all? Indeed, Dr. Tribe tells us that there are no scientific observations in these cases save for the figures of weight.

When I saw this result I was for the moment struck by how much a very slight change of environment, a few doses of perchloride of iron, or a little extra milk could do for

Fig. I. Growth of Children with Anaemia and Debility
under treatment

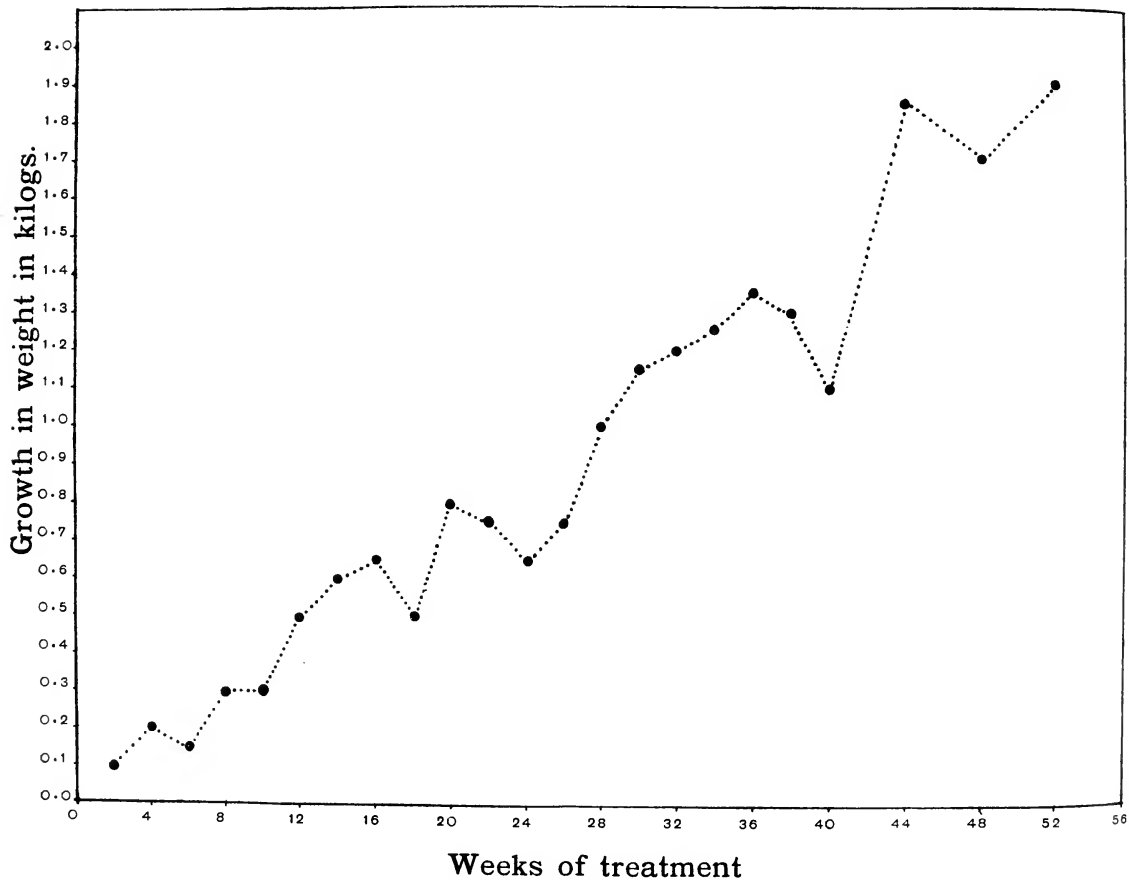




Fig. II. Scatter Diagram of Children with Anaemia and Debility
showing growth before treatment

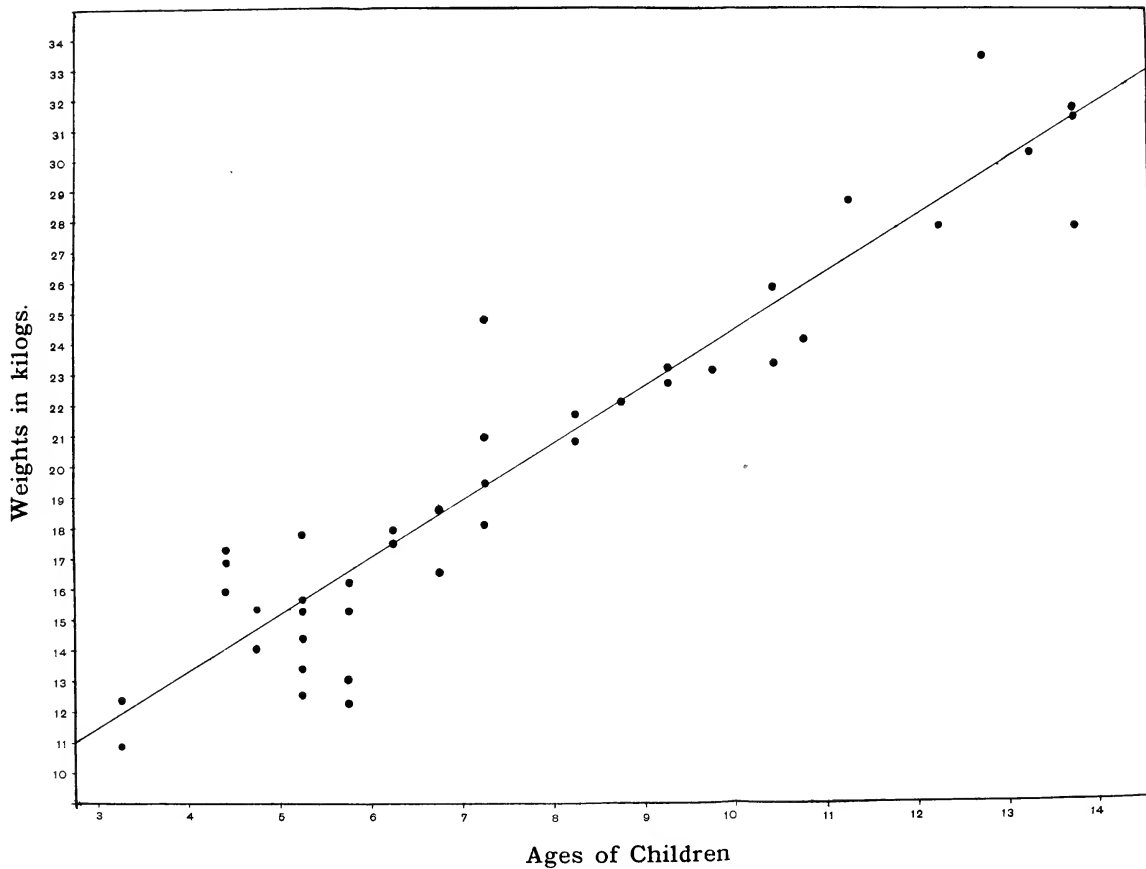
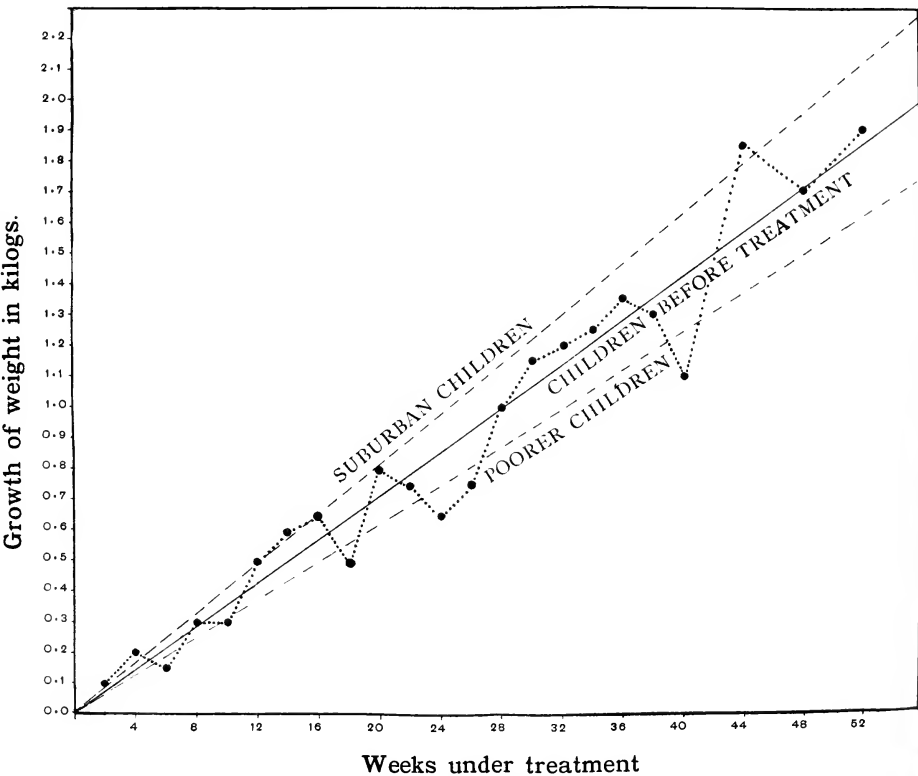


Fig. III. Growth of Children with Anaemia and Debility under treatment compared with all Children and with Anaemic Children before treatment



a child—could the mere attendance, advice, and drugs provided by the clinic continuously send up the weight of a child like this? Then it occurred to me that it was worth investigating how much a poor child of the same class would grow in the same period who was *not* attending a school clinic. There are two ways of reaching this result, either by taking poor school-children of the like class and same average age as Dr. Tribe's group, or by actually basing our growth on the weights of Dr. Tribe's children before treatment. Since these are of different ages they show how such children actually grow without treatment. These results are exhibited on the next plate. Fig. II exhibits the growth of Dr. Tribe's children before treatment. I have obtained the average line of growth of these children, and then, in Fig. III, I place it on the same diagram as I have shown you in Fig. I. It accurately continues to describe the growth after treatment! I have also placed on the diagram the lives of growth of *normal* children in a suburban London school and of children in a poor-class school. You will see that Dr. Tribe's children grow in an exactly intermediate manner, which manner is closely represented by their growth before treatment!

Now I have no doubt Dr. Tribe's results will be quoted for many years to come as exhibiting the excellent effect of school clinics! Personally I cannot see how a school clinic can fail to be of some advantage, but a fearful nemesis seems to pursue those who use statistics without adequate knowledge, to support some foregone conclusion of their own.

I will now turn to an illustration of another type. It is a strong and frequently adopted argument against all use of alcohol that it produces a crop of tuberculous, imbecile, dwarf, and other abnormal children. In particular it has been asserted that children begotten at the time of the

vintage show a larger percentage of imbeciles in their number than those begotten at other seasons. Apparently the authors who support this view look upon the modern vintage, not as the season for the laborious task of gathering rather sour grapes, but as a wild bacchanal in which men and women maddened with wine imitate the orgies depicted by classical writers and sculptors. However this may be, here are a few medical opinions on the subject :

In October, writes Dr. Bezzola, the birth-rate of imbeciles blazes up suddenly afresh. The summer holidays have refreshed folk to new excesses, and the vintage in many districts provides new germinal poison.

Senator and Kaminer cite Bezzola's figures as indisputable proof that alcohol has a toxic effect on the germ cell.

Professor Forel tells us that ' In the wine-growing districts the maximum conception of idiots at the time of the vintage is enormous, while it is almost nil at other periods '.

Please keep those words in your minds.

Dr. Basil Price tells us that ' In certain wine-growing districts . . . it has been shown that the majority of imbeciles are conceived during the periods when most drinking takes place '. And lastly we have Sir Victor Horsley and Dr. Saleeby repeating the same story, the latter in the words, ' We have Bezzola's inquiry showing that in Switzerland most idiots are conceived at the time of the vintage.'

Now where lies the importance of all this? In the simple fact that we think we have demonstrated in this laboratory that the worst type of alcoholism flows from mental defect, and that it is the heredity of mental defect which leads to the presence of imbecile and mentally-defective children in the families of extreme alcoholists. If you cut off the alcohol you will not stop the mental defectives, but if you segregate the mentally defective from

childhood onwards, you will check, perhaps, 75 % of the excessive alcoholists.

Now let us look at the actual data, such as Bezzola had before him when he started his hypothesis that the vintage produced imbecile conceptions.

On the accompanying plate (Fig. IV) I have distributed 8,196 births for ten years in months on the basis of a total Swiss experience of 934,619 births for ten years. This is the polygon A A. On either side of this I have drawn two further polygons in such positions, that if the experiment were repeated ten times by taking 8,196 Swiss births, only once on the theory of pure chance would the result trespass outside those limits. I now take the 8,196 imbeciles actually born in those years in Switzerland. If they were a random sample of the general births, we should expect that the curve would only fall once outside our C C and C' C' boundaries. The imbeciles at the point α do fall once outside the band, but everywhere else they are well within the band. In other words, the imbecile births are a perfectly random selection of all other births—here and there they differ from other births, just as if you toss a coin one hundred times, you fail to get fifty heads and fifty tails on each occasion!

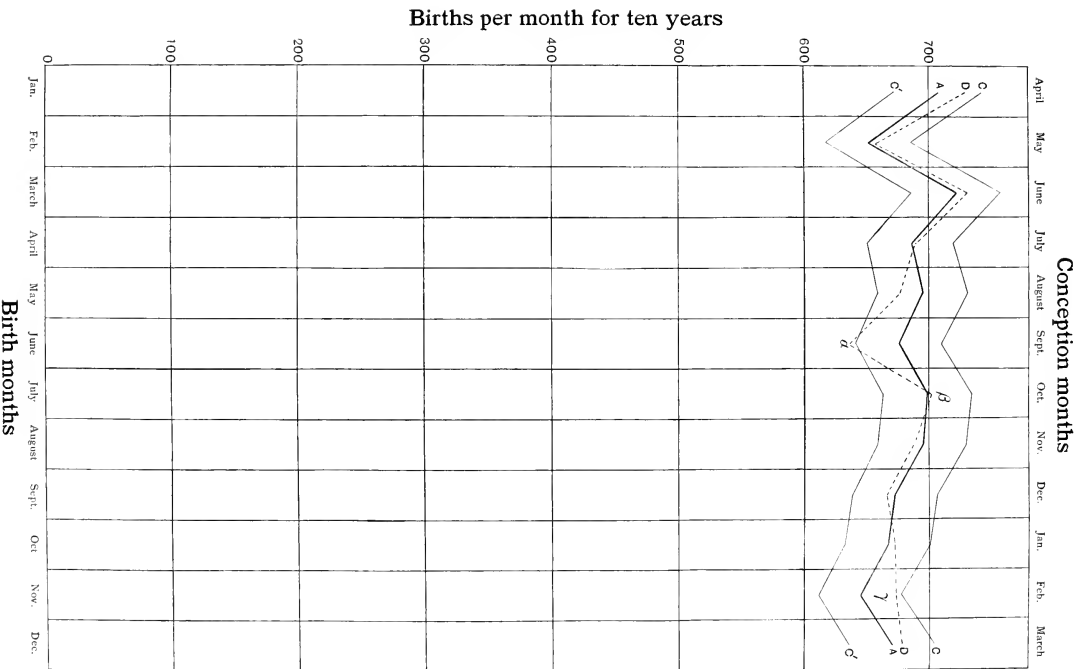
Now look at October! This is the month when the vintage according to Bezzola has caused the number of imbecile conceptions to blaze up! This is the enormous conception of idiots at the time of the vintage according to Professor Forel, while he tells us it is almost *nil* at other periods. This is Dr. Saleeby's 'most idiots are conceived at the time of the vintage'. If the idiots were a random sample of all conceptions, we should expect 700 in the month of October; there are 703! Those three extra idiots—well within the limits of random sampling—represent Bezzola's blaze-up in idiot conceptions, and Forel's enor-

mous conception of idiots due to the vintage. Those three extra idiots are the source of the widespread medical belief that somebody has demonstrated that children conceived at the time of the vintage are likely to be imbecile! And medical literature has accepted such evidence as a demonstration of how temporary alcoholism affects the germ plasm! I believe that in both Germany and Switzerland you would find more persons drunk at the time of the carnival and at the harvest festivals than at the vintage. Such are the type of statements upon which our social 'knowledge' is too often based! And such statements are made without public criticism and will be accepted by masses of men because they are put forward by medical authority. In the present case there is not a grain of evidence produced to show that the parents of the surplus three idiots beyond the 700 had ever been associated with the vintage at all!

From Swiss statistics I will come a little nearer home. There is not the least doubt that the teeth of the present generation of children in the public schools are very bad, and that caries is a real national danger. There is only one way to meet the trouble, i.e. to endeavour by observation and experiment to determine what causes the trouble and how, if possible, we can remedy it.

Dr. Leslie Mackenzie is Medical Member of the Local Government Board of Scotland; he has written a big book on the Medical Inspection of School Children, which has had much influence on all this new work and its methods. In this book he cites statistics of the badness of present-day children's teeth. He gives no evidence, however, to show how much worse they are now than a few thousand years ago, although there are plenty of long series of skulls in existence from which some idea might be formed. He produces no evidence at all that there are more carious teeth

Fig. IV. Conceptions of imbeciles in Switzerland
Bezzola's data



in the children of the poorer classes than among those of the middle classes, he overlooks entirely the elaborate researches of Röse on the influence of drinking-water on caries, but he insists on a new school drill, the 'Tooth-brush Drill'.

'Is it more preposterous or more ridiculous', he asks, 'to teach our children how to preserve their teeth than to reject tens of thousands of good army and navy recruits because they cannot munch hard biscuits with the teeth left to them? Is it more preposterous to spend nothing but a little common sense in teaching the use of the tooth-brush than to spend hundreds of thousands in providing our soldiers with false teeth? In the school age and at school, it is possible to lessen the losses of teeth. In the recruiting age, the teeth are already lost. An army marches on its teeth. Surely therefore it is the lowest depth of ineptitude to scoff at the tooth-brush drill and yet to lament the big percentage of rejections' (p. 264).

Dr. Leslie Mackenzie then passes to the organization of the tooth-brush drill and the sterilization of the school tooth-brushes. Now personal experience would lead most middle-class persons to believe that the hygiene of the mouth was aided by the use of a tooth-brush; it contributes, they would consider, to the amenities of life. But they might be rather doubtful as to how far it checks caries. They would note that this evil is by no means confined to those who neglect the tooth-brush drill; that some races, who never think of this drill, have excellent teeth and that others appear to have peculiarly bad and caries-labile teeth. They would raise such questions as whether caries was really a matter of race, of hereditary disposition, or constitution, or again, whether it was due to environment, to food or water supply, to habits of breathing, or to urban or rural conditions. Shortly, they would at once see that, as in the case of tuberculosis, we have a vast social problem before us and that of a truth 'the lowest depth of ineptitude' lies only in those who—without full inquiry into the subject—without previously

ascertaining whether heredity, environment, or habit is the dominating factor, preach the doctrine that a school tooth-brush drill will save thousands of pounds a year to army and navy, and arrest the decay of children's teeth.

Quite recently Dr. Frank Rock has taken up the problem¹ and investigated the number of decayed teeth in boys and girls for three classes of children: (A) those who use a tooth-brush daily, (B) those who use it occasionally, and (C) those who never use it.

The accompanying table gives Dr. Rock's results:

AVERAGE NUMBER OF CARIOUS TEETH.

DR. ROCK'S DATA.

Tooth-brush.	Boys (556).	Girls (507).
Used daily	1.13	1.33
Used occasionally .	1.35	1.21
Never used	1.25	1.13
Correlations . .	+ .07	- .07

Thus Dr. Rock's results seem to show that the tooth-brush exerts no influence whatever in the prevention of decay. Whether Dr. Rock's results will be confirmed or not with larger numbers I cannot say, but I feel quite confident that his method and not that of the Medical Member of the Scottish Local Government Board is the right method with social problems; we must isolate each factor of habit, of environment, of parentage, and test its significance, before we rush to conclusions as to what will or will not cure a social or racial ill. The 'tooth-brush drill' for caries is only another illustration of the same frame of mind as the sanatorium cure for tuberculosis.

Some of you may be inclined to say that I have picked out special cases of statistical blunders and that it is always easy to do this. Now I want to emphasize that such blun-

¹ *Biometrika*, vol. viii, p. 237.

ders and such inadequate forms of reasoning occur on almost every page of the Local Government Board Reports of both Scotland and England, and that the results reached or supposed to be reached influence political action and social legislation.

I take up another illustration : The Report by Dr. Leslie Mackenzie and Captain A. Foster on the Physical Condition of Children attending the Public Schools of Glasgow, *Scotch Education Department*, 1907. The authors discuss the data given in the following table :

INFLUENCE OF ENVIRONMENT.
LESLIE MACKENZIE AND FOSTER'S DATA.

Homes.	Boys 5 to 18 years.		Girls 5 to 18 years.	
	Weight in lb.	Stature in inches.	Weight in lb.	Stature in inches.
One-roomed	52.6	46.6	51.5	46.3
Two-roomed	56.1	48.1	54.8	47.8
Three-roomed	60.6	50.0	59.4	49.6
Four-roomed and air .	64.3	51.3	65.5	51.6
Extreme Differences .	11.7 lb.	4.7 in.	14.0 lb.	5.3 in.

The authors comment on this table as follows :

‘ These figures show that the one-roomed child, whether boy or girl, is always on the average distinctly smaller and lighter than the two-roomed ; and the two-roomed than the three-roomed ; and the three-roomed than the four-roomed. The numbers examined are so large and the results are so uniform that only one conclusion is possible, viz. : that the poorest child suffers most in nutrition and in growth. It cannot be an accident that boys from one-roomed houses should be 11.7 lb. lighter on an average than boys from four-roomed houses and 4.7 inches smaller. Neither is it an accident that girls from one-roomed houses are, on the average, 14 lb. lighter and 5.3 inches shorter than girls from four-roomed houses ’ (p. v).

Now these differences, 11.7 lb. for boys and 14 lb. for girls, have gone the round of all sorts of medical papers

and books as a measure of the influence of environment, and this because they have all the weight due to a Government report !

Now if you come to think over one-roomed homes, who do you consider are likely to occupy them? Why clearly as a rule small families, and these will be largely the cases of *incomplete* families, families not yet grown up or consisting of the younger children.

Here is a plate (Fig. V) showing the basis of this fallacy in the reasoning of the Local Government Board officials. You see the enormous preponderance of the younger children in the one-roomed houses; the children of 13-18 belong to the four-roomed houses, and naturally the weight and height of children in those homes is greater.

Is there then no difference between the children from the poorer and wealthier homes in weight and height? Undoubtedly; we can ascertain at once what it is by simply reducing all the children to a standard age distribution. This has been done for Glasgow by Dr. Heron in his memoir on the *Influence of Defective Physique and Home Environment on the Intelligence of School Children*.

Here is the corrected table :

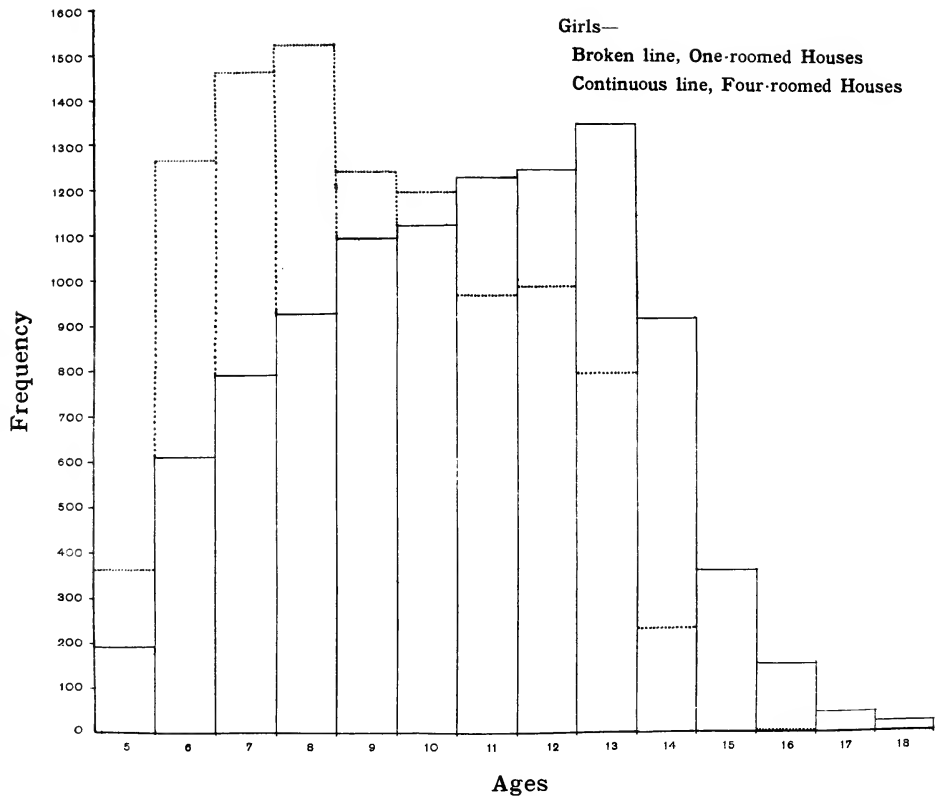
INFLUENCE OF ENVIRONMENT.

GLASGOW DATA, REDUCED TO STANDARD POPULATIONS BY DR. HERON.

Homes.	Boys 5 to 14* years.		Girls 5 to 14* years.	
	Weight in lb.	Stature in inches.	Weight in lb.	Stature in inches.
One-roomed	54.9	47.6	54.4	47.6
Two-roomed	56.9	48.4	56.0	48.2
Three-roomed	59.0	49.4	57.8	49.1
Four-roomed and air .	60.4	50.0	59.8	49.8
Extreme Differences .	5.5 lb.	2.4 in.	5.4 lb.	2.2 in.

* No children over 14 can be taken, as such do not occur in all the classes of homes.

Fig. V



We see that the differences are not 12 to 14 lb., but about 5.5 lb., and in stature 2 inches instead of 5.

Well, shall we attribute these 5 lb. and 2 inches difference to the nature of the houses in which the children dwell? *No one at the present moment can say.* Dr. Leslie Mackenzie attributed his 12 lb. and 5 inches to the children suffering in nutrition and growth, and said that no other conclusion could be drawn. He said that it could not be due to 'an accident'; 50 per cent. and more we have seen is due to an 'accident', i.e. to a logical mishap in his reasoning. What of the remainder? Well, there is only one way of finding that out, i.e. by laborious investigation of all the other factors concerned. Naturally the physically and mentally inferior parents earn lower wages.¹ Well, will not such parents pay less rent and live in one-roomed houses? They, naturally, quite apart from nutrition, have physically inferior children. Again, there are large Irish and Italian populations in Glasgow widely differentiated in physique from the Scotch; to what extent do they live in one-roomed tenements? Until these factors are allowed for, no one can say how much of that 5 lb. and 2 inches is due to heredity and how much to environment. You might possibly remove all your population to four-roomed dwellings without improving its children by a pound and an inch.

As a further illustration of a type of reasoning often employed when dealing with social problems, I take an example from Dr. Newsholme's work on Tuberculosis.² He has correlated the fall in total pauperism with the fall in the phthisis death-rate, and uses this correlation of 0.89, together with a number of similar instances, to confirm his theories that increased national welfare and increased insti-

¹ We have evidence to show a considerable inferiority in stature of the men following less highly paid trades.

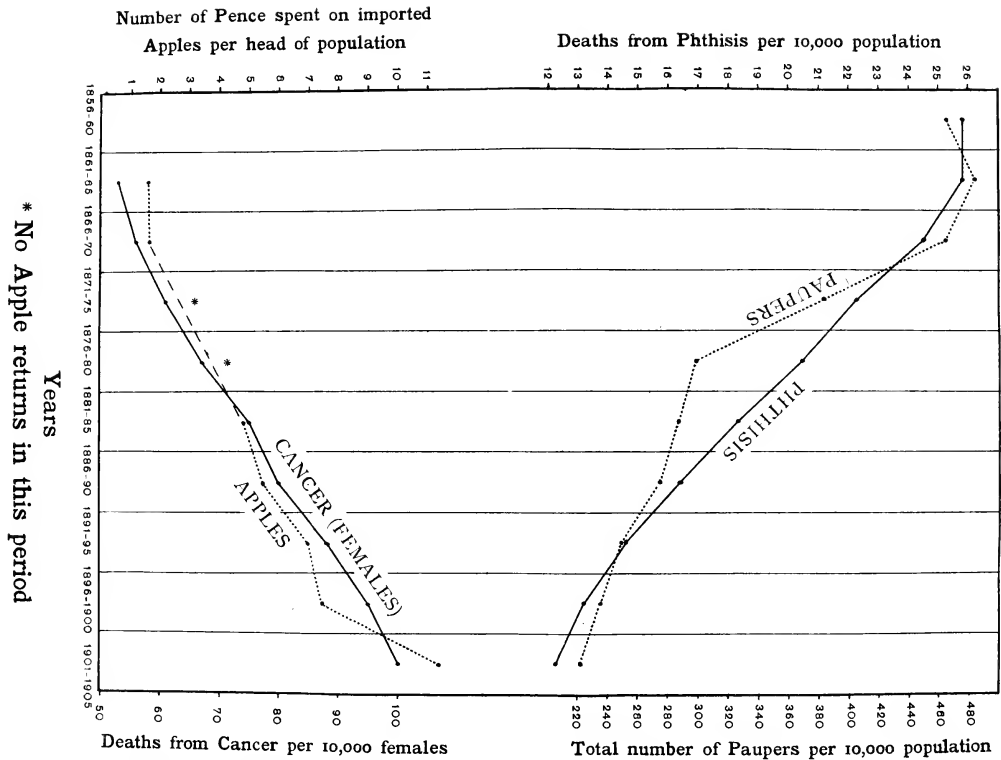
² *The Prevention of Tuberculosis*, especially chapters xxii and xxiv.

tutional deaths are the sources of the fall in the phthisis death-rate. In Fig. VI, I show the apparent parallelism of pauperism and phthisis death-rate in the upper part of the figure and in the lower part the increasing cancer death-rate among women associated with the increased expenditure per annum per head of the population on imported apples! The correlation between cancer death-rate and expenditure per head on apples is 0.87. The argument that eating apples produces cancer is equally valid with Dr. News-holme's arguments from the fall in the phthisis death-rate and the decrease in pauperism. The association which arises from *continuous contemporary* changes in the intensity of different phenomena is in itself no argument for a causal relationship. Yet we find such pseudo-arguments put forward by no less an authority than the Medical Officer to the Local Government Board! What is needed above all things at the present time is an official bureau of statistics, with a staff trained in modern methods, which should act as an advisory board to all Government Departments, without the sanction of which no statistics should appear in Government Reports. At the present time the wildest conclusions are formed, and the most fatuous legislative proposals are made in Government Reports for want of some proper statistical supervision of the vagaries of untrained or improperly trained officials.

I should like to give a last illustration of how 'social reform' is developed. I take the following returns for the number of female apprehensions in Greenock from the *Sixth Report* of Dr. Dunlop on the working of the Inebriates Act (p. 10), and I have supplemented them by the data for the number of women proceeded against for drunkenness and disorder.

You see a most satisfactory reduction since 1903, the year in which the Greenock House of Refuge for female

Fig. VI



inebriates was opened. This house has accommodation for thirty women, and is said to be sufficient for the district. It is, indeed, the only certified inebriate reformatory in Scotland which is well filled; the remaining four are all emptying, apparently on the ground that no true reform results from them. Now it is only natural to associate the fall in female apprehensions with the establishment of the reformatory.

BURGH OF GREENOCK.

Year.	Apprehensions of Women.	Drunkenness and Disorder.	Greenock House of Refuge Admissions.
1899	1212	—	—
1900	1201	—	—
1901	1311	—	—
1902	1213	—	Opened
1903	1168	—	19
1904	849	—	15
1905	964	905	10
1906	999	878	17
1907	790	684	23
1908	643	532	12
1909	—	469	13

Dr. Dunlop writes :

‘Greenock during the last five years has had between 20 and 25 of its worst female drunkards secluded in a reformatory, and *the result has been* that the total number of female apprehensions has fallen from a yearly average of fully 1,200 to one of 850, a fall of about 30 per cent., and the Chief Constable is able to report a marked improvement in the condition of the streets and a diminution of the amount of female brawling,’¹

and he concludes ‘that the segregation of the worst of drunkards can have a beneficial influence on a locality’.

In his *Seventh Report* Dr. Dunlop returns to this matter. He writes :

‘The value of a reformatory as a place of segregation has been fully demonstrated at Greenock. In that town the reformatory is of a sufficient size to accommodate all the worst of the female drunken pests, and has been taken full

¹ *Sixth Report of the Inspector for Scotland under the Inebriates Acts.* Edinburgh, 1909.

advantage of, and the removal of these drunken pests from the town has been found to be very beneficial, their removal having resulted in a marked diminution in the number of drunken and riotous scenes in the streets of that town, and in a marked diminution in the female apprehensions, which facts have been attested by the Greenock Chief Constable on several occasions' (pp. 2-3).

And again, under the heading of the *Greenock Certified Inebriate Reformatory* (p. 16):

'The advantages of this reformatory continue to be appreciated in Greenock, as it is of sufficient size to meet the requirements of the town, and it has done much in diminishing the number of drunken women seen on the streets, and dealt with by the police. It is satisfactory to note this, as Greenock is the only town in Scotland which possesses a certified inebriate reformatory of sufficient size to meet its requirements, and which has been fully taken advantage of, and the success of its reformatory, as shown by the beneficial influence it has had on the town, is a good demonstration of the value of such an institution.'

In 1908 a Departmental Committee was appointed to report on the operation in Scotland of the law relating to inebriates, and it reported in 1909; and this Committee reports that 'as regards reformation of the persons committed to reformatories the results have been disappointing' (p. 15), but it draws attention to the evidence submitted from Greenock—

'which leads us to believe that a rigid enforcement of the Act would lead by its deterrent effect to a marked diminution in the number of persons who might come before the courts. The result of an energetic enforcement of the Act in Greenock has been that the number of female drunkards coming before the courts has been reduced by a third, and the Chief Constable states that "the reformatory has had a most beneficial restraining influence on the class of women from among whom those women came, and a vicious example and influence has been to a large extent removed from the rising generation".'

The Committee believed 'that a general enforcement of the

Act would show similar results to those obtained in Greenock', and they recommend the compulsory establishment of inebriate reformatories by all local authorities.

Here you have an apt illustration of the genesis of social reforms. A modern Dogberry notes a fall in female apprehensions contemporary with the establishment of a reformatory for twenty-five female inmates. The Government Inspector accepts his views, and a Government Committee follows the Inspector and recommends definite legislation involving the general establishment of reformatories, not to reform but to deter! Surely the first thing to be done was to inquire whether the male sex, who had no reformatory provided for them, had maintained its old rate of drunkenness; or are we to suppose that the men were led into evil after the fashion of Adam, or that they were deterred by the dread that a reformatory would be established for them as it had been for the opposite sex, if they did not better themselves? Again, Dr. Dunlop tells us that Greenock is the only Scottish town with sufficient accommodation for inebriates: might we not have anticipated that a Government Committee would have inquired what was happening in other towns without this accommodation?

Now let us look at the total returns for Greenock with which the Scottish Prison Commissioners have kindly provided us:

PROCEEDINGS FOR DRUNKENNESS AND DISORDER.
BURGH OF GREENOCK.

Year.	Males.	Females.
1905	2,279	905
1906	2,374	878
1907	1,870	684
1908	1,369	532
1909	1,090	469
Reduction .	57%	48%

Why, we see at once that the deterrent effect of the female inebriate reformatory on the males has been considerably greater than on the females! As neighbour Dogberry says: 'We will spare for no wit, I warrant you; here's that shall drive some of them to a noncom: only get the learned writer to set down our excommunication and meet me at the gaol!'

Now remember that Greenock is the only burgh with 'reformatory' accommodation sufficient to 'deter' its alcoholic citizens. Well, let us look at Paisley:

PROCEEDINGS FOR DRUNKENNESS AND DISORDER.

BURGHS OF PAISLEY AND LEITH.

Year.	Paisley.		Leith.	
	Males.	Females.	Males.	Females.
1905	1,153	359	1,120	450
1906	1,288	356	1,062	479
1907	1,099	322	1,137	370
1908	955	269	907	306
1909	620	191	623	238
Reduction .	46 %	47 %	44 %	47 %

where we find a 46 % reduction in the males, and a 47 % reduction in the females!

And look further at Leith with almost like results!

In the smaller cities of Scotland, as distinct from Edinburgh, Glasgow, and Aberdeen, this decrease in drunkenness has been going on. Let us set to work and find out the true cause of it: reduction in wages, rise in price of whisky, fewer public houses, whatever it may be. But do not let us see legislators blindly following a Government Committee, which equally blindly follows a Government official, who in his turn blindly accepts a Chief Constable's dogmatic assertion.

That association is causation is a conception that has done more harm in social reform than any delay caused by a frank statement of ignorance. We are to have inebriate reformatories in every county because neighbour Dogberry has associated one with diminished drunkenness among the women of Greenock! Such is the present method of solving social problems.

No superficial treatment such as that of these Government reports will really and truly aid us. I know that these problems want close study, and I hold no brief in favour of leaving things as they are; but I decline to accept the view that by abolishing all one-roomed tenements, by pulling down all back-to-back houses, or by establishing a school clinic, a tuberculin dispensary, a sanatorium, and an inebriate reformatory in every parish, you are going to regenerate our race.¹ It is a much more complex problem than that. Until we know what factors are significant, after correction for other variates, we cannot effectually solve any social problem. There must be prolonged study and accurate methods.

The illustrations I have given you must suffice—they are only a few out of the many which appear the moment a critical eye is turned on the current treatment of social problems. I have taken medical illustrations, because they have a glamour of science cast over them in popular appreciation, but the condition of affairs is immeasurably worse if we turn to the writings of social reformers and politicians.

¹ 'We do not see', write Sidney and Beatrice Webb, 'the Societies [i. e. Friendly Societies] insisting on every city having its Tuberculin Dispensary and Phthisis Sanatorium' (p. 189). This is an apt illustration of how social problems are solved by our social reformers before the knowledge of cause and effect is ours! Mr. and Mrs. Webb's chapter on Insurance in their *Prevention of Destitution* teems with similar assumptions as to what is right policy.

What, then, is the purport of my lecture to-night? Merely to impress upon you the blunders of others? Not for a moment. To assert that anything or nothing can be proved by statistics? Again, not for a moment.

I want to insist upon two or three facts, which I have tried to emphasize. In the first place I assert that we are nearly all Socialists nowadays, in that we believe that the direct object of government is to form a stable society; that all real legislation, that all foreign action must ultimately be guided by the aim of increasing national welfare. But I believe that our social instincts, however developed, are wholly insufficient guides to social conduct. They may even take us widely astray in domestic legislation, leading us, out of pity or from feelings of revulsion, to sanction measures which directly bar the pathway of mankind to higher things. Any legislation which renders the fertility of the unfit dominant is of this character, and the differential change in the birth-rate of this country since 1870—1880 is, I believe, a noteworthy case in point. We are already feeling the dearth of able men in all departments of activity. We have now consciously to undertake the work of natural selection ourselves, for we have suspended Nature's effective but oft-times harsh methods of raising our stock. We have to check the fertility of the unfit, and encourage that of the fit. We have in future to discuss every social problem from the biological standpoint; we have to study, record, and measure the factors of human development with precisely the same accuracy as we have studied animal or plant life or inorganic nature. Such a study cannot be carried out either by marketplace methods—by shouting at the hustings, or talking in the parliament places—nor can it be achieved by busy Government officials without adequate training in science. There is only one solution of this problem—the establish-

ment of university laboratories, adequately equipped biologically, medically, and statistically, whose sole business shall be sociological research. It is and must be a breach, not only with the old political and philanthropic solution of social difficulties, but also with the old sociology, the sociology of the word, which conceived that sufficient talk would solve all problems.

There is a great future for sociology, widened in the sense of Galton's definition of Eugenics: 'the study of agencies under social control which may improve or impair the racial qualities of future generations,' but the spirit of that study will be that of the two grandchildren of Erasmus Darwin; it will not be that of Comte and Herbert Spencer.

'You fellows will scarcely believe that I was once the author of a tragedy,' said, years ago, Herbert Spencer in the presence of Huxley and Lubbock. 'I know the catastrophe,' cried Huxley. 'Impossible,' replied Spencer; 'I have never revealed it to anybody.' 'Yes,' Huxley persisted, as Spencer put him to the proof. 'It was the history of a most beautiful induction killed by a nasty ugly little fact.'¹

The laborious accumulation of 'nasty ugly little facts' can only be carried out in one way; there is only one manner of analysing them when accumulated. That is by the methods of modern science. The public cannot be the final judge of truth in any problem of science, but every educated man and woman can develop their critical powers and insist that slipshod market-place argument shall not take the place

¹ I have cited this tale before in my *Groundwork of Eugenics*, p. 17. It occurs in Galton's *Memories*. One version of it, however, was written down for me many years ago by Galton himself, and is not quite identical with that in the *Memories*.

of investigation and logical reasoning in social affairs. They can demand a higher standard of scientific training for medical advisers of Government departments and for the cessation of charlatanism in politics. The educated will never form a voting majority, but they can, if they make the effort, be dominant by the written word.

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