

Essays and addresses, sociological, biological and psychological / by a surgeon.

Contributors

Bond, C. J. 1856-1939.

Publication/Creation

London : H.K. Lewis, 1930.

Persistent URL

<https://wellcomecollection.org/works/ca4g8k2w>

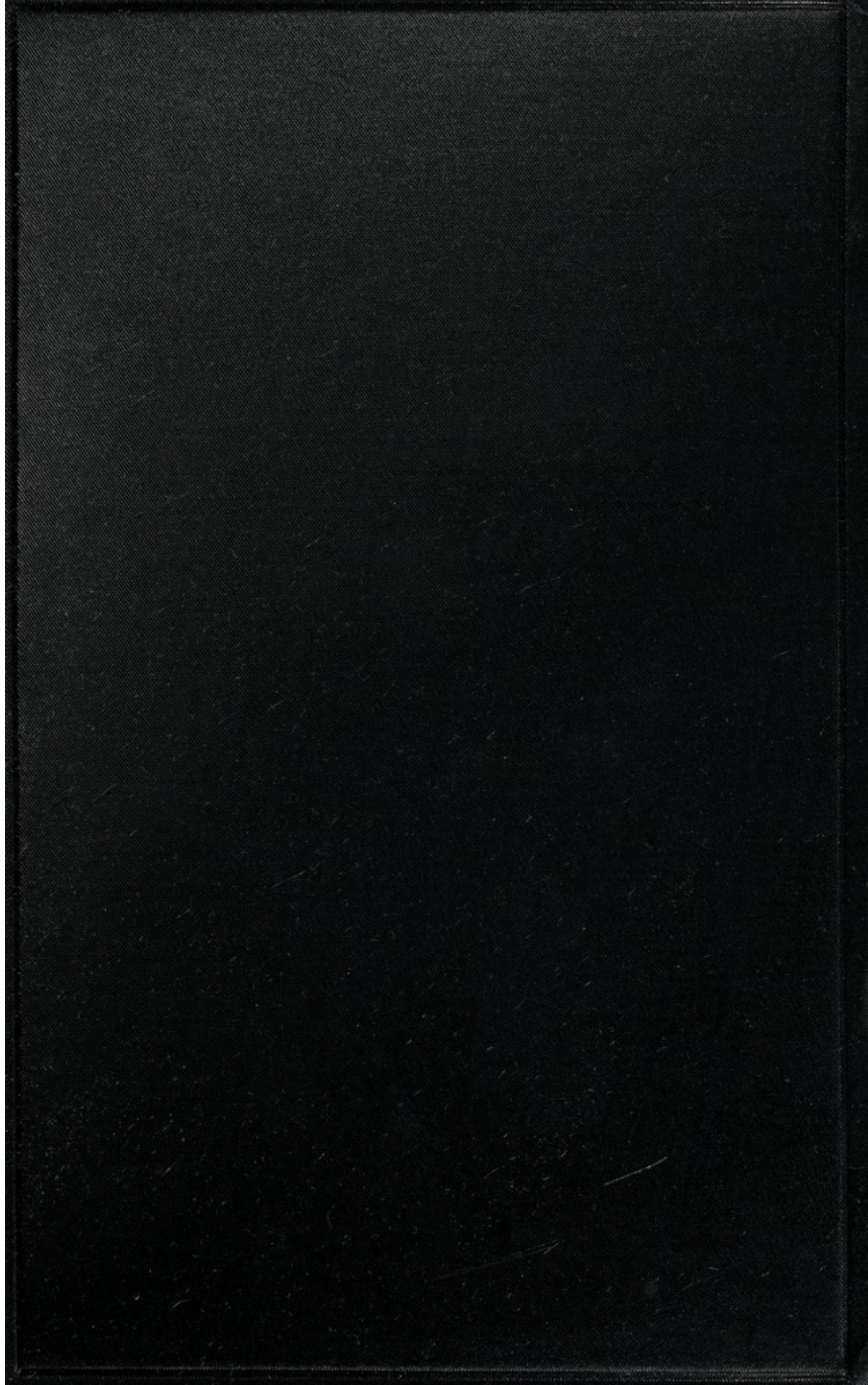
License and attribution

The copyright of this item has not been evaluated. Please refer to the original publisher/creator of this item for more information. You are free to use this item in any way that is permitted by the copyright and related rights legislation that applies to your use.

See rightsstatements.org for more information.




Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>





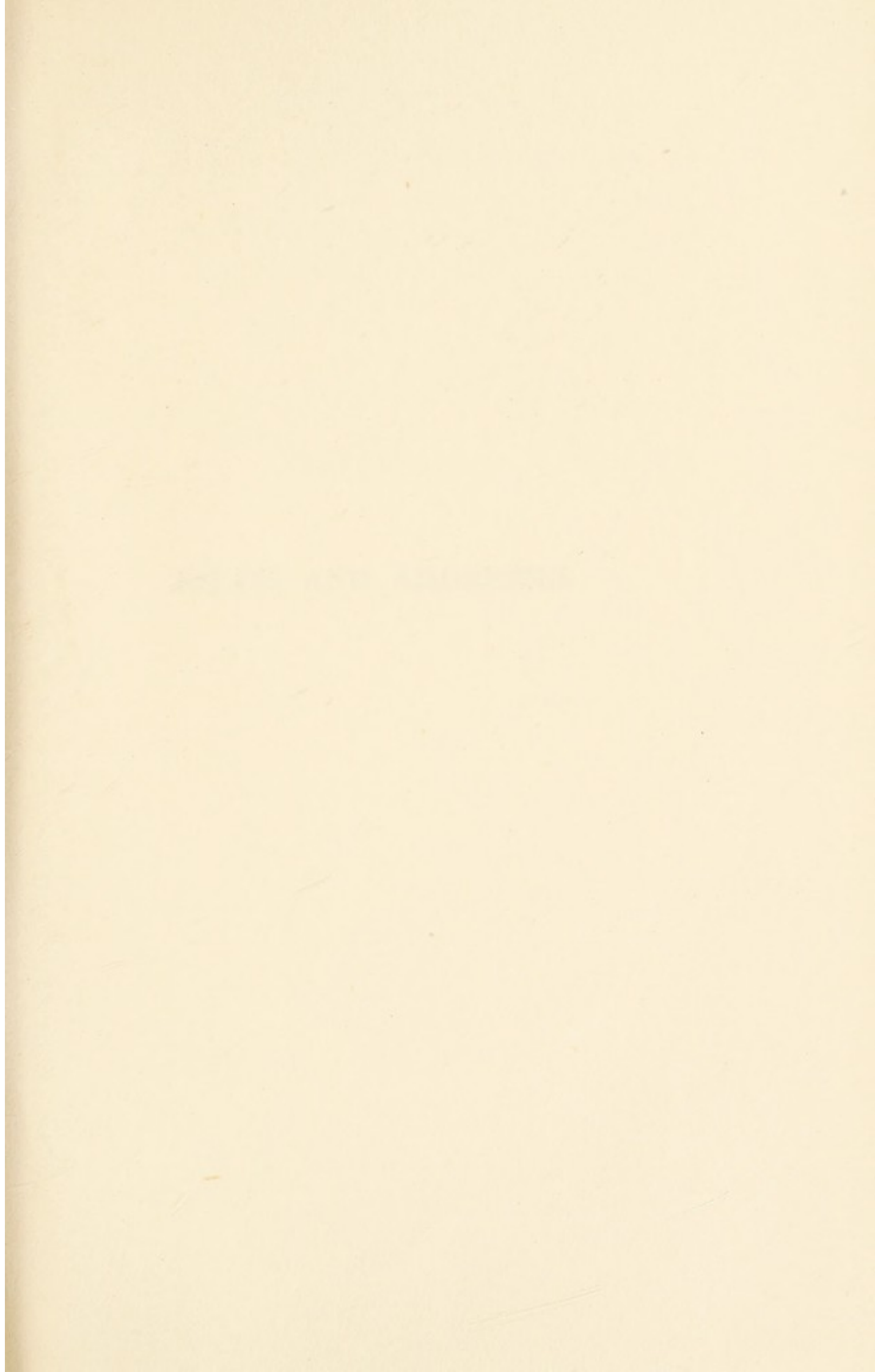
22102214340

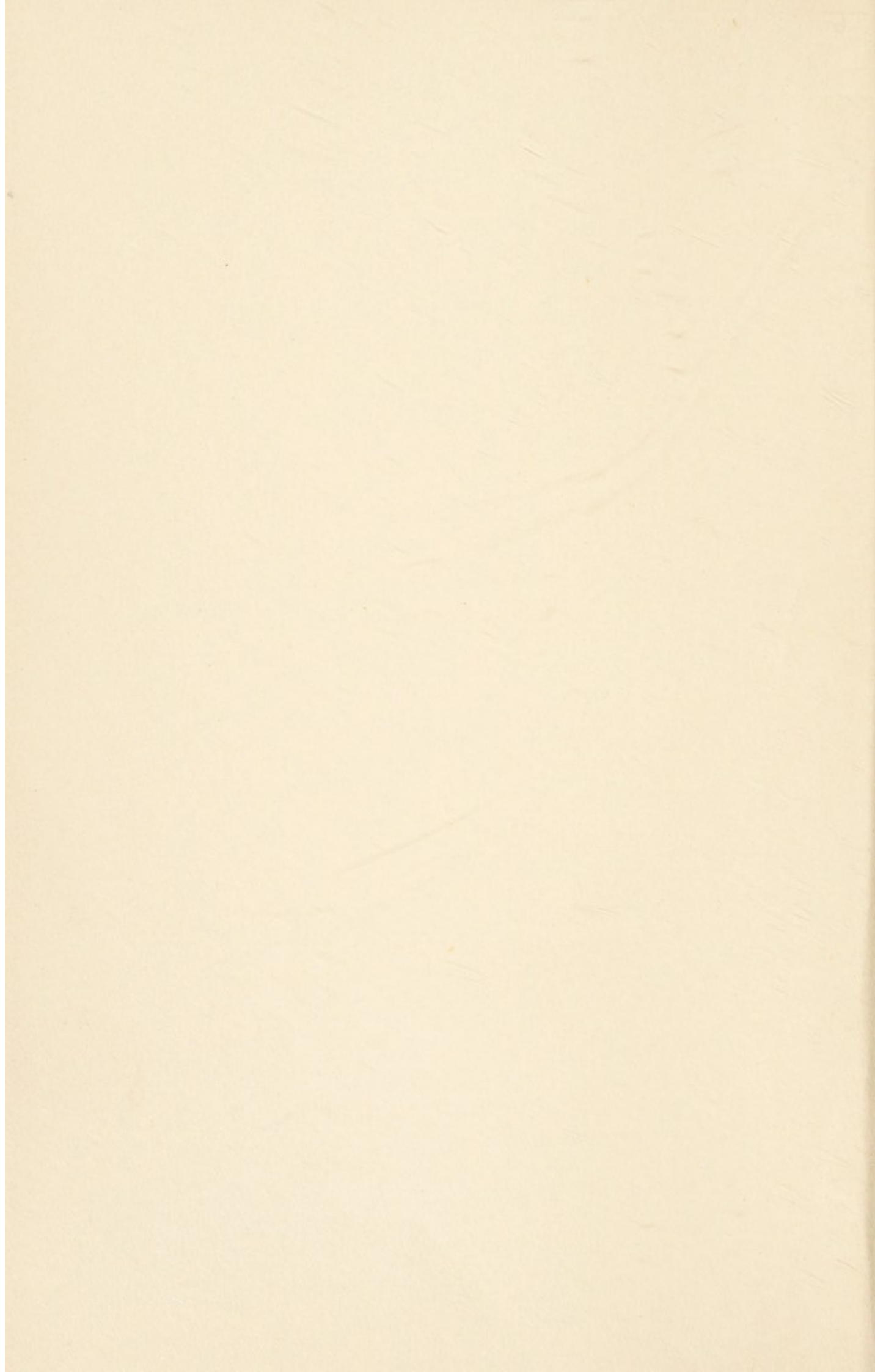
Med
K21001



Digitized by the Internet Archive
in 2017 with funding from
Wellcome Library

<https://archive.org/details/b29810048>





ESSAYS
AND ADDRESSES

SOCIETY, PSYCHOLOGY
AND PSYCHOLOGY

ESSAYS AND ADDRESSES

ESSAYS AND ADDRESSES

SOCIOLOGICAL, BIOLOGICAL
AND PSYCHOLOGICAL

BY
A SURGEON



LONDON
H. K. LEWIS & CO. LTD.

1930

ASSAYS
AND ADDRESSES

PSYCHOLOGICAL, SOCIOLOGICAL
AND PSYCHIATRIC

BY
A. S. HERRING

WELLCOME INSTITUTE LIBRARY	
Coll.	welM0mec
Call	
No.	WA

TO MY WIFE

TO MY WIFE

PREFACE

IN offering this little volume to a wider circle of readers, my chief object has been to comply with requests from friends, who were interested in the addresses at the time they were given.

I am conscious that these essays vary greatly in importance and in the interest of the subjects with which they deal. Some readers may indeed share the opinion of an elderly friend of the old school, who described one of the addresses as "lacking the stately tread of the Athanasian Creed, but as being quite as incomprehensible." However this may be, two or three underlying principles, or connecting ideas, may be traced throughout the series, which will, I hope, serve to link together the different chapters. They are:

First, the need for a fuller recognition of the part played by evolution in all studies of human affairs—in the mental as in the physical sphere—and in individual as in social life.

Second, the fundamental importance of hereditary constitution and innate capacity in all attempts to promote human progress.

Third, the pressing need for a wider diffusion of biological knowledge, for a fuller understanding of the working of the body and the mind, and for a deeper appreciation of the importance of biological principles in the framing of our social legislation and in our national life.

These addresses and essays extend over a number of

years. Some were written nearly twenty years ago ; others last year. They may perhaps therefore serve as landmarks indicating the growth of knowledge in certain fields, and the extent to which public opinion has changed in certain directions during a single generation.

Though written by a surgeon, they also represent the thoughts and opinions of the ordinary citizen. I am hopeful that the combined experience of the laboratory, the hospital ward, and of public and private work of which they are the outcome, may be of some little help to fellow-workers in the same or in allied fields ; I also hope that, in so far as they do represent the experience of the ordinary citizen, and not that of the professional expert, the many shortcomings of which I am fully conscious may be regarded leniently.

Chapters I to VI deal with various aspects of social life and the relationship between the individual and the community.

In Chapter VII (The Galton Memorial Lecture, 1928) the distribution of natural capacity in different levels of society is discussed in relation to the differential birth-rate, and a plea is put forward for a national stocktaking—a census of the quality as well as of the quantity of the population.

Chapters VIII, IX, and X deal with biological problems. In Chapter VIII a theory is advanced to explain the origin of "use acquirements" through variation and selection occurring among the intra-cellular units, or parts, of which the animal cell is composed. In Chapter IX it is pointed out that this theory does not apply to the case of the germ cell, at any rate to the same extent as to the nerve cell. In Chapter X the biological conclusions so reached are applied

to the problems of human evolution, and to the attitude of civilised communities to disease.

Chapter XI, on "The Human Factor in Industrial Life," may be described as a "Lay Sermon." In it an attempt is made to bring before the notice of a Church of England congregation the close relationship which ought to exist between religion and certain aspects of our social and industrial life.

Chapter XII is a survey of the present position of the Mental Deficiency problem in the light of the Government Joint Report, with a plea for a sympathetic consideration of voluntary sterilisation, in certain cases of pronounced mental defect, and for an alteration in the law as it affects the problem of the prevention of mental deficiency and other congenital defects.

Chapter XIII deals with a psychological and philosophical problem. It is an attempt to review the evidence which bears on the development of a social consciousness, as a step in the psychical evolution of the human race.

C. J. B.

LEICESTER, 1930.

CONTENTS

CHAPTER I

	PAGE
INDIVIDUALISM AND SOCIALISM FROM THE BIOLOGICAL STANDPOINT	I
An Address delivered to the Leicester Literary and Philosophical Society, October 30, 1911.	

CHAPTER II

THE ATTITUDE OF THE STATE AND SOCIETY TO "ANTI-SOCIAL DISEASES"	38
Reprinted from <i>Health and Empire</i> , March 1926.	

CHAPTER III

HOW THE STATE CAN HELP VOLUNTARY EFFORT IN THE PROMOTION OF NATIONAL HEALTH	56
An Address to the Conference on Imperial Health, People's League of Health, Wembley, May 1924.	

CHAPTER IV

INTEREST IN WORK AS A FACTOR IN INDUSTRIAL HYGIENE	69
<i>Dictionary of Industrial Administration.</i> Pitman & Sons, 1928.	

CHAPTER V

THE INFLUENCE OF HOSPITALS ON TEMPERANCE REFORM 81

The Presidential Address to the Society for the Study of
Inebriety, July 11, 1922.

CHAPTER VI

HEALTH IN THE GREAT STATE 100

From chap. v, *Health and Healing in the Great State*,
H. G. Wells and others. Harper Bros., London, 1912.

CHAPTER VII

SOME CAUSES OF RACIAL DECAY 115

The Francis Galton Memorial Lecture, Eugenics Society,
February 1928.

CHAPTER VIII

ON THE MAKING OF "USE ACQUIREMENTS" BY A
PROCESS OF INTRA-CELLULAR VARIATION AND
SELECTION 151

A Paper communicated to Section D, British Associa-
tion Meeting, 1912.

CHAPTER IX

DO GERM CELLS MAKE "USE ACQUIREMENTS"? . 164

CHAPTER X

THE IMMUNITY PROBLEM AND THE ATTITUDE OF
CIVILISED COMMUNITIES TO DISEASE . . . 183

An Address to the Oxford Medical Society, 1912.

CONTENTS

xiii

CHAPTER XI

PAGE

THE HUMAN FACTOR IN INDUSTRIAL LIFE . . . 216

An Address delivered in All Saints' Church, Northampton, on Sunday, December 10, 1926.

CHAPTER XII

THE PREVENTION OF MENTAL DEFICIENCY . . . 237

An Introductory Address at the Conference on Racial Decay, Leicestershire Health Insurance Committee, November 27, 1929.

CHAPTER XIII

IS THERE A SOCIAL CONSCIOUSNESS? . . . 253

Introductory Paper at a University College Staff discussion meeting, March 1925.

ESSAYS AND ADDRESSES

CHAPTER I

INDIVIDUALISM AND SOCIALISM FROM THE BIOLOGICAL STANDPOINT ¹

THIS fundamental question which underlies much of the Educational, the Economic, the Political, and the Social controversy of the present day is really a question of Evolution. It is none other than the old dispute somewhat disguised concerning the relative importance of heredity and environment as factors in evolution.

The answer given by the Socialist to the question—What is the cause of Poverty—differs from that given by the Individualist to the same enquiry.

Speaking generally, and with certain reservations, the Socialist is inclined to think that the explanation of the poverty of the poor, not only in riches but in comfort, and in the things which make life tolerable, is to be sought largely in economic conditions, in a faulty construction of Society, in mischievous and antiquated legal statutes concerning property, in wrong relationships of employer to employed, of capital to labour, and of rich to poor.

The Socialist would regard the cheerless lives of the toilers in our large cities, nay even the very existence of

¹ An Address delivered to the Leicester Literary and Philosophical Society on October 30, 1911.

a submerged class, as the result of scantiness of opportunity, inadequate wages, lack of employment, of unfair and depressing conditions which weigh upon the poor from without—in a word, to a faulty social and economic environment, rather than to causes which arise within the individual citizens themselves.

The Individualist, on the other hand, is concerned rather with personal factors. He regards the failure on the part of the toiler to surmount the obstacles which stand in the way of his reaching a higher level of existence as due largely to causes inherent in the constitution of, or acquired by, the individual himself. He lays stress on lack of adaptability and individual effort, the result of some inherent mental or bodily defect, or the outcome of bad habits and mode of life.

Personal characteristics are, in his view, more important than environmental factors, and what we shall become depends much more on what we are in ourselves, than on what circumstances can make us.

We have stated the problem in this extreme manner in order to accentuate the fact that a great divergence of opinion undoubtedly exists among educated people as to the essential factors concerned in these social problems of which Poverty is only one. In fact, so great is the dissimilarity of mental attitude that one might well be called the Individualist and one the Environmentalist point of view.

And yet it is essential that we should come to some clear understanding about such important matters. Just as in the case of the human body, and in matters medical, a knowledge of the cause of disease must precede its rational treatment, so in the case of the aggregation of individuals

which forms the Social organism, the Body Politic, the treatment of social diseases must depend upon a recognition of the causes which produce them.

Before we can be sure that the abolition of the slum will also abolish the slum dweller, we must first ascertain whether the life of the slum depends on individual or environmental causes or on both combined. Knowing this, we shall also know whether the remedy must consist in material reconstruction or in a renovation of human character, or in what proportion the two factors must be combined.

A clear recognition of the essential principles which underlie both the individualistic and socialistic positions is essential before we can hope for any agreement between them.

The first thing for us to realise is that the problem is essentially an evolutionary one.

Stated in Biological terms, the social condition of large numbers of human beings in this as in all civilised countries at the present day, means essentially, imperfect Adaptation. It means failure, partial or complete, on the part of such individuals to adapt themselves to changing social conditions, and altered standards of life.

Observation of plants and animals and human beings in primitive societies teaches us that all progress consists in more perfect adaptation to a relatively constant, or in fresh adaptation to the altering phases of a changing, environment.

It is indeed only when we have clearly realised that the problem is one of Adaptation, or failure in Adaptation, that we are in a position to enquire whether the failure is

the result of individual or environmental causes or of both combined. It is also admitted on all sides that in the past the standard of fitness has been maintained by a process of competition between individual organisms or species of organisms.

But we must also remember that evolutionary progress by means of the survival of favoured individuals is entirely dependent on the appearance of new and favourable characters and on new powers of adaptation to altered conditions of life.

This depends on Variation, the apparently spontaneous, and to us mysterious, appearance of individuals differing from their fellows in greater responsiveness to old, or in fresh adaptability to new, stimuli. It matters not for our present purpose whether these innate differences are the end result of small and continuous variation, or whether they come about in a more sudden manner by discontinuous and abrupt stages ; the essential point is that all variation of an hereditary kind is, speaking biologically, for the most part a question of germ-cell and not of body-cell development. It has gone on in the past, and still goes on largely uninfluenced by human control and uninfluenced directly by changes in the environment.

Thus then we have got as far as this point :

Firstly, that in the earlier stages of organic evolution, up to and including that of primitive mankind, the fitting of different individuals and groups of organisms to their allotted place in nature has been a question of individual Adaptation, and it has come about through the interaction of two sets of forces, those inherent in the individual and those depending on the environment.

Secondly, that the individual factor is a matter of

Heredity, of germ-cell evolution, and that it, alike with the natural environment of uncivilised mankind, has been for the most part uninfluenced by conscious human control.

Thirdly, owing largely to the labours of Mendel, Weismann, De-Vries, Bateson, Morgan, and other workers, modern biological conceptions attribute an overwhelming importance in development to these spontaneously arising hereditary characters as compared with those modifications of structure and function which are brought about in the individual as the result of environmental influence of a direct kind.

Such then has been the record of evolution in the past up to the advent of civilised man. Its driving force has been the uncompromising process of natural selection.

The material upon which this natural selection has worked has been the innate differences between individuals, and the chief sphere of its influence has been inter-individual competition, or a struggle for room and nourishment between relatively small groups of organisms. It is necessary thus briefly to recall the landmarks of pre-human evolutionary history in order that we may understand the manner in which Individualism and Socialism have both arisen as factors in human progress.

Now the record of civilisation is largely the record of a constantly increasing interference by man with this process of natural selection. And this interference has been rendered possible by changes in the environment and by changes in the individuals exposed to it.

We will first consider those changes in individual capacity which distinguish civilised from primitive man. It has been pointed out, notably by Ray Lankester, that the chief

feature which distinguishes modern civilised from primitive man and from the higher animals is "Educability," a capacity on the part of the individual to become adapted to, and to fit himself for, changes in his environment—in short, the power to profit by experience and to make useful acquirements.

The outcome of this increased adaptability, this extra capacity for making useful acquirements on the part of civilised man has been to enable him to overcome the obstacles of space and time, and not only to acquire thereby for himself, but to hand on to his children and succeeding generations, not indeed an increased capacity for learning or acquiring—this is an innate character, a matter of variation and heredity—but an increased range and complexity of acquirements in the shape of written and spoken language, scientific discoveries, creations of art, victories over disease, ways of doing and being, ethical conceptions concerning conduct, and many other acquirements, not only vital in themselves but vitally affecting also the environment of the future.

Thus on the side of individual equipment this educability and this general adaptability to a changing environment on the part of civilised man does to a certain extent depreciate the selection value of those preadaptational characters and those instinctive capacities which primitive mankind and the higher animals possess in such profusion.

Moreover, civilised man interferes yet further with the old order of natural selection by his power of controlling his own environment. By substituting the wider and more complex environment of human society for the narrower and simpler environment of nature, he alters, as it were, not only the level on which the evolutionary process is being carried

on, but also the actual environmental factors to which adjustment has to be made, and as a consequence the methods by means of which progress is achieved.

It is especially in this new method adopted by civilised man in bringing about adjustment to an altering social environment that we are now concerned when weighing the relative claims of Individualism and Socialism as factors in social progress.

We now turn to change in the Environment. It is difficult for city dwellers and for workers under the artificial conditions of modern industrialism really to appreciate the enormous change which separates the modern industrial from the primitive agricultural or pastoral life. And this imperfect appreciation of fundamental differences in life is chiefly responsible for the failure on the part of many persons to perceive that methods of adjustment which are suited to one set of conditions are unsuited to another. The change amounts to a more or less complete substitution of a human and psychical, for a natural and a physical environment.

Division of Labour of a physiological kind has been a marked feature of the life of all multicellular organisms.

The specialisation of structure and function, which distinguishes the cells on the outer from those on the inner surface of any individual plant or animal, involves the loss on the part of one group of cells of some of the characters possessed by the other group or by the organism as a whole. Dependency on others is in fact one of the penalties or privileges of differentiation. The same is true in human life and in the social organism. The self-sufficiency of the individual or of the small individual group or family in the primitive state gives place to the dependency of the

individual, or the group, or the family, on the whole community under modern conditions of civilisation. Moreover, the incidence of the competitive process changes also. No longer a matter of individual, or family, or village, or clan, or tribal war, Competition becomes international.

The composition of the units which vary and between which selection operates is also thus profoundly altered, and where competition lessens, co-operation increases, provided—and this is the important point—that competition still continues among the larger and more integrated units of which the smaller and co-operating units form a part. Competition there must be on some plane or other of existence as long as the process of redistribution of matter and dissipation of energy, which we recognise as evolution, continues on this earth. The important question is as to the size and complexity of the units which are to compete, and as to the level of social organisation at which co-operation is to supplement or replace uncontrolled competition.

The trouble is, not that the individualist wishes to retain competition—we all wish to do that—but that he wishes to retain it at a level in social organisation, and among social units which, in the full course of evolutionary progress, ought to be in co-operation.

Having now considered the individual and environmental differences which distinguish the primitive from the modern society, we are in a position to summarise and contrast the essential features which characterise modern progress with those which characterise the evolution of animals and primitive man.

Firstly, the course of natural selection has been interfered

with. It has been partly controlled by artificial or human agency. Innate characters of adaptation, and pre-experiential instincts are giving place to educability and a capacity to profit by experience, that is, to make useful acquirements. The transmission (by artificial means) of acquirements from generation to generation, and from age to age, which was formerly quite an inconsiderable factor in organic evolution, has now acquired an importance which neutralises to some extent the old value of pre-adaptation.

Secondly, the incidence of the struggle for existence has also been altered. Competition no longer occurs to the same extent between individuals or small individual groups, but has become international and world-wide. Thirdly, an artificial environment has superseded the old environment of nature. A large proportion of the stimuli which affect the modern citizen, and to which he must respond, are neuro-psychical incentives to good or bad conduct, which reach him from his fellow-men. This means that the social evolution of the future must needs be increasingly ethical in character, an evolution of conduct, a question of adjusting the actions and the life of the individual in conformity with the larger interests of the whole community of which the individual forms a part.

We may illustrate this human interference and the differences which distinguish primitive from modern evolution by the different attitude assumed by primitive and civilised human societies respectively to Alcohol or Disease.

Primitive peoples, when first brought into contact with Alcohol in the concentrated form introduced by civilisation, fall ready victims to its influence, and perish from its effects

in large numbers. Not so with civilised races, which have had a longer experience of Alcohol as an Environmental Agency.

In addition to the partial protection already afforded by the agency of natural selection in weeding out, through long periods of time, individuals unduly susceptible to the charms of alcoholic stimulation or lacking in innate power of self-control, the more progressive civilised communities, in proportion as they have learned the value of environmental control, are beginning to protect themselves by reducing the opportunities for alcoholic indulgence in their midst. By so doing, by dealing with the environmental factor, to which adjustment has to be made, by reducing the influence of, or where possible by banishing injurious agencies from the environment, such communities are supplementing the older method of natural selection, with its waste of life and its reliance on innate preadaptation, by newer methods of co-operation and control with their reliance on Educability.

The same is true of the struggle against Disease. The story of modern sanitation is the story of an attempt, more or less successful and more or less tentative on the part of the community, acting through the agency of skilled individuals, to deal with the problem of disease on its environmental side. Preventive medicine seeks to obtain a knowledge of the life-history of disease organisms outside the human body, that is, in the human environment, in order that it may check their multiplication in, or abolish them from, the food, air, soil, and water with which the citizens come in contact. And where absolute destruction is difficult or impossible, it seeks, by refined bacteriological methods, to reduce the virulence of such organisms.

In short, in dealing with the seeds of disease outside the human body, modern sanitation affords a good example of the radical difference in method which distinguishes evolution by human interference, by use acquirement, and by environmental control, from the older evolution by natural selection and innate preadaptational characters. Powerless in the presence of disease of which they or their ancestors have had no experience, and towards which as a consequence they have undergone no adaptation, or against which they have not acquired immunity, primitive races fall ready victims to strange epidemic diseases.

The wholesale destruction of tribes and nations recorded in the history of civilisation has been due to the inadequate protection afforded by the older method of evolution by natural selection, even more than to the destructive agencies of war.

The success already attained in the field of prevention of disease must provide the sanction for the newer method. Even under the imperfect conditions of to-day, with restricted knowledge on the part of skilled advisers, with inadequate education on the part of citizens, and a want of complete co-operation on the part of different local authorities, many diseases have been permanently banished from the environment, while in others the mortality has been enormously reduced, not by the destruction of susceptible individuals and the survival of the naturally immune, but by the destruction of the organisms of disease, and by the removal of the source and means of their propagation outside the body over large areas and in the materials with which human beings come in contact. That environmental control by human agency is assuming increasing influence, and that use acquirements ARE

gradually superseding innate preadaptation in the growth of civilised communities there can be no doubt.

The important fact, however, from our present point of view, is that without some co-operation between individuals, between societies, and between municipalities and authorities, this environmental control and these newer methods are unattainable, and this progress would have been impossible.

Until inter-individual competition becomes permeated with inter-individual co-operation, until in fact individualism has been modified by collectivism, socialism, environmentalism, call it what we may, it is impossible to replace to any extent the old order of natural selection by the new order of artificial control.

The impossibility of artificially controlling the injurious effect of alcohol and disease by any measures short of social co-operation on a large scale, and between large social groups, well illustrates this point. It is, for instance, hopeless for the individual or the small group in the midst of a large community to attempt to banish the tubercular organism from its environment. The only way of escape under such unorganised conditions of life is the old way of natural selection, and the survival of the naturally immune after the naturally susceptible have been ruthlessly weeded out.

Whether the England of to-morrow will hold her own in the competition between the nations will depend partly on the Educability and the Adaptability of the English people, and partly, and to an increasing extent, on the way in which English men and women apply their capacity to the improvement of their physical, intellectual, and moral environment.

The promise of the future is undoubtedly to that community which has the insight to limit industrial competition to that level and to those phases of its social and industrial life up to which competition is a source of progress, but beyond which it may lead to decay. In fact, we may say truthfully, that while competition between individuals and small groups was essential to progress under the old regime, co-operation is now just as essential under the new regime of use acquirement and environmental control.

And if we are to take advantage of, if we are to work in harmony with, world forces, then we must integrate our social activities. Thus then, in the success which has attended modern efforts to grapple with disease by methods of environmental control (methods impossible without co-operation and some curtailment of individual liberty), we find a sanction for Socialism of the scientific kind.

Let us for a moment picture to ourselves the case of some savage tribe attacked by a deadly and mysterious disease. Children of Nature, such people bow in submission to the stern rule of natural selection, regarding their misfortune as the work of an unseen and angry Deity. True individualists by nature and by training, they attribute the survival of those who possess a higher disease-resisting power to a greater ability to satisfy the demands and to appease the wrath of the Disease God.

But suppose, as has happened in history, some less orthodox but wiser members of the tribe should be led by intuition or observation to attribute the mysterious plague to a natural, instead of a supernatural cause, to some polluted spring of water, or to contact with another tribe or race. Suppose also that these individuals should gain the ear of the chief of the tribe and induce him to compel

his followers to search for another water supply, or to observe some sort of quarantine or isolation in regard to the sufferers from the disease. Would they not under such circumstances be interfering with the rule of natural selection as well as the rule of the witch doctors? Would they not be exercising some control over the conditions of life? Would they not be interfering with individual liberty and also incidentally with the established tribal religion? Would they not be Socialists in such a primitive society, and as such would they not run the risk of incurring the displeasure of those in high places whose prestige and influence they had undermined?

It is just possible that in these enlightened days of civilization we, the respectable citizens, we, the observers of old tradition and custom, may represent the ruling members of the savage tribe, the witch doctors, and the individualists, while those who disturb our peace and interfere with our liberty, and our incomes, represent the irreligious unorthodox disturbers of social custom.

I am well aware that to some authorities and to the followers of some schools, sound and permanent evolutionary progress against disease, at any rate on these lines, seems impossible, and that the only permanently effective method is still that of natural selection, the killing off of the susceptible or those incapable of recovery, and the production of a race naturally immune to lethal, and capable of recovery from non-lethal diseases.

But we cannot ignore the facts within our experience. Diseases, among which we may include typhoid, and typhus, and plague, have been largely or entirely banished from the environment by communities adopting sanitary ways of life.

By what means has this been brought about? Not by

the production of a more resistant race : the experience of the South African and other wars shows that our young adults are as susceptible to attack by the typhoid bacillus as formerly ; the improvement has been effected by the application of new knowledge concerning the life-history of these disease organisms outside the human body ; in fact, by measures of environmental control. And if it has been possible by such means to banish typhoid, it should be possible, by a modification and extension of the same measures, to permanently exclude it from the environment.

Moreover, what can be done in the case of typhoid can be done, and is being done, also in the case of tuberculosis. In fact, the greater difficulty, and in some cases the impossibility, of establishing an acquired immunity against the tubercle bacillus after it has once gained an entrance into the body of the individual, constitutes a powerful argument in favour of perfecting our methods of environmental control over tubercular disease, unless we are prepared to return to the crude methods of natural selection.

The two statements, that it is better that England should be free than that England should be sober, and that before England can become sober England must be drunken, would contain a certain germ of truth if the English people were still living in a state of savagery and under the regime of natural selection.

Is it too much to hope that in these latter days of social co-operation and environmental control, Acquirements may supplement deficient Preadaptation, and that the halting volition of the occasional drunkard as opposed to the habitual inebriate may be reinforced and supplemented by the organised help of the community ? Is it not possible, in fact, to have England sober as well as free ?

But the transition from non-adaptation to adjustment is marked by certain similar stages in ALL phases of evolutionary progress, whether under the regime of natural or of artificial selection.

We start from the pre-experiential stage of absence of Relationship. Many animals are insusceptible to some diseases of human origin of which neither they nor their ancestors have had previous experience. Either the organisms which cause these diseases do not possess the necessary machinery for successful attack, or the animal tissues do not provide the material for their growth. The conditions are lacking for the establishment of any relationship between the host and the parasite.

Then comes the stage of experience and the establishment of relationship. The disease organism acquires greater power of attack or the host provides a more favourable soil. The individual contracts the disease. This is followed by the stage of reaction and adjustment to the new conditions.

Recovery from disease is followed by insusceptibility to further attack ; by the natural immunity which succeeds racial or the less perfect form of acquired immunity which follows individual experience of disease.

We find the same stages in social evolution, and in that process of environmental control by which civilised man becomes adapted to his surroundings. Here, too, the social organism begins with the stage of non-relationship. The Community as a whole, or the State as a State, has not been brought into contact with, it is not conscious of, injurious environmental agencies like Alcohol or Disease.

Then comes the period of experience and relationship. The Community, or Municipality, or State, recognises the

presence of Disease and Poverty, and other harmful social and industrial conditions.

Finally, in every progressive Community, the establishment of Relationship and the Recognition of Responsibility is followed, or accompanied by, efforts at adjustment and control, the successful accomplishment of which prepares the way for new relationships and new adjustments. Such is the history of all social as of all individual, intellectual, and moral, progress.

But, surely, this is an old story. Is it not the story of the Fall? First the age of Innocence, then the Temptation, then the Experience of good and evil, then the failure of adjustment on the part of some races to the wider experience, the Fall of Man.

It is in a difference of method between the old order of natural selection and the new order of co-operation and control that we are now especially interested, and it is to this difference in method we must look if we wish to trace the beginnings of Individualism and Socialism as factors in human development.

But we must seek also in the records of past evolution some answer to the question—How far can we carry this doctrine of Progress by Acquirement and Environmental Control, and how far can we rely on it as a guide in the affairs of daily life?

While it may be true that the possibilities of further improvement and of further control over the conditions of life by Society, as a whole, are still very great, it is even more true that the making of a successful response to altered conditions can only proceed *pari passu* with the growth of capacity to make successful adjustments on the part of the individual citizens.

When Society has made available by education the reserve stock of innate Capacity, then she must fall back on individual variation for the origination of fresh capacities of adjustment in new fields and on new stores of Educability. It may be that in the matter of bodily structure, muscular development, and manual dexterity we are reaching the limits of human endowment. It may be that the evolution of mankind is almost stationary along these lines, but there are grounds for believing that there are yet large untapped reservoirs of potential mental energy, capacities of ethical and social development still unexplored by education and still available if called upon by human necessity. Moreover, the environment of civilised man is becoming increasingly social and increasingly ethical.

The adjustments which the individual citizen in a civilised community must now make are largely adjustments of feeling and conduct, responses to the neuro-psychic activities of his fellow-citizens, and to the social group to which he belongs. Hence it comes about that since the environment of the future, over which control must be exercised, will be an environment of mind and conduct, the evolution of the future, both individual and social, will be a neuro-psychical and ethical evolution also.

But granting all this, unless innate capacity increases in the same ratio as Acquirement and Environmental Control, social organisation must remain stationary or even decline. The problem of the immediate future is therefore how to ensure the constant supply of individual capacity. Thus we are gradually led to the conclusion that everything depends fundamentally on innate capacity.

If this newer method of Progress by Use Acquirement, by Co-operation, and by Environmental Control is to be

successful—if we are to escape the real dangers of decadence of individual capacity and relaxation of individual effort—then it is essential that social control shall be more, rather than less complete over the factors which make for the production of innate capacity and character, when the standard of fitness, which formerly existed under the rule of natural selection, has been relaxed or removed.

Surely the remedy is to be sought not in a return to the old regime, but in a further extension of the newer method. The social organism must control the activities of its component units, its citizens, in the field of race production, and in the manufacture of human capacity, just as it now limits their activities in industrial and other directions.

When in the near future the great possibilities and the true limits of this co-operation and social control are more fully appreciated, then a far-seeing and a virile public opinion will provide the sanction and the motive power for the carrying out of those Eugenic reforms which at present the ordinary citizen regards as the visionary and impracticable ideals of a newly founded school.

It is quite clear that there will be, and must be for some time to come, the individualistic foundations of Competition and Self-assertion in every Society. The problem for the social architect is—At what level in social organisation it is safe and profitable to supplement individual competition by social control.

In every stage of civilisation it is well to remember that the initiation of new activities may interfere with the co-ordination of existing enterprises. The records of municipal and national government teach the lesson that it may sometimes be wiser to reorganise old rather than to found new institutions. Self-assertion and competition played their

part as factors in evolution before self-effacement and co-operation entered the field. Hence it may be better to leave to Individualism the duty of initiating new enterprises and to Socialism the equally important duty of co-ordinating such of them as have stood the test of experience and have become valuable to Society.

If we appeal to Biology and the past records of organic evolution for some guiding principle in this matter, we find that in animal development the test of fitness for centralisation has been UTILITY. The central nervous system appeared in the history of animal development when the co-ordination of various incoming and outgoing stimuli in one central brain gave one individual or one species an advantage over another species in the struggle for existence.

So, too, in the history of human societies the relative value of any Industry or Enterprise to the Community under Municipal or State, as against Individual control, must be the ultimate test of the fitness of such Industry or Enterprise for Socialisation.

And this, again, depends largely on the stage of integration and on the development of the industry or enterprise in question. Some industries and enterprises are more advanced, more integrated than others. Some are more vital than others to the welfare of the Community.

The level, then, in the organisation of Society at which Socialism can supplant or supplement Individualism must vary not only in different societies but in the same society at different stages of its growth and development.

I have already stated that the initiation of new enterprises, if they are to be successful, may require more foresight even than the co-ordination of old activities. Now some consciousness of the aim, some prevision of the end

to be attained, is characteristic of all human attempts at interference with the progress of evolution and the course of Nature, even under primitive conditions of life.

Some pre-recognition, more or less dim, of the object aimed at, must also accompany the semi-conscious efforts of civilised communities to bring themselves into truer harmony with their surroundings, and also to improve their surroundings in relation to a higher standard of life.

It is thus that civilised man brings about environmental control, and it is thus that he also, to a certain extent, extends his own development.

As T. H. Huxley truly observed : " It is in view of some Ideal of Beauty or Utility that the gardener has been enabled to bring about the endless variety of beautiful flowers and useful fruits " (*Coll. Essays*, vol. ix).

If then Society is to have an increasing share in the control of its own destiny, it must become more or less self-conscious. It must more or less dimly realise to itself the next step which is to lead to the ideal social state to which it has to be guided, and with this in mind it must not only train and educate such capacities as its citizens already possess, but it must also control, as far as it is able wisely to do so, the production of future capacity and future character to the same end. And if from insufficient knowledge of the laws which govern the hereditary transmission of human characters, further advance along positive Eugenic lines should be at present too difficult, it can at any rate take steps to render impossible the perpetuation of those characters which lead to race suicide.

Huxley (*Coll. Essays*, vol. ix) says himself that the only radical cure for the diseases which threaten the artificial state, the human or garden colony surrounded by a state

of Nature, is the " Horticultural " method of rooting up the weeds, or, as we now call it, the " segregation " of the unworthy, and in spite of his further opinion, there stated that this " Eugenic " solution hardly comes at present within the range of practical politics (owing to lack of human intelligence, and to the risk it involves of weakening the bonds which hold Society together by reducing the influence of ethical factors in social organisation) ; still, in spite of this, it seems to me, as to many others, that it is to some sort of Race Culture we MUST look for that compensating influence which alone can modify the antagonism between the older cosmic and the newer ethical evolution, and which alone can hold the balance between the claims of self-assertion and self-restraint in social development, or render possible the transition from the old order of competition and selection to the new order of co-operation and environmental control.

If, as we believe, the modern preventive method of treating disease, as practised by civilised societies, is a sound one from the evolutionary point of view—if the provision of sanitary surroundings is one method of social progress, as the adjustment of individual constitution to disease organisms, by modification of bodily structure, is another—then why not extend the principle of Prevention and Environmental Control to the decadent and the hereditarily diseased elements in human society ?

Society does already protect itself fitfully and partially against the criminal, the insane, and the mentally deficient, by temporary banishment in the Prison, Asylum, or Workhouse.

Surely it would be better to ensure the permanent withdrawal and the eventual disappearance of these and other

injurious anti-social elements, by lifelong segregation, carried out with due regard to the capacities which such individuals possess for happiness and healthy occupation. By so doing, Society would be employing in most important fields the intelligent agency of control instead of the unconscious agency of a semi-paralysed Natural Selection.

We may at once admit that the question of Eugenic action on the positive side is a difficult one. But the flood of light thrown on heredity problems by the discoveries of Mendel and the labours of Galton, Weismann, De-Vries, Bateson, Morgan, and other workers in the field of Genetics, cannot always count for nothing. Increased knowledge must eventually lead to increased power of control.

It is at any rate a suggestive fact that this great accession to knowledge concerning Race Production should have come at a time when not one nation only, but nearly the whole of civilised Society, is already committed, rightly or wrongly, to a policy of reducing the human birth-rate.

In so far as such a movement is actuated by legitimate and not dishonourable motives, it may well indicate a certain degree of weariness on the part of Human Society at the ever-present competition and the struggle for existence, and a desire to find a more excellent and a less wasteful way of life.

There can, at all events, be little doubt that this, like many other social movements of world-wide importance, is one result of the increased power of environmental control acquired, for good or ill, by Social man, and that it is one outcome of the substitution of artificial for natural selection in social evolution, and a concomitant of the establishment of a human Polity of Art in the midst of a wider environment of nature.

Even the most fastidious have no doubt as to the rightful uses of segregation in extreme cases of bodily and mental abnormality, or in cases of marked reversion to ancestral types, such as those which sometimes arise in the human species.

Why then not segregate for life in colonies under proper conditions of supervision and employment the congenitally feeble-minded, the innately criminal, the habitual inebriate, and the hereditarily insane ?

If it is desirable to isolate by penal servitude the criminal whose anti-social activities are a grave danger to the Society of to-day, surely it is desirable to segregate, under conditions of comfort and happiness, those unfortunate individuals, who, if allowed to perpetuate their incapacities and their diseases, constitute an even greater danger to the Society of to-morrow.

Society, however, does not interfere with the liberties or the lives of those who preach or of those who practise, within limits, the doctrines of the old regime of individualism and self-assertion. It has been the men in advance of the times, and those who have run counter to these old cherished notions who have suffered in the past.¹

But what of the ideal which the State of the future must strive to realise ! Among much that we cannot foresee, and more that is impossible of immediate realisation, this we may safely affirm—the cords which will bind the Human Society of the future together must be far stronger than those which now unite its component parts. The love of the citizen for the State must at least equal the love he

¹ This was written in 1911. I hope that "segregation" will soon be supplemented by further methods for dealing with Mental Deficiency.

now has for his family. His desire to help the State must at least equal, and, if need be, exceed, his present desire to aid himself and his family. For affection and emotion will be the mainspring of social development in the future as they have been the ruling motives of individual conduct in the past.

Subject then to the all-important duty of safeguarding the supply of individual capacity, which is a problem of Heredity, there would seem to be no theoretical limit to the extent to which Society may utilise and control not only individual capacity, but individual acquirement, for the furtherance of its own development and welfare. The difficult problem is how far in practice it is wise to go in this direction of control.

In view of the limitations of Human Capacity, in view of the crude semi-integrated condition of even the most civilised Societies in the present day, it would seem that out of four possible lines of advance, only one holds out any hope of permanent usefulness and practical efficiency.

1. We may decide not to exercise any control over, and not to interfere with, the individual or his environment, but leave things as they are to take their chance as in past time, under the guidance of natural selection, unlimited competition, and the survival of the fittest.

If the slowness of the method, the waste of life, and suffering involved, if the doubtfulness of the result are insufficient arguments against such a course, a sufficient answer is afforded by the fact that it is out of our power to leave things as they are. The social instincts of mankind and the constitution of even primitive societies have long ago decided this point for us, and man, whether he

wills it or not, whether he is conscious of it or not, has already taken up the reins of government.

Having interfered with the old order of evolution, he is bound to continue to exercise control over his surroundings and to work out his own social salvation.

2. Or we may concentrate our energies on the environment only. We may strive to provide better surroundings and easier conditions of life, we may re-distribute wealth and shorten hours of labour, we may take out of the hands of the individual or small group, and place in the hands of the State or large group, the control of natural resources and the means of the production of wealth.

In a word, we may try to equalise the environment of all to an average level midway between the luxury of the rich and the poverty of the poor, and trust by so doing to effect the renovation of Society. Apart from the Biological necessity which precludes or renders negligible the transmission of acquired characters from parent to child and which thus renders ineffectual any attempt to increase innate capacity by an artificial rearrangement of social conditions, there are other objections to trusting only to environmental methods.

For by interfering with life conditions we alter selection values and standards of adjustment. We interfere, as it were, with the automatically acting machinery of natural selection, which is good, without substituting any other compensatory mechanism in its place, which is bad. By removing injurious environmental agencies, we remove some of the most potent agents which have in the past brought about adjustment without supplying others equally potent. Moreover, we are shutting our eyes to the fact, that, owing to the rapidly increasing human element in

the environment of modern civilisation, in treating only with the products of human activity, and the conditions under which human activity is exercised, and by ignoring innate mental and bodily capacity, we are dealing only with Use Acquirements and the conditions under which acquirements are made, and are leaving out of account the capacity which makes them.

We are, in fact, dealing only with the material and ignoring the human element in the environment. We know already that the abolition of slum dwellings does not of necessity abolish slum habits of life or change the nature of every slum dweller. Much that is inaccurate and bewildering has been written on the effect of slum surroundings on city dwellers.

The more clearly established facts seem to be: that while a relatively large proportion of the inhabitants of crowded slum areas in large cities are endowed with a fairly normal, though undeveloped, innate capacity of mind and body, and owe their slum habits and their depraved tastes to devitalising and demoralising physical and psychical surroundings, and ARE capable of considerable intellectual and moral improvement when removed to better surroundings, yet a certain much smaller proportion are actually deficient in innate physical, mental, or moral capacity, and fail to respond or develop even when transplanted to healthier surroundings.

The same is true in a lesser degree of Pauperism, and to a still less degree even of Unemployment. Modern investigations into the causes of Poverty have very roughly apportioned the relative share of bodily illness, of intemperance and other acquired vices, of accident, of unemployment, of economic, industrial, and social influences, and

of various other environmental agencies in the production of Poverty, but they have also showed that a certain, perhaps relatively small proportion of persons drift into unemployment and pauperism owing to a lack of innate capacity for sustained labour or effort of any useful kind. These form the vagrant and unemployable classes.

Now the important point is that these extremes of incapacity in various fields and at various levels of human society, are, like feeble-mindedness, inherited qualities of body and mind, and as such are capable of transmission, and are indeed transmitted, from parents to children.

The urgent problem arises how to prevent not only the perpetuation of this inferior human material in the mass, but how also to stop the transplanting of detached portions of this inferior race substance into the bulk of the population, and how to prevent the lowering of the standard of racial fitness which such a leaven must produce.

This cannot be done by Environmental improvement, it can only be done by Eugenic measures of race culture, such as the education of public opinion on this important subject, and by a wisely administered State control over the lives and activities of the individuals who are the unfortunate sufferers from inherited disabilities of a character and degree which, if transmitted, threaten the welfare of the next generation.

3. Or we may try another plan and deal primarily with the individual. We may cease to trouble about higher wages and better cottages, about the nationalisation of the means of production and exchange, and the re-distribution of wealth, and turn our attention to the individual citizen, and strive by moral means, by religious influences, by

Education, and by Training, to improve his character and enlarge his acquirements.

Here, again, the initial Biological difficulty confronts us with even greater force. We may educate and train. We may improve the health and develop the intellectual and moral powers, but we have no reason to think that such improvements will be handed on to the next generation. The probability, the certainty, is that with the children we must begin over again at the same old level of development.

Moreover, here again, as in Crime and Pauperism, there is a residuum in every Society on which Education and Training are as ploughing the sands, and in which innate capacity for useful acquirements and for ethical conduct is entirely lacking. With such material, individual training and environmental control accomplish little of permanent value. But there is still another and a better way.

4. We can deal with both individual and environment at the same time. We can direct our attention not only to individual character but also to improving the opportunities for its exercise. By so doing we shall favour the development of such Innate Capacity as already exists without running the risk of arresting the growth or checking the exercise of capacity in the future.

If having decided to try to renovate Human Society in the individual as well as on the environmental side, we also recognise that to do this effectually and permanently it is necessary to deal not only with the formation of habits by education, but with the raw material of innate capacity by methods of race culture, such as the prevention of the perpetuation of hereditary Criminality, Imbecility, and Inebriety, then the ground will be made good for further

progress. Remembering always that all human efforts at guidance must be tentative, and therefore cautious, and that every step in social reconstruction must be experimental, and therefore should not be irtraceable.

For Society has no monopoly of wisdom. If through long ages the drama of evolution has been one long story of failure intermingled with success, how can social man hope to avoid mistakes? If the testing of "fitness" by a life and death standard has been the way of Natural Selection, some sort of milder penalty must still attach to social unfitness under the regime of Artificial Control. For in this matter of racial development History does not repeat itself.

The problem of the adjustment of every individual and of each group, with its own special capacities, to its own place in Society, is ever a new one. The individual and the environmental factors are constantly varying, and each Society and each generation must find its own solution for itself.

Our difficulty is largely want of knowledge and lack of imagination. We cannot sufficiently realise the Environment of the future or the kind of capacity required to fit it. Whereas, if on the other hand we wait on experience and limit our interference and our control to those social problems which are already urgent, then in a sense it is too late to set about adjustment in the present generation, for in some problems it is only by beginning with the children that there lies any hope of success.

But whatever the difficulties may be it is only by dealing with the Individual AND with the Environment that we can find the solution of the problem of social development.

The Individualist and Socialist points of view are not

really antagonistic, they are complementary. While the Socialist's method of renovating human Society errs in attributing too great an influence to environmental factors in originating innate capacity, and sometimes fails to realise the evanescent influence of surroundings on permanent racial characteristics, the Individualist, on the other hand, still lives in the old world of natural selection. He is apt to ignore the influence that integration and co-operation are playing in human life. He does not realise that a new ethical evolution is at hand, the development of which can only take place along lines of co-operation and social control.

While Individualism stands for Initiation, Socialism stands for Co-ordination. It is in a delicate balancing of Initiation and Co-ordination not only in the fields of human acquirement, but also in the fields of human capacity that future success depends. The initiation of new activities and new enterprises and the integration of old acquirements are both equally necessary.

But while thus speaking as if these Individualistic and Socialistic, these differentiating and these integrating forces acted contemporaneously, we must not forget that in the development of human societies they act to a certain extent alternately.

A wave of Collectivism or Socialism follows a wave of Individualism, and a wave of Individualism succeeds a phase of Socialism.

When the raw material of varied innate capacity which has originated during an age of Individualism has been fully integrated and worked up into the structure of Society during a period of Socialism, then comes another age of Individualism and the birth of new innate capacities. At

present we are living in an age of Socialism. The problem is how to live the mature life of Socialism without losing the youth and energy of Individualism. For if Socialism ignores the duty of safeguarding and controlling individual capacity it is fighting against Nature.

If Individualism ignores the duty of regulating the conditions under which innate capacity is exercised and of co-ordinating the acquirements that the exercise of capacity makes, it is only dealing with half the problem of social development.

We have appealed to Biology. What answer do the records of past evolution give to our enquiry concerning the rival claims of Individualism and Socialism as factors in Human Progress ?

In the first place, they tell us that in Individualism and Socialism we ought to recognise two companions, two guides of the infancy of the human race. One concerned in the origination of Human Capacity, the other in the co-ordination of Human Activity. While seemingly at variance, the one is complementary to the other. The one, the protector of Human Society from external and natural foes, the other the force which binds Society together and prevents disruption from within.

Biology teaches us that competition and co-operation have both played important parts in the development of human societies in the past, and it also suggests that social co-ordination and social control over the physical and psychical environment will assume even greater importance in the future as civilisation increases. If the movements and the forces which we designate by these names are a part of Socialism, and if by Socialism we also include

some control over the Production of human capacity, then undoubtedly we must look to some measure of Socialism for future progress.

Viewed in the light of Evolution, Political and Economic Socialism is only one aspect of a great world movement whereby Artificial is superseding Natural Selection, Plastic Educability is replacing fixed Response, Use Acquirements are taking the place of Preadaptation, and Co-operation is restricting Competition, and whereby Progress is also being secured by adjusting the conditions of Life to the needs of the Organism, instead of, or as well as, adjusting the Organism to its Environment.

Judged then by this Biological Standard, what must be the Socialism of the future? It must be a Socialism which recognises not the equality, but the inequality of man. That is, the inequality of the individual citizen in Innate Capacity as well as in the acquirements which result from its exercise. It must be a Socialism which aims at the ultimate provision not so much of equal opportunities for all, as opportunities best calculated to develop the capacity and character of the individual in each case.

At present, while an average innate capacity exists throughout the population, the opportunity to exercise it (owing to artificial social and industrial conditions) is very limited, and in many cases is absent. Hence attempts to equalise opportunity in a general way, and without regard to special individual aptitude, are also still necessary, because they help to remedy the great inconsistency which overshadows our civilisation, the inconsistency of capacity lying idle for want of opportunity, and opportunity wasted for lack of capacity to use it. It must

be a Socialism which is prepared to recognise the importance of, and to exercise control over all the factors concerned in evolutionary progress.

These are on the side of the INDIVIDUAL :

1. Innate capacity.
2. The conditions under which capacity is exercised.
3. The adaptations which result from its exercise.

And on the side of the ENVIRONMENT, the factors to which adjustments have to be made.

We have already seen how in the field of physical adaptation to disease a certain innate capacity of resistance is primarily necessary. This can only be exercised by contact with disease. The nature, the severity, and the duration of the illness, these form the conditions under which this capacity of recovery is exercised, and these also help to determine the degree of immunity which results. The same is true of Individual and Social adaptation to Ethical influences.

There must be some innate capacity of moral response. This must be exercised by experience of good and evil, and by contact with the realities of life. Education and Training, the social and moral atmosphere in which the struggle of life is carried on, these represent the conditions under which moral capacity is exercised, these determine the kind of moral adaptation which is made, and the character which results.

At present the State rightly appropriates a variable proportion of the material acquirements, and makes use of a certain portion of the social adjustments made by the individual citizen. It controls, to a certain slight extent, the conditions under which the individual exercises his capacity and responds to his surroundings.

But it exercises little or no control over the production of innate capacity itself. The important duty of race culture is still left in the hands of a crude natural selection, and a natural selection deprived of some of its most potent weapons.

The Socialism of the future must deal with the production of innate capacity as well as the conditions under which it is exercised and the acquirements that it makes. It must be a Socialism which recognises the predominating and increasing importance of psychic influences in social growth. It must be a Socialism which recognises character and utilises conduct as well as material acquirements. It must, in fact, be a Socialism founded on ethical principles.

It must recognise that modern human society is gradually becoming emancipated from some of the controlling conditions which surrounded the evolution of bodily structure and brute force in earlier days, and that Society is becoming more and more amenable to the laws which govern the evolution of mind in its social relationships.

It must be a Socialism which is both willing and able to exercise continuous and permanent control over both individual and environmental factors. For it must ever remember that as far as the inter-social relationships of its own citizens are concerned, the constant spur and the automatic regulation of natural selection have both been left behind, and that until the control of the production of innate capacity has been placed on a firm basis of experience it is not safe to relax any effort. Seeing also that there are only two ways of dealing with injurious environmental conditions (by adjusting ourselves to them or by controlling and adjusting them to our own interests), the Socialism of the future, having acquired increased

powers of control over individual as well as environmental factors, will deal with those Life conditions and faulty social relationships which can be best dealt with by environmental methods.

It will deal also individually with those questions of faulty capacity and its inefficient exercise, which can only be effectively remedied on individual lines.

It will be a Socialism which recognises that Society is the result of organic growth and only partially the product of human manufacture; and that consequently if the evolution of Society is to be influenced by human guidance it must be by measures which do not run counter to the laws of organic development, and by influences which affect all the factors concerned in organic evolution.

No doubt numerous objections are already arising in the minds of my hearers to this conception of the Socialism of the future as a fusion of the better qualities of both Individualism and Environmentalism. Some will urge that since too much is already done for citizens, further assistance and further interference must lead to further helplessness and further incapacity.

But the Socialism we are speaking of will recognise the law of Response in Social as in Individual life. Division of labour among the component cells of the Individual organism, while it is associated with the provision of protection and nourishment for the individual cell, is associated also with the exercise of important duties on the part of the individual cell at the call of the organism.

So, too, service for Society must accompany help by Society. The trouble is not that too much is done by the State for its citizens nowadays, but that too little is expected of them in return. If State Education, State Protection,

and State Support carried with them the obligation of social service according to capacity, then the treatment of the Criminal would become reformatory as well as punitive, and the treatment of Pauperism would include the stimulation of capacity for labour as well as the alleviation of distress.

Then the treatment of social diseases would include the prevention of the growth and exercise of anti-social character, instead of, as at present, being too often a vain attempt to overtake the results of anti-social conduct.

Under such circumstances the State would be interested in the making of acquirements, and in the manner in which wealth was amassed by Individual citizens and groups, as well as with the manner of its disposal. It would supervise unemployment at both extremes of the social scale.

Then Charity would be so exercised as to bring about the response of renewed effort on the part of the recipient instead of, as at present too often, increased indifference and greater demoralisation. Then Education would mean evoking capacity and forming character as well as instilling information. Then Government would mean the training of citizens to govern themselves.

Finally, it must be a Socialism which recognises that just as we can set no limits to the development of human capacity, so also we can set no bounds to the future environment of mankind.

For if in the feebleness of individual isolation "Primitive" man marvelled and trembled while he worshipped at the shrine of Nature, surely the strength derived from human sympathy, and the wider gaze of a Social Consciousness, will enable "Social" man to behold a clearer vision of the Infinite.

CHAPTER II

THE ATTITUDE OF THE STATE AND SOCIETY TO "ANTI-SOCIAL DISEASES" ¹

IN this chapter I propose to discuss the question "What should be the attitude of the State and Society to those diseases and disabilities which arise from unphysiological living and from anti-social conduct?" I shall take as examples Venereal Disease and Alcoholism.

Partly owing to the pressure of public opinion, partly as the outcome of wider medical knowledge about disease, the State now officially recognises, and provides facilities for the treatment of certain diseases which arise from a disregard of the laws of health and right-living in various departments of human life.

Thus, free medical treatment (free in the sense that no direct charge is made to the individual) is now provided at the public expense for sufferers from venereal disease.

Along with this free provision of medical treatment by the State, acting through local Health Authorities, the approved societies, under the pressure of Government and medical opinion, have been induced to relax the rule which formerly precluded the payment of sickness and disablement benefit to persons so suffering. We may therefore now regard it as an established practice that free treatment (and financial help in the case of an insured person) can be claimed by any individual citizen, who through indulgence

¹ Reprinted from *Health and Empire*, March 1926.

in promiscuous sex intercourse (or in other ways) contracts venereal disease.

Every citizen will agree that it is in the true interest of the community that steps should be taken to prevent the spread of venereal disease, and if it should prove to be necessary, in order to do this, that the State should provide not only facilities for free treatment, but also special inducements to the individual to avail himself or herself of such facilities, no right-minded citizen should object to sharing the burden of the cost of such a scheme.

The first thing, however, that strikes the thoughtful observer is this: Though it may be possible, by improved methods of disinfection, to prevent the development of disease in a certain number of cases, yet as long as a considerable proportion of the population indulges in promiscuous sex intercourse, venereal diseases will continue to spread from diseased to healthy persons.

The essential factor in the prevention of these diseases becomes therefore a question of reducing the amount of promiscuous sex intercourse by raising the standard of sex morality in the community.

It is not possible or necessary now to consider in detail the various factors concerned in the growth of prostitution as it affects modern communities. Of these the physiological disharmony which arises from the divorcement of normal desires from their legitimate satisfaction under modern social conditions of life is one of the most fundamental. Delayed marriage, the economic burden on parenthood, the numerical disproportion between the sexes, these play an important part, but in addition to these biological and sociological influences, there also exists a psychological factor of very great importance, and that is

public opinion, or the influence on the individual of the group mind.¹

It is well known to those who have studied the psychological aspect of the problem that the standard of sex morality in any group of adolescents will depend largely on the mental attitude to sex matters assumed by companions, and to the established code of morals which underlies the relationship between the sexes in our monogamous State.

The average young man and young woman is influenced in this matter of sex conduct primarily by the training and moral atmosphere of youth, and secondarily by the mental and moral attitude to sex matters of the group to which the individual belongs; in other words, by the moral environment of the home, the school, the university, the workroom, the shop, the factory, the club, or the society, in each case.

There can be little doubt that one important influence in the lowering of the standard of sex morality which has taken place since the War has been the shifting of public opinion in the direction of condoning sexual irregularities and sexual indulgence in both sexes.

It also seems clear that we cannot look for any considerable raising of this standard of sex morality until public opinion ceases to condone prostitution, and until indulgence in promiscuous sex intercourse is no longer considered by the citizens as a matter of individual concern only, but

¹ By the influence of the group mind in this connection is meant the effect exercised on the conduct of the individual by the expressed mental and moral attitude of the social group with which the individual is in intimate neuro-psychical association. No opinion is here expressed as to the real nature of this group consciousness or of its relation to individual mentality.

comes to be regarded as an injury done to the community and as conduct of an anti-social character.

This means that in endeavouring to prevent the disastrous moral and physical consequences which result from promiscuous sexual indulgence the Government is brought into conflict with a certain section of the population, and it will be necessary for the State to exercise some control over the so-called liberty of the subject, if further progress is to be made.

Seeing then that in order effectually to prevent the spread of venereal disease, public opinion must actively disapprove of indulgence in promiscuous sex intercourse, the important question arises whether, and to what extent, State action should be invoked to reinforce moral and social influences in a combined effort to move public opinion in this direction.

Now in order to influence public opinion in this matter of sex morality by State action we must show :

1. That indulgence in promiscuous sex intercourse *is* injurious to the best interests of the community ; that it is, in fact, selfish, anti-social conduct, which ought to receive the disapproval of all public-spirited citizens, and

2. Produce reasons for thinking that State intervention in this field of morals *will* exercise the desired influence on the communal mind.

In regard to the first question there can be no doubt that indulgence in promiscuous sex intercourse tends to the disintegration of family life. In the unmarried man it tends to delay or to prevent marriage, inasmuch as the gratification of the sex appetite is secured without incurring those economic burdens and those social restraints which attend the married life.

A loose standard of sex morality also depreciates the feeling of responsibility of parents to offspring; it dulls the sense of "fatherhood" in man and "motherhood" in woman.

Further, inasmuch as the chivalrous ideal and many other of the noblest emotions of which human beings are capable spring from and centre round the sex instinct, it comes about that all premature attempts to grasp mere physical satisfaction, without regard to these higher interests, must involve a grave risk of bringing about the arrested development and the ultimate atrophy of these nobler feelings. Nothing can compensate any society for the loss of emotional experiences of this higher kind.

In these and in other ways indulgence in promiscuous sex intercourse strikes a deadly blow not only at individual but also at national welfare, and when, as in a large number of cases, to such anti-social conduct the terrible effects of venereal disease are added, then the result to the community and to the race is most disastrous, and this fact must be brought home to the social mind and conscience by all legitimate means.

We must now further enquire to what extent State action can reasonably be expected to be helpful, and what form such intervention should take.

In the first place, since the main object is to influence public opinion, it is clear that State action must be primarily directed to this end.

The Ministry of Health should, by public announcement and through local Health Authorities, draw the attention of the public to the fact that the ratepayer and the taxpayer are now bearing the cost of the treatment of venereal disease, and that it is therefore the duty of every citizen

to abstain from indulgence in promiscuous sex intercourse, with its associated risk of the contraction of disease.

It should be made clear to all that the onus of making such restitution as is possible rests on the individual, and that every person who exposes himself or herself to the risk of infection of venereal disease becomes a potential source of danger to society, and must therefore take the initiative in obtaining medical advice and treatment.

If, as is probable, in order the more effectively to deal with the problem, it should become necessary for the Government to include venereal diseases in the list of notifiable diseases, then such action on the part of the Ministry as is now suggested would prepare the way for further legislation, and would make notification more acceptable to the public.

It is not suggested that any such State pronouncement should be associated with threats of penal consequences, except in the case of individuals who fail to obtain or to continue under medical treatment, and in those who knowingly transmit venereal disease, neither is it suggested that such State action would immediately and directly influence individual morality.

The average man is not likely to curb one of his strongest appetites until, as the result of education and training in citizenship, he learns to attach a higher value to communal approval than he does at the present time. Hence the first place must be given to education in Citizenship.

The difficulty is that Society is not yet interested in, or at any rate does not show its approval of the moral life, and although State action must undoubtedly bear some relation to the public opinion of the day, yet every wisely considered and moderate step forward on the part of the

people's representatives will in itself tend to react on the group opinions of citizens so represented, and this in turn will bring about the possibility of a further advance.

Just as the average citizen is influenced by the verdict passed by his associates on his conduct, so the smaller group mind is swayed by the larger group, and the mental attitude of the people as a whole is influenced by the judgment pronounced by the Press, and by the voiced opinion of Parliament.

What we expect and hope from State intervention on right lines in this field of human action, then, is a strong impulse to public opinion in bringing about active disapproval of promiscuous sex intercourse, as conduct of an anti-social nature.

In other words, it is hoped that moral and religious appeals will be reinforced by a communal appeal to the citizens to keep constantly before their minds the welfare of the community when tempted to indulge in selfish conduct.

But for public approval or disapproval of any kind of conduct to be effective it must be known to the group or to the society concerned.

Secrecy in sex matters, as in other human affairs—the fact that the so-called respectable citizen may be indulging in sexual immorality outside the knowledge of his immediate associates, or the group to which he or she belongs—this has been a very potent factor in delaying the arousal of a communal disapproval of promiscuous sex intercourse.

This disharmony between the public and the private lives of many citizens is largely responsible for the fact that Society still condones sex irregularities, and as long as this is so prostitution will continue.

Any action by the individual or the State, therefore, which throws the searchlight of public opinion on the conduct of the individual citizen, *in so far as this affects the public welfare*, will tend to increase the sense of individual responsibility, and will promote a higher level of conduct.

This means that the time has come to re-estimate and revalue our judgments concerning *secrecy* in all relations of life. We must be willing to relinquish some of our cherished so-called individual rights in order to obtain a healthier communal life.

So far we have limited our enquiry to State intervention in the field of the sex relationships, but with the growing complexity of social relations, and with the rapidly increasing interdependence of group interests in a modern community such as our own, there must be an ever-deepening association between individual health and conduct in many other departments of life.

In order to preserve health and vigour under modern social and industrial conditions men and women must order their lives on physiological lines.

A large and increasing part of the economic burden borne by the thrifty, willing, and vigorous section of the population is directly or indirectly the outcome of idle, health-destroying, and selfish habits on the part of a section or sections of the population.

If this burden is not to become unbearable the State must step in to protect the public-spirited citizens, and to penalise these and other forms of anti-social conduct.

In selecting indulgence in sexual promiscuity, with its associated risk of venereal disease, as one example of anti-social conduct, we must not overlook the sad case of those

individuals (often innocent wives and children) who through no fault of their own become the victims of venereal infection.

These demand not only the sympathy but the help of all right-minded citizens.

The establishment of a higher standard of sexual morality, together with active disapproval by the State and the public of prostitution in all its forms, would, we believe, materially help to reduce the numbers of this unfortunate and long-suffering class.

But before this can come about, public opinion must be educated and a national *health* and *racial* conscience must be aroused.

We can further illustrate this problem of the relation of the State and Society to diseases which threaten social and racial welfare by taking as an example intemperance in the use of alcohol.

Our knowledge about the action of alcohol on the human organism is much fuller and more accurate to-day than it was even ten years ago.

We now know that alcohol acts as a narcotic and not as a so-called stimulant, and that this narcotic effect falls chiefly on the central nervous system, where it tends to put out of action the higher centres in the brain, those concerned with judgment, self-criticism, and self-control, the very qualities which are so much needed in our complex social life.

Indeed, it is true to say that, partly owing to the growth of physiological knowledge, and partly as the result of the increasing demand to-day for alertness and self-control, public opinion is now undergoing a great change in regard to the use of alcohol and the real meaning of temperance.

Temperance nowadays, to most citizens, does not mean

merely the avoidance of gross intoxication, it means abstention from the use of alcohol in amounts which impair these qualities of alertness and self-control, even though the quantity of alcohol consumed is not enough to produce the grosser forms of incapacity, and may be even regarded as moderate by many people.

But in spite of this altered mental attitude on the part of the public generally to temperance, our *national practice* in regard to the use of alcohol still urgently calls for revision and amendment.

A word must be added about this national habit of alcoholic indulgence as it affects the hospitals of the country.

It is well known that the voluntary hospitals have recently been passing through a critical stage in their history, and that the service they render, though of enormous value to the community, is still inadequate to provide fully for the demands made upon them.

A record kept of the applications for medical and surgical treatment at a large and representative provincial hospital before the War, when applied to the hospitals of the country as a whole, suggests that a very large demand, amounting probably to more than 10,000 applications annually, was then made on the voluntary hospitals of the country by persons who, at the time, were more or less under the influence of alcohol. If to this we add the demands made on hospital accommodation and hospital services by persons suffering from the *indirect* effects of alcoholic indulgence, we begin to realise the serious problem which the careless, the indulgent, and the anti-social conduct of one section of the population imposes on these already overburdened institutions.

We suggest that the time has arrived when a separate

record should be kept by each hospital of the number of persons who apply for the relief of illness or injury the direct outcome of alcoholic indulgence. If this record appeared in every hospital annual report, some idea would be gained by the public of the magnitude of the demand which is made on hospitals by the careless conduct of a certain section of the population.

In this way the subscribers would know to what extent subscriptions which were intended for the help of persons who may be regarded as genuine applicants for hospital treatment are being diverted to repair the damage done by anti-social conduct.

The spread of this information in hospital reports and by Press notices at annual meetings would also greatly affect public opinion in regard to this question of the effect of intemperance on the overburdened hospitals.

It is indeed probable that if the hospital accommodation now occupied by alcoholic patients could (by a change in our national habits) be made available for other patients, a considerable proportion of the 10,000 additional hospital beds, now regarded by the Voluntary Hospital Commission as necessary, might be saved or might be put to better use.

The same is true of venereal disease, the only difference being that in the case of alcoholism, the burden, so far as the hospitals and the public are concerned, falls on the charitably disposed public, whereas in the case of venereal disease it falls on the taxpayer and the ratepayer as well.

It is freely admitted that the peculiar stigma attaching to venereal disease makes it very important that while everything should be done to render the patient non-

infectious and to cure the disease, nothing should be done which might tend to prevent sufferers from seeking prompt medical advice and treatment, that is, which might prevent the detection of the disease in its earliest stages.

But keeping these facts in mind, it is still necessary to have regard to fundamental principles.

To assume responsibility for the treatment of persons suffering from venereal disease and alcoholism, without any organised or definite reference to the indulgence in sex promiscuity or in alcohol, which has produced the disease, is to fail to make use of a great opportunity for influencing young citizens for good. It also perpetuates the mistaken notion that physical, mental, and moral disorders are shut up in watertight compartments and require treatment by different persons and different authorities, as well as by different methods.

This failure to realise all that preventive medicine really means is due partly to a misconception of the nature of preventive medicine, partly to a failure to realise the essential unity between mental, moral and bodily health, and partly to a lack of training of medical students in the science of psychology.

It may perhaps be thought by some that a fuller appreciation by the public of the loss the nation sustains owing to the anti-social conduct of a section of the population might lead to want of sympathy with, or to harsh treatment of the sufferers themselves, either by the hospitals, or the public, or the State.

On the contrary, experience shows that the greater our knowledge of the causes of disease, and the deeper our study of the innate tendencies and the environmental influences which lead to crime and anti-social conduct of all kinds,

the more rational, the more humane has been our method of dealing with disease on the one hand and with anti-social conduct or crime on the other.

I desire here to anticipate a possible criticism which may arise in regard to the jealously guarded and rightly valued tradition of professional confidence between a doctor and his patient.

I would point out that the suggestions now made do not contravene any rule of professional secrecy.

The present proposals are that the State should make public use of the recorded facts as to the cost of venereal disease to the community, and thus influence public opinion in the direction of active disapproval of prostitution. That it should instruct medical officers attached to venereal disease clinics to impress on all patients the responsibility which rests upon them, not only to obtain and continue under medical treatment as long as necessary, but also to abstain from promiscuous sex intercourse in the future.

In short, that warning and remonstrance should supplement free advice and treatment, and only in the case of wilfully negligent and viciously disposed persons, that secrecy should, if necessary, give place to publicity and penalty.

In like manner in regard to alcoholic indulgence. The proposals that the hospitals should keep records of the numbers of patients who seek hospital aid as the direct or indirect result of alcoholic excess, and should make these records publicly known, would not contravene any rule of professional secrecy.

Neither would the suggestion that the individual doctor should do far more in the future than he has done in the

past in warning his patients as to the injury done to the community by vicious habits, destroy professional confidence.

It is no doubt unfortunately true that medical men do, at present, shrink from giving such warning and advice, partly because patients are themselves sensitive on such matters of morals and conduct, and also because, under our present system, the doctor makes his living by relieving or curing, rather than by preventing disease.

A different attitude is, however, slowly but surely coming over the public and the professional mind, both in regard to the real meaning of preventive medicine, and the necessity for including anti-social conduct among the antecedents of disease.

The time will come when not only Medical Officers of Health, but medical practitioners and hospital staffs, will regard it as an important part of their duty to give advice to patients concerning the principles which underlie the physiological and the sociological way of life.

CONCLUSION

Such, then, is the position, such is the present attitude of the State and Society to diseases and disabilities which result from anti-social conduct ; or, as we may for the sake of brevity, call them, " anti-social diseases."

In regard to the question of future action, some suggestions have now been made.

For instance, it would reinforce public opinion in regard to the evils which arise from alcoholic indulgence if records were kept of the extent to which, in different hospitals, hospital accommodation is being used for helping intemperate citizens to obtain relief from their self-imposed

disabilities, and to escape the consequences of their self-indulgence.

It would help to arouse a more active disapproval of prostitution in the public mind if the cost to the ratepayer and the taxpayer of the treatment of venereal disease, and the further cost to the nation of the maintenance and support of patients in mental hospitals and public institutions, and by poor law agencies, who owe their illness to venereal disease, were also publicly known.

But alcoholism and venereal disease are by no means the only examples of diseases and disabilities which arise from misconduct.

In every department of life a large part of the economic burden now borne by the community is the result of idle, selfish, health-destroying habits on the part of some section or other of the population.

We want a special name for the diseases, the disabilities and the inefficiencies which are the product of selfish and anti-social conduct. We suggest the term "Anti-Social Diseases."

The State deals summarily with the delinquent who robs his fellow-citizens of material possessions, but it takes little notice of the man who robs the community of its most valued possession, its capital of human health.

It imprisons the would-be suicide who by one summary act tries to end an unhappy existence, but has little to say to the man who takes his life slowly by habits of self-indulgence, spread perhaps over many years, although in this case there is ample time for remonstrance and restraint.

If the State is to achieve the best results in preventive medicine of the true kind, it must widen its outlook and

concern itself with the psychological as well as with the physical antecedents of disease. It must deal with the conduct which results in the sickness or the disability. In other words, it must be interested in the life of the *citizen as a whole*.

If the community is to get relief from the heavy burdens which it now bears, it must cease to condone sexual immorality and must show its active disapproval of intemperance.

But a still further danger is involved in this non-recognition of individual responsibility for health and efficiency.

It has been one of the great reproaches of our penal system that, as carried out until recently, it affords so little opportunity for reclaiming the delinquent, and is only very partially successful in preventing crime.

Our present method of dealing with the "Anti-social Diseases" is open to the same criticism, though in a different way. For instance, while it confers a benefit instead of a punishment on the individual, it fails, through the absence of any remonstrance, to bring about any association in the mind of the citizen between disease and wrong-doing. The result is that the patient is led to conclude that if the authorities and the public take so little notice of conduct as being responsible for disease, the patient himself is entitled to do the same, and he does it.

A wide field is here opened up for exploration and improvement.

In order to bring about a true realisation by the public of the loss the nation suffers and of the burden imposed on it by the anti-social conduct of certain sections of the population, the facts must not only be available, they must be made publicly known.

A wiser public opinion will be thereby gradually formed, which will enable the State to deal more efficiently, not only with disease in its earliest beginnings, but with the psychological happenings, the conduct, which is responsible for disease.

It will only, in fact, be possible to deal adequately with these diseases when public opinion has been sufficiently aroused, and when a "national health conscience" has been formed which recognises that it is "wrong to be ill if illness is avoidable."

Then the unrestrained liberty of the individual to injure himself and the community can be more effectively curtailed. Then the Ministry of Health and the Ministry of Education will be enabled to embark on a combined campaign for the promotion of the physical, mental, and moral welfare of the nation.

Thus we arrive at some sort of answer to our question—
"What should be the attitude of the State and Society to sickness and disability the result of anti-social conduct?"

We find, first, that in its efforts to promote individual and national health and welfare, the State must take an increasing interest in, and exercise a growing control over, those disorders of mind and body which arise from anti-social conduct on the part of its citizens.

For this control to be effective it must deal with the causes and early beginnings, as well as with the results of such conduct.

The State must, in fact, be more and more concerned with preventive measures, as applied to the mental and moral, as well as to the physical aspect of individual and social life.

One very important way in which this preventive influence can be exercised is by the instruction of the public in the

facts as they affect our national life and well-being, and by guiding public opinion along right lines.

The fear of consequence will still remain as a deterrent influence, and the use of penal measures will still be necessary, though, it is hoped, in a gradually diminishing degree.

But before all this can come about, much work of an educational kind will still be necessary.

CHAPTER III

HOW THE STATE CAN HELP VOLUNTARY EFFORT IN THE PROMOTION OF NATIONAL HEALTH¹

IN discussing the relation of communal to individual effort in the furtherance of national health and efficiency it will be best to focus attention on two main aspects of the problem :

- (a) The present position and what requires to be done.
- (b) The means by which the suggested improvements can be best carried out.

THE HOSPITAL PROBLEM

Perhaps the hospital problem as it exists to-day affords the best example of the loss and injury the nation suffers owing to the absence of co-ordination between State, Municipal, and Voluntary efforts in providing a hospital service for the country.

It is well known that the voluntary hospitals are passing through a very critical stage in their history. All are short of funds, many are living from hand to mouth on legacies or other fluctuating sources of income like whist drives, dances, parades, or other local " efforts " to raise funds.²

¹ From the Report of the Conference on Imperial Health held at Wembley in May 1924 by The People's League of Health.

The other side of the story—How voluntary effort can help the State—still awaits description.

² This was written in May 1924. The financial position of the voluntary hospitals has improved in recent years.

Most of the voluntary hospitals have long "waiting lists" of persons seeking to gain admission. These "waiting lists" vary at different hospitals, but they approximate roughly to the number of beds provided by any given hospital.

Thus at the Leicester Royal Infirmary, with its 300 to 400 beds, the waiting list varies between 300 and 400 persons. At the London Hospital, Whitechapel, with its 1,000 beds, the waiting list is, I understand, about 1,000.

If we regard the voluntary hospitals of the country as providing some 30,000 beds, this means that there must be at any given time about 30,000 persons seeking admission to the voluntary hospitals for whom there is no room.

An enquiry on April 1, 1924, into the number of beds and the waiting lists in eleven representative hospitals showed that the number of persons on the waiting lists was more than double the number of beds, i.e. 8,340 persons waiting for 3,900 beds.

Let us pause for a moment to consider what this means to the life and health of the nation.

From the medical point of view delay in the treatment of all disease is a serious drawback, while in some diseases, such as cancer, delay becomes a calamity.

It is true that cases of emergency illness and serious accident *are* for the most part admitted promptly, but other illnesses which, if not treated in the early stages, tend to become serious, often have to wait.

At the Leicester Royal Infirmary this April,¹ owing to the extreme pressure on the beds, a number of cases of acute pneumonia have been refused admission. *From the hospital point of view* this delay is a bad policy, because it tends to increased demands on the hospitals by the same

¹ 1924.

individuals at a later date. *From the national and economic point of view* the position is equally serious.

A large number of the individuals who figure on these "waiting lists" belong to the working class. They are suffering from varicose veins, hernia, or some other disability which does not perhaps threaten life, but which prevents them from working and from carrying out their daily duties efficiently.

If it was necessary (as it was) during the War to make every citizen efficient in the face of a national emergency, surely it is just as necessary to render every citizen fit, as far as possible, for service in the international competition which now confronts us in peace. The peace struggle, though perhaps not so concentrated, is as important in the long run as the struggle of war.

It is certainly true that, from the point of view of adequacy of accommodation and capacity to deal with disease in its early stages among all sections of the population, the hospitals of this country are only touching the fringe, they are only dealing with a part of the problem of the adequate institutional treatment of disease.

THE HOSPITALS AND PREVENTIVE MEDICINE

There is a further aspect of this matter of lack of accommodation and the enormous pressure on our hospitals at the present time which deserves notice.

We are beginning in these days to realise more and more that the preventive side of medical, and to a certain extent also of surgical, work is more hopeful than the curative side. I should like to illustrate what I mean by a short reference to the effect of intemperance and venereal disease on the health and resources of the nation.

Before the War a record was kept at the Leicester Royal Infirmary over a period of two and a half years of the number of persons applying daily for treatment for accident or illness the *direct* outcome of alcoholic excess.

The number of intoxicated persons so applying varied from two or three per week to twelve or thirteen per week in holiday times. The Leicester Royal Infirmary is a representative institution, and calculating on the accommodation and work done at this hospital, we must assume that some 10,000 persons applied to the voluntary hospitals of the country annually for the treatment of illnesses or accidents which were the *direct* outcome of alcoholic excess, while if we include minor degrees of intoxication the number would be far larger.

If to these *direct* effects we add the number of persons who crowd our hospitals for illness or disability the *indirect* result of intemperance, we begin to realise what intemperance means not only to the hospitals, but in loss of working time, wage-earning capacity, and efficiency of our workers and their families.

The point, however, that I now wish to emphasise is this—that owing to these demands on our hospitals by a certain thoughtless section of the population, together with the burden of trying to overtake the results of confirmed disease, these institutions are overcrowded and overworked; the doctors and nurses have no time or opportunity to deal individually with each patient by giving personal advice concerning the laws of health and the best way to prevent and escape disease. The hospitals, in fact, are too busy in trying to overtake the results of disease to deal with disease in its early beginnings.

How then can this pressure be relieved, and a truly

preventive and educational health service be secured of an institutional character ?

The first step is to bring about co-operation between the different branches of such a health service as we already possess. This can only be done completely and effectually by Municipal or State action, because many of the institutions concerned are already under Municipal or State control.¹

The voluntary hospitals are hampered and clogged because no efficient Clearance Bureau exists in the areas served by different hospitals. Patients ready for discharge are often obliged to be retained in the hospital because there is no method of promptly drafting them to convalescent homes, or sanatoria, or Poor Law infirmaries, according to the medical or surgical requirements, or the social and economic needs of each individual case.

Frequently the house surgeon or house physician is obliged, in the absence of more suitable accommodation, to send a patient to his own home, where, owing to insanitary conditions, lack of nursing, good food and fresh air, he fails to convalesce and remains a burden on the casualty or out-patient department of the hospital for a long time.

Promptitude and efficiency are essential factors in good medical and surgical treatment, and these are sometimes lacking.

MENTAL HOSPITALS

The same lack of co-operation exists between the mental hospitals and the Poor Law infirmaries.

At present, owing to the unfortunate postponement of legislative sanction, asylums run by county and city

¹ A beginning has now been made under the Local Government Act, 1929.

authorities are precluded from dealing with mental cases before certification. This means that mental disorders are not treated sufficiently early, or in the recoverable stages.

Further, the same need for grading and sorting of patients is present in the Poor Law infirmaries, especially in regard to the old people, the senile demented, who form a considerable proportion of the inmates of these institutions.

The asylums are doing at present a part of the work of looking after these senile demented, the Poor Law infirmaries another part.

If the asylums are to become real mental hospitals and take a larger share in dealing with the "voluntary boarder" and the early stages of mental disorder, then they must be relieved of the routine work of dealing with this mass of senile mental decay, which is essentially incurable and could be equally well and at less cost provided for in other institutions or wards set apart for this purpose.¹

CHARGE FOR ADMISSION TO HOSPITALS

Another essential step is to secure larger accommodation and adequate financial support for the voluntary hospitals themselves.

Under the present voluntary system the financial burden falls very unequally on the population.

An attempt is being made to make ends meet by charging for admission to hospitals during illness. In my opinion this is an unsound and a short-sighted policy.

In the first place it contravenes the spirit of insurance, which means that contributions against illness must be

¹ These problems are now receiving consideration in the Mental Treatment Bill, 1930.

made *during health* and that the contributions should rest on as *wide a basis as possible*.

Further, the imposition of a charge for admission during illness, especially in the case of heads of families, tends to postpone application for admission, and thus prevents that early recognition and treatment of disease which medical men now recognise to be an essential element in success.

Although a good deal has been done in progressive towns by means of contributions from factories and workshops and by enlisting the interest of the workers by Saturday Hospital Societies, and by other efforts to widen the basis of hospital support (in Leicester, for instance, the contributions from the workers to the Royal Infirmary and the Saturday Hospital Society Convalescent Homes amounted in 1923 to over £30,000), yet the hospitals generally throughout the country are starved for lack of funds.

Seeing then that the voluntary hospitals have no legal claim on public funds, it would appear that the time has come for the State to concern itself with this question of lack of hospital accommodation and adequate financial support for the hospitals of the country.

It would pay the community over and over again to provide an adequate and efficient hospital service for the population by which disease could be treated in its early beginnings, and these farcical "waiting lists" done away with.

In my judgment, *institutional hospital treatment* should become a recognised part of *national insurance against illness*.

The citizens already contribute through the rates and taxes to the support of certain units in a national health

service. They support municipal hospitals for infectious diseases, municipal mental hospitals, sanatoria for tuberculosis, Poor Law infirmaries, and it is an anomalous state of things that the large voluntary hospitals of the country which render the most important services at critical stages in both accident and illness, should be starved for lack of support.

What is wanted is a co-ordinated and unified hospital service for the country, adequately supported on an insurance basis by all classes of the citizens. The State must help voluntary effort to bring about such a service.

At this point I should like to remove a possible misapprehension. I suggest that the provision by the State on an insurance basis of adequate financial support for an enlarged hospital service does not involve the scrapping of the present voluntary system of hospital management.

What it does mean is a certain degree of standardisation and levelling up of hospital administration and work. It means a certain, but not an undue, amount of central supervision. It means a hospital service which, while not falling below a certain level of efficiency, shall be free to rise above this level whenever and wherever the brains and the opportunities are present to initiate further progress and to achieve better results in the treatment of disease.

It means also that the medical officers, the physicians and surgeons and specialists, who perform these hospital duties must be *adequately paid for their services*, as they quite well could be if the financial support of the hospitals were based on a national insurance contribution. It means that this unhealthy competition between hospital and private practice, by which services rendered to the poor in the hospital ward are paid for by attendance given to the

rich in the consulting-room or in their own homes, must be done away with.

The real problem is how to preserve the stimulus to effort provided by the voluntary system, and at the same time to get rid of the paralysing influence of poverty.

But there is yet another way in which the State can powerfully help voluntary effort in promoting national health and welfare.

I have spoken of the demands which are made on hospitals for the treatment of accident and illness the outcome of alcoholic indulgence. These demands are not limited to intemperance alone; they arise from unphysiological living of every kind, from over-indulgence in food, and from eating the wrong kind of food, from working and sleeping in a vitiated atmosphere, and from all forms of excess.

THE HOSPITALS AND VENEREAL DISEASE

The cost of providing for the treatment of venereal disease has during recent years been placed on the shoulders of the clean-living and healthy section of the population.

This burden now amounts to a large sum annually. This sum is spent in trying to overtake disease after it has attacked its victims. But venereal disease is essentially a preventable disease, preventable, that is, not by medical measures only, but by the application of medical knowledge, together with instruction in sex hygiene in childhood and adolescence, and by ethical guidance in order to ensure right conduct.

The prevention of venereal disease provides a very good example of a socio-medical problem, the solution of which calls for the fullest co-operation between the two State Departments which are respectively concerned with the

bodily welfare or *health*, and the mental and moral welfare, the *education* of the citizens. It also calls for co-operation between these State Departments and the hospitals which treat these diseases.

We shall not abolish prostitution nor shall we prevent venereal disease until we begin in childhood and youth to lay a sound foundation of biological knowledge on which physiological, psychological, and ethical instruction can be built up in adolescence and in later life.

NATIONAL WELFARE AND INDIVIDUAL CONDUCT

Another fundamental fact which emerges from a study of social evolution is the increasing association between National Health and Welfare and the conduct of the individual citizens.

Preventive medicine, while still striving to secure a pure and abundant water supply, a fresher and a more sun-lit atmosphere, a more adequate and a better balanced diet, while still endeavouring to improve the conditions in the home and the factory, will, in the future, be more and more concerned with the psychological and sociological aspects of the lives of the people.

Not only the destruction of disease germs but the prevention of industrial fatigue and those other injurious conditions which bring about a lowered resistance to infection will occupy the attention of future Medical Officers of Health.

It is only by a recognition of the *essential unity of mental and bodily health* that the present gap of the pre-school age will be bridged over. The prevention of tuberculosis in childhood is a case in point. The treatment of the tubercular or the pretubercular child, with its lowered resistance, to

be efficient, must be spread over months or even years, and while this is going on in sanatoria or open-air schools the mental development and welfare of the growing child must be equally cared for at the same time.

The nation must not only realise, it must act on the conviction, that mental efficiency on the one hand is unattainable without a fair measure of bodily health, and that bodily health, on the other, depends on physiological living, that is, on right conduct and mental health.

CO-OPERATION BETWEEN THE MINISTRIES OF HEALTH AND EDUCATION

But all this means a growing co-operation between the Ministries of Health and Education. It means a fusion of aims and methods, an integration of the work of the two Ministries in one unified *Ministry of Bodily and Mental Welfare*, with this twofold outlook on the life of the nation.

The instruction of our children and adolescents on sound lines in sex hygiene provides a good example of such a wider outlook.

Parents, as a rule, are not nowadays giving that sound instruction to their children on sex matters which is essential for the right living of the sex life.

But a sound and healthy sex life, on the other hand, is vital to the future of our country and our race.

The State cannot afford to let its young citizens grow up without such instruction and guidance.

We must begin in the training colleges, and raise up a band of suitably endowed and well-equipped teachers who can not only lay the necessary foundation of biological knowledge in the elementary schools, but who would be also able to instruct the older scholars in the physiological

facts, and guide and advise the leaving scholars concerning the temptations and dangers which will beset them when they enter the office, the factory, and the workshop.

Just in so far as it concerns itself with the *conduct* of its young citizens, in relation to bodily and mental health and efficiency, will the Ministry of Education be fulfilling its real function. By thus preparing its young citizens for life in all its aspects it can powerfully aid the Ministry of Health and become a valuable agent in the prevention of disease.

CONCLUSIONS

To summarise the foregoing observations : we find that there exists a serious lack of co-ordination among the various hospitals, convalescent homes, sanatoria, Poor Law infirmaries, and other agencies which provide institutional accommodation for the treatment of disease both of mind and body.

We find that these different units in what should be an Institutional Health Service fail to co-operate and are in wasteful competition among themselves, both in regard to securing financial support and in carrying out the work which they undertake.

We believe that the time is opportune for the State to link up these various municipal and voluntary agencies ; that they should together form an institutional branch of a unified Health Service for the country, the financial support for which should be secured by contributions on an Insurance basis spread over the whole population.

In view of the growing association between national health and the conduct of the individual citizen, we consider that instruction on sound physiological and psychological

lines in personal hygiene, in sex hygiene, and in social hygiene or citizenship, that is, education for life in all its aspects, should become an essential part in our scheme of national education.

It should be the duty of the Ministry of Health and the Ministry of Education, working together, to see that, when owing to defect or illness, or to predisposition to illness, children are unable to attend the ordinary school curriculum, or to obtain advantage from the ordinary school instruction, then, by means of special classes and open-air schools, by instruction in personal and social hygiene, and in other ways, the bodily health and the mental and moral development of the children should be promoted as far as possible.

This necessary co-operation will in the future lead to a fusion of the two Ministries in one State Department of *National Welfare* in which the essential interdependence and unity of bodily and mental health, efficiency, and welfare will be fully recognised.

CHAPTER IV

INTEREST IN WORK AS A FACTOR IN INDUSTRIAL HYGIENE ¹

BEFORE considering the part played by "Interest in Work" in industrial hygiene we must first form some conception of what hygiene as applied to industry means, and of the nature and relationship of the various factors which affect its application to industrial life. The aim of industrial hygiene is to improve the conditions under which industry is carried on; to establish better methods, whereby exhaustion and fatigue may be prevented, invalidism and accidental injury lessened, and the mental and bodily health and well-being of the workers may be promoted. But hygiene as applied to industrial life forms only one aspect of the larger problem of national hygiene; that is, the promotion of the mental and bodily welfare of the citizens as a whole. Just as personal hygiene is concerned with the life of the individual citizen, and social hygiene with his relations to fellow citizens, so that part of the life of the worker which is spent in the factory or workshop or office presents peculiar problems, and it is with these that industrial hygiene is specially concerned.

The case of the worker in relation to his industrial environment is comparable with that of the individual in regard to his surroundings in other spheres of life. We

¹ From the *Dictionary of Industrial Administration*. Sir I. Pitman & Sons, 1928.

must therefore consider the individual worker from a general standpoint, and regard him as a human personality, affected by psychical as well as by physical influences, and not merely as a manual worker, a factory hand, or a machine. That part of human life which is engaged in the production and distribution of material wealth is intimately concerned with, it contributes to, and derives support from, those other human activities which are concerned with the production and distribution of immaterial goods, of ideas and ideals, and of worthy conceptions of art, science, and ethical truths. Further, while the time spent in the factory or office is not without its effect on the home life of the worker, domestic conditions also exercise a powerful influence on the bodily health and the mental activities of industrial workers, and so, on the moral atmosphere of the factory and workshop. Moreover, it is a mistake to regard industrial life as consisting of external relations and conditions only, it also includes less obtrusive but very important internal factors, such as innate capacity of prompt response, and ability to profit by training and experience in the workers themselves.

It is to lack of appreciation of these innate individual differences, and to failure to make the best use of natural aptitudes in different occupations, that much of the excessive "labour turn-over" and many of the "industrial misfits" in industry are due to-day. To this point we shall, however, return when speaking of the part played by vocational selection and vocational guidance in industrial life.

With this short explanatory statement concerning industry and the industrial environment, the interdependence of physiological with psychological influences, and of external or environmental, with internal or personal characters,

we are now in a position to consider very briefly the various factors which influence the practical application of hygienic principles in industrial life. These fall into two groups—(1) Physiological, and (2) Psychological. It is in the latter group that “interest in work” plays such an important part.

Among the physiological factors which mainly affect bodily health and vigour may be mentioned: ventilation and air movement; temperature and humidity; lighting, natural and artificial; hours of labour, spells of work, and rest pauses; clothing in relation to work and temperature; posture and fatigue in relation to muscular movements; machine design in relation to physiological needs. We do not propose to discuss these in detail, and can now only point out that conditions which act favourably on raw material in the process of manufacture may react unfavourably on the human machine. The influence of temperature and humidity in spinning and weaving sheds affords a good illustration of this point.

Psychological factors which mainly affect mental health and mental activities are—fatigue, of the pathological kind, specially affecting the nervous system; emotional states, dread of unemployment, and anxiety in its various forms; these are partly the outcome of environmental influences, and partly depend on internal tendencies, such as temperament, and the mental outlook of the individual worker; monotony and repetition. These two latter factors, while undoubtedly associated with fatigue and loss of interest in work in certain individuals under certain conditions, must not be regarded as wholly injurious or anti-hygienic in all cases. Thus, repetitive work, which to one worker brings boredom and fatigue, may in a differently

constituted individual afford opportunities for thoughts not directly connected with the work in hand, and may thus help to relax a too-concentrated attention and so to prevent fatigue. Emotional disturbances due to tactless or unsympathetic overlooking, or other defects in organisation or management. Other neuro-psychical disturbances which arise from a lack of adaptation between the worker and his or her industrial environment also affect mental health.

In considering these and other conditions which play an important part in industrial hygiene it is necessary to bear in mind that no hard and fast line can be drawn between physiological and psychological factors. For instance: injurious environmental conditions like bad ventilation, with its concomitant defective aeration of the blood and tissues, affect both mental and bodily activities. Muscular exhaustion, due to too prolonged or too violent muscular effort, has its counterpart in fatigue of that part of the nervous system which controls muscular movements. In the same way mental friction between worker and overlooker, or the strained attention which attends undue "speeding up," or a too intensive system of training in young workers slow at attaining skill and proficiency in any particular occupation—these, and other psychological factors also react on physiological processes, and a vicious circle is set up, in which mental disturbances react prejudicially on bodily functions, and these, in their turn, embarrass mental activities.

Such then are some of the more important factors which affect the human element in industry, and thus constitute the problem of industrial hygiene. By their influence on the health and efficiency of individual workers they also

exercise an important effect on industry as a whole. The cost of maintaining the human machine in efficient running order is not yet adequately provided for in the balance sheets of many industrial concerns.

Among the psychological factors just described, "interest in work" is one of the most important, and must now be considered in some detail. Regarded merely as stimuli to effort, "joy in working" and the sense of satisfaction which accompanies work well done are probably more important than many other factors which affect production and output, or play any part in industrial hygiene.

One or two biological principles of great importance underlie this question of interest in work. The first is, that human beings exert mental and bodily activity in varying degrees and in diverse ways. The second is that every normal human being endeavours to obtain satisfaction as the result of effort, and if some sense of satisfaction does not accompany or succeed the expenditure of energy in effort, then effort itself diminishes or is diverted into other channels. The third is, that the kind of mental and bodily effort, the making of which is associated with satisfaction, varies in different persons. It depends partly on the innate tendencies and capacities, and partly on the training of the individual. Thus, capacity to experience pleasure and happiness in industrial work as in other spheres of life depends on personality.

When we apply these fundamental principles to the study of industrial life we find that, in order to obtain a full measure of industrial prosperity and individual well-being, those who labour must derive satisfaction from the energy they expend in work, or in the results of their work. But in order to experience this sense of satisfaction the worker

must be interested in what he is doing, or must be interested in the conditions under which his work is carried on, or, failing these two sources of interest, satisfaction must be obtained independently of work or the conditions which surround it.

This brings us to the consideration of the rewards of labour. It is partly owing to the fact that the monetary reward of labour, the payment of wages for work done, enables the worker to satisfy his desires apart from his work or the conditions under which it is carried on, that the wage system of rewarding labour has come to hold the all-important place which it now occupies in industry.

It is no doubt true that the payment of wages offers advantages over the older and more primitive method of payment in kind, i.e. the provision of food, clothing, and shelter. A money payment or wages provides an interchangeable token for goods delivered or services rendered, and will no doubt continue to be the method adopted by civilised communities. This does not necessarily mean that the payment of wages as a total and complete compensation for labour has no drawbacks. The fact that a money payment, wages, has very little influence in arousing interest in work as work, is itself a disadvantage. Under the conditions which prevail in industry to-day, labour, by itself, does not in many cases provide satisfaction or happiness to the ordinary worker: consequently, satisfaction is sought independently of the work, and is obtained in other ways which the payment of wages makes possible, and for which it provides facilities.

The fullest and the best results are attained in industry under present conditions, when work of a kind which stimulates interest is carried out under healthy and happy

conditions, and when the energy expended in doing it is rewarded by an adequate money payment or wage. Even so, it still remains true that the satisfaction experienced by the worker is ultimately derived from working or from the results of working. The *anticipation* as well as the realisation of satisfaction also plays an important part. Anticipated or realised satisfaction constitutes in fact the indispensable motive force which makes the wheels go round in industry as in other departments of life.

Reduced to essentials, the question thus becomes one of the relative importance of *interest in work*, and *wages*, as incentives to effort in modern industrial life.

When we consider that all the best work in the world has been the outcome of interest in work and not of wages, we realise that while a money payment, or wages, may be necessary under certain conditions to enable a worker to support himself and his family, and to obtain facilities for the satisfaction of legitimate and of growing desires, we must still rely on interest in work to stimulate the best efforts and to produce the best results.

Why then, we may ask, has the system of monetary reward, the payment of wages, come to occupy such an important position in industry? The answer depends partly on social organisation, partly on individual personality. The two are closely associated and react the one on the other. The truth is that our social and our industrial life is as yet in a more or less primitive stage of evolution and development. Partly owing to innate individual deficiencies, partly to defective education and training, and partly to defects in industrial and social organisation, the ordinary citizen, men in the mass, still require the incentive of self-interest and self-satisfaction to stimulate them to

continued effort in industry as in other departments of life. The citizens, speaking generally, are not yet prepared, they have not yet learned to work for the good of the community as their main source of satisfaction and object in life.

One of the results of the industrial revolution of the last century has been to make industrial work less interesting and less satisfying, and at the same time to bring about an increase in the monetary reward of labour. The two things are closely connected, because wages, by providing supplementary facilities for satisfying desires, acts as a substitute for the decreasing interest in work, and as the one goes down the other goes up. Since, however, man can only ultimately live by working, i.e. by exercising mental or bodily effort, and since interest in work is necessary for continued and successful industrial effort, and therefore to individual and communal well-being, it becomes essential to national prosperity that interest in industrial work should be revived and developed.

The satisfaction which springs from interest in work well done, and adequately remunerated, must be the normal reward of the willing and the efficient worker if industrial life is to be prosperous or happy. If to the stimulus of adequate wages we could add the more powerful incentive to effort which interest in work supplies, then industry in this and other countries would go forward by leaps and bounds, and industrial life would be a different thing.

In order to derive satisfaction from his work a man must be interested in what he is making or doing, and in what he has done or is about to do. But if interest is to be aroused attention must be directed to the matter in hand. Moreover, the attentive attitude must not be too intense or too

prolonged, for while lack of attention leads to diminished effort, a too prolonged, a too exclusive focusing of attention on one single movement or process, brings about loss of interest, fatigue, and finally diminished effort. Thus, the concentration of mental effort which accompanies close attention must be under control. It must not end in or be wasted in anxiety, for anxiety eventually leads to lessened interest and to diminished effort.

While individual workers vary greatly in their liability to fatigue as the result of a too concentrated or a too prolonged attention on what they are making or doing, they also vary in the degree to which the absence of any demand for attention in any occupation leads to a sense of monotony and boredom. It is on account of this individual variation in the capacity of sustained attention that repetitive processes and monotonous work produce such different results in different workers. It is also owing to these varying results that the true relationship between monotony and fatigue has not yet been fully understood. But this applies not only to industry but to other departments of life. In all forms of learning or doing, the continued repetition of a movement or an effort under favourable conditions is followed by a more automatic, a more economical expenditure of energy, and a better result. Practice makes perfect. But if active interest is to be maintained the process of learning or doing must not cease at this stage. It must be progressive, and must lead on to further acquisitions.

The same is true, to a considerable extent, in industrial occupations. In most workers the long-continued repetition of any movement or process unrelieved by any diversion of attention leads to a sense of boredom, and eventually to fatigue. In neuro-psychical language the nervous organisa-

tion, the brain of the worker, must, if it is to function properly, be capable of responding adequately, but not wastefully, to the matter engaging the attention, and demanding the effort. Nervous energy, with its psychical counterpart, conscious attention, must be generated in adequate degree, and must be directed along appropriate nervous channels if the response made is to be effective. In biological terms, adaptation between the worker and his industrial environment must be attained. When, however, adaptation has been reached, in any occupation, then satisfaction is experienced in industrial life, as in other spheres of human activity.

Having now pointed out the extent to which industry suffers from this loss of interest in work, the more difficult task remains to indicate some of the ways in which interest can be restored to work and "joy and labour" can again be associated. I have elsewhere pointed out that there are only two alternatives—the first is to make the work itself less exhausting, less monotonous, and more interesting; the second is to enlarge the outlook of the individual worker in regard to his own share in any particular process or occupation, and to make the physiological and psychological conditions under which the work is carried out as healthy and invigorating as possible.

All this means, however, a fuller knowledge on the part of employers and employed of the scientific principles, physical and psychological, which underlie industry. It implies a wider application of scientific methods to industrial processes, and an extended use of machinery and labour-saving devices, by which exhausting and prolonged muscular effort may be diminished, and energy and interest set free for less exhausting and more interesting work. It also means

progressive methods, not merely in work, but in industrial organisation and administration. It means enlisting the interest of the workers, not only in different industrial processes, but in industry as a whole, and in the results of industry.

There must also be a better system of education and training for industrial pursuits. The present haphazard method by which adolescents drift into industrial life, with very little guidance as to the best way of learning or understanding industrial methods, or of the need for efficiency and economy in muscular movements, and with little or no instruction in the chemical and physical laws which underlie industrial processes—all this is partly responsible for lack of interest in the work itself.

But in addition to making the work more interesting, a change is also necessary in the mental attitude of some industrial workers to work in general. To expect that rewards, monetary or otherwise, can be secured without willing and efficient work or service, is as delusive and unreasonable in industry as in other departments of life. There are, no doubt, some individuals (probably comparatively few in numbers) who dislike all work and find no satisfaction in any kind of labour. These must be regarded as temperamentally abnormal, and must be dealt with on special lines.

Equally important is the problem of making the best use of varying natural aptitudes in different industrial occupations. We must realise the waste of human energy involved in putting the shorthand clerk to do the work of a navvy, and the folly of trying to fit the square peg into the round hole. We need, in fact, a more general and a wiser use of vocational selection and vocational guidance in industrial life.

The other alternative is to take the line of least resistance and allow things to go on as they are. To rest content so long as the supply of unskilled or partially skilled labour is adequate to industrial demands, and so long as factory hands and office clerks are available in sufficient numbers, who are content to work for wages only, and are satisfied with the supplementary sources of satisfaction which the payment of wages provides, and who are willing to forgo the more abiding happiness which comes from interest in work and "joy in labour." In choosing between these alternatives there can be no doubt which of the two is most likely to ensure industrial progress, or which, in the long run, will best promote the happiness and well-being of the workers themselves.

CHAPTER V

THE INFLUENCE OF HOSPITALS ON TEMPERANCE REFORM ¹

THE position of the hospitals of this country in regard to the use of alcohol in the treatment of disease throws an interesting sidelight on the attitude of the community as a whole to the alcohol problem. In an address given at Brighton on the occasion of the annual meeting of the British Medical Association in 1913 on "Institutional and National Intemperance," I showed records of the expenditure on alcohol of forty-six British hospitals for the year 1912, and compared these with the expenditure of a number of Poor Law infirmaries and other institutions.² The result of this preliminary enquiry was to show that no uniformity of practice existed at that time in the annual expenditure of hospitals on alcohol.

The great outstanding feature of the work of the voluntary hospitals of the country in recent years has been the growing number of patients successfully treated in those institutions. Hospitals, largely as the result of Lord Lister's life-saving work, are now much happier and safer places to live and work in; the opportunities and facilities for the cure of disease and the relief of suffering are much greater than in former years, and in consequence of growing medical and

¹ Presidential Address delivered before the Society for the Study of Inebriety, July 11, 1922.

² See *British Journal of Inebriety*, January 1914.

surgical knowledge and a corresponding progress in medical and surgical practice, many more lives are now saved, patients recover more quickly and more easily, surgical operations have been largely relieved of their horror and their pain ; but in this great life-saving and pain-relieving work *these records show that the use of alcohol has taken little or no part.* It will now be useful to compare these general records with a closer analysis of the alcohol expenditure in one or two representative institutions.

It so happens that through the kindness of the secretaries I have been able to obtain records of the expenditure on alcohol at the Leicester Royal Infirmary and the Derby Royal Infirmary over a period of 110 years from 1810 to 1920. From a study of these records in a graphic form we find, first, a general agreement in outline in the practice of the two institutions in the use of alcohol. In both we can recognise the occurrence of certain phases or periods, more or less coincident in time, in which the expenditure on alcohol, the A.E. line, rises above or falls below the line recording the number of patients admitted, the N.P. line.

The *first period*, which began in 1810 and lasted to 1825 at Derby and to 1835 at Leicester, is characterised by a relatively high expenditure on alcohol in relation to the number of patients. In the year 1810 at Leicester the amount reached £530 per 700 patients and the staff, or about 15s. per head per annum. At this period England was passing through a critical stage in her history. It represents the later years of the Napoleonic struggle and the lean years which followed the peace after Waterloo. At the same time, not only was alcohol largely used as a beverage, it was also regarded as a valuable agent in the treatment of disease. Moreover, a number of county

hospitals were founded at the end of the eighteenth and the beginning of the nineteenth centuries; the Leicester and Rutland and the Norfolk and Norwich hospitals in 1771. And in some cases these pioneer hospitals, in their early stages, acted as fever hospitals, and even as asylums for the reception of lunatics.

In the *second period*, which extends roughly from about 1830 at Derby and 1838 at Leicester to 1860, the expenditure on alcohol, the A.E. line, runs on a level with the N.P. line; small alternating rises and falls occur in a relative position; while at Derby from 1840 to 1860 the A.E. line remained below the N.P. line. This period, 1830 to 1860, coincides roughly with the growth of the industrial revolution in England and the conversion of the population from a rural into an urban community. From 1845 to 1853 the consumption of alcohol (calculated in gallons of proof spirit per head of the population of the United Kingdom) shows a rise from 3.36 to nearly 3.76 gallons per head. In the next ten years a lower consumption is shown, while in the succeeding period from 1865 to 1875 the rapid rise occurred which reached the very high level recorded from 1875 to 1880 in the national consumption of alcohol.

In the *third period*, which lasted from about 1860 to 1880, the A.E. line rose above the N.P. line at both institutions, and remained so over a period of twenty years. There was also at this time, especially at Leicester, a return of the sharp, short rises in alcoholic expenditure as shown by the Alpine peak type of graph. This sharp rise of the A.E. line in individual years, without any corresponding rise in the N.P. line, is interesting. It occurs during periods of a general rise in expenditure on alcohol, and probably has a psychological origin in the mental attitude of some

individual member of the visiting staff, or sometimes perhaps, of the resident staff, as to the value and use of alcohol in the treatment of disease. This period of twenty years from 1860 to 1880 represents the high-water mark of alcohol consumption both institutionally and nationally, and the top of the wave was reached about 1875 in both cases. These years represent great industrial activity and prosperity, the building up of the great brewing and distilling industries¹ and the gradual cessation of domestic brewing in the homes of the people. The tradition and the belief as to the great value of alcohol, both as a beverage for the support of labour, and as a drug in the treatment of disease, was still very strong in the public mind.

The *fourth period*, from 1880 to 1900, represents at both institutions a low consumption of alcohol in relation to the number of patients received, and the A.E. line remains well below the N.P. line in both cases. Nationally, too, these twenty years coincide with a lower level of alcohol consumption, though in the latter half of the period a gradual rise and a higher level occurred.

In the *fifth period*, about 1900, a sharp accentuation of the fall in alcohol consumption occurred at both institutions, and was especially noticeable at Leicester. At the same time the marked rise in the number of hospital patients set in which constituted a striking feature in the life and work of the hospitals of the country about this date. This fall in alcohol consumption and rise in the number of patients caused an increasing divergence between the A.E. and the N.P. lines, which lasted until the war. This fifth period, 1900 to 1914, is also represented nationally by a fall in

¹ The establishment of the trade distilleries preceded that of the breweries.

alcohol consumption roughly down to the 1880 to 1890 level.

The *sixth period*, representing the *War period* from 1914 to 1919, shows some features of peculiar interest. The very low, almost negligible, consumption of alcohol was maintained till 1918 at Leicester. At Derby the post-war rise began as early as 1915, though this may have been associated with some difference in the number of wounded soldiers admitted, or in the severity of the cases. It is at any rate clearly shown that a marked *post-war reaction* took place in the matter of alcohol consumption in both institutions. It appears in both hospital records, and it is shown also in the records of national consumption where it began in 1919.

There is one interesting point to notice about this post-War reaction : nationally the rise occurred in the consumption of both malt liquors and wines and spirits, whereas in the case of the hospitals it was entirely due to the increased use of wines and spirits, malt liquors showing no increase. This means that, while the nation (as soon as the opportunity arose) returned to the larger employment of alcohol as a *beverage* and as a so-called pleasurable-experience-producing agent, the medical staffs of hospitals returned to the larger use of alcohol as a *drug*, and for its narcotic, or so-called stimulating, effect in the treatment of disease.

GENERAL REMARKS ON THE MEANING OF THE RECORDS

If we compare with these hospital records the consumption of beer by the whole population of the United Kingdom, calculated in gallons *per capita* for the same periods, we find that the high level of 1870 to 1880 was followed by a

lower, more regular, level from 1880 to 1890, with a higher level again from 1890 to 1900, while in 1899 the gradual fall began in the consumption of beer, which continued to the War in 1914.

In the national records, the malt liquor, or beverage side, and the wines and spirits, or so-called stimulant side of alcohol consumption, show a fairly constant relationship over a long period of years. When one line rises or falls the other line rises or falls with it.

When we examine, however, the hospital records, as fortunately we are able to do at the Derby Royal Infirmary, for a period of 110 years, we find a different story. Thus at Derby, from 1810 to 1840, the expenditure on malt liquors rose above the expenditure on wines and spirits; no doubt at this period malt liquors were largely used by the staff and by the patients as a beverage. From 1845 to 1870 the position of the two lines is reversed, and the expenditure on wines and spirits rose above the malt liquors level. From 1870 to 1890 the position of the two lines was again reversed. In 1893 the malt liquor line fell, and has remained below the wines and spirits line to the present time. Further, it did not rise with the post-war reaction at Derby or Leicester. This means that the marked rise which began in 1915 at Derby, and somewhat later and in a less marked form, at Leicester, was due entirely to an increased consumption of wines and spirits, and not malt liquors.

The case is different with national consumption. Here the fall which occurred as the result of war conditions in the malt liquors line in 1914-15, and in the wines and spirits line in 1915-16, was succeeded by the peace reactionary rise which began in 1918 in wines and spirits and in 1919 in malt liquors.

The considerable post-war rise in the national consumption of malt liquors has no counterpart in hospital records. Looked at generally, this alternating variation in relative expenditure on malt liquors and wines and spirits, during this long period of over 100 years, in the case of two large hospitals, is on a par with the alternating rises and falls in alcohol expenditure as a whole, and, like it, has evidently rested on varying fashion rather than on settled conviction.

We must now enquire further: What were the factors, economic or educational, general to the whole population, or peculiar to the institutions concerned, which were associated with the marked drop in alcoholic expenditure which occurred in these two large hospitals in or about 1880 and again about 1900?

We have seen that a corresponding fall in the national consumption of alcohol began about 1876-7, three or four years earlier, so that the change in hospital practice was not the cause of the alteration in national habit in regard to the use of alcohol. The high-water mark of alcohol consumption (as regards the whole population) was reached in 1873, in wines and spirits, and in 1874 as regards malt liquors. The high-water mark of total alcoholic expenditure was reached in 1875 in both the Leicester and Derby Royal Infirmaries. Thus, about 1875, the national and the institutional use of alcohol had probably reached its highest level, and a reaction against this harmful and wasteful expenditure set in both nationally and institutionally.

It is with regard to the factors which caused or influenced this reaction which, as I have said, set in nationally about 1876-7, and institutionally in a marked form about 1880, that we are now concerned. It is interesting to note that the teaching of temperance in schools, which began with

Mr. Hope in Edinburgh in 1852, the inclusion of children in temperance organisations which commenced in Leeds, and the origin of the Band of Hope in 1847, were all beginning to take effect, inasmuch as these children had now become adult citizens.

Further, the adoption in many schools of Sir Benjamin Ward Richardson's "Temperance Lesson Book" in 1875, and his strenuous advocacy of temperance on medical grounds about this time, exercised a powerful influence in arousing intelligent interest in the subject of temperance reform.

Economic influences also played an important part. The intimate association between employment and good trade and a high national consumption of alcohol is of course well known, and it is of interest to note that these two periods of decline in national expenditure on alcohol which we are now considering, namely 1880 and 1900, both coincided with, or preceded, the fall of institutional expenditure on alcohol. A trade depression, followed later by a fall in national alcohol consumption, occurred about 1877, and a second period of depression began in 1884 and lasted till 1888. With regard to the second great fall in hospital alcohol expenditure which occurred in 1899 at Derby and 1901 at Leicester, this also coincided with the marked fall in national consumption which began in 1899 and continued to 1905.

The moderate reactionary rise in national expenditure from 1905 to 1907 is not markedly represented in the hospital records. And if it had not been for the later experience which followed the War, we might have hoped that the hospital staffs and hospital administrators at that time were shaking themselves free from the influence of national

custom, and were dealing with the alcohol problem on scientific principles at last.

The experience of the War, however, has repeated the old story. The great fall in national consumption which, under extreme economic, social, and Government pressure, occurred in the later phases of the War, and which lasted till 1918 in the case of wines and spirits, and till 1919 in the case of malt liquors, also coincides, as we should expect on economic grounds, with a low institutional expenditure more marked at Leicester than at Derby. The reactionary rise in national consumption which occurred after the Armistice, and continued till the great trade depression of 1921, is also represented by a rise in the alcoholic expenditure in both these institutions. The rise began in 1915 at Derby and 1917 at Leicester.

The admission and treatment of a considerable number of wounded soldiers, many with severe wounds, has been thought to account for this rise, but the continuation of the rise into the post-war period later at Leicester (when soldiers were no longer admitted) is not in harmony with this explanation. There is, in fact, a disquieting feature about this post-war rise in alcoholic expenditure in hospitals which, when viewed in the light of our previous knowledge of the way in which institutional expenditure tends to follow the lead of national consumption of alcohol, suggests that hospital practice is not yet founded on scientific knowledge as to the real action of alcohol on the human organism, or of its therapeutic influence in the treatment of disease. It is no doubt important to compare the charts referring to the Leicester and Derby Royal Infirmaries with the records of other hospitals over a series of years. This has been done to a somewhat limited extent, and one or two facts

of importance have come out. One is that the records of alcohol consumption in relation to the number of patients admitted varies in different hospitals within very wide limits.

Thus in the address on "Institutional and National Intemperance," given at Brighton in 1913,¹ I gave a list of the relative expenditure on provisions, milk, and alcohol, together with the number of patients admitted for forty-six British hospitals for 1912. The expenditure on alcohol in relation to the number of patients varied very greatly in different institutions. A number of other large hospitals (notably the Manchester Royal Infirmary) shows, however, the same marked rises and falls in alcoholic expenditure, especially the notable falls about 1880 and 1900 (which are shown at Leicester and Derby), although in some institutions the fall begins earlier than in others. In the fever hospitals under the control of the Metropolitan Asylums Board, a steady fall in alcoholic expenditure commenced in 1900 and went on for the next five years.

If we compare the expenditure on alcohol in the voluntary hospitals with that in other institutions such as asylums, prisons, and workhouse infirmaries, we find on the whole a marked tendency to a decline in alcoholic expenditure during recent years. One asylum shows the same two marked periods of fall as those shown in many of the voluntary hospitals, though in the case of the asylum the first fall set in about 1885, somewhat later, and the second about 1899, somewhat earlier, than in the hospitals recorded.

These and other records all suggest that somewhere about 1880 a marked fall occurred both in our national and institutional expenditure on alcohol. This was followed by a

¹ See *British Journal of Inebriety*, January 1914.

moderate reaction lasting for some years, and somewhere about 1900 a second fall occurred which in regard to institutional expenditure at least was of a more permanent character.

Although there is evidence that these falls in alcoholic expenditure, especially the latter one in 1900, owe much to the growth of scientific knowledge and a wider education concerning the action of alcohol on the body, a consideration of the facts recorded would seem to show that in earlier days, hospitals, in their attitude to the use of alcohol in the treatment of disease, have been influenced by the national custom in regard to the use of alcohol at the time. Hospital staffs and hospital administrators (from the evidence afforded by the two large hospitals of Leicester and Derby over a long period of years) do not seem to have been influenced in their use of alcohol as a therapeutic agent by any settled or sound conviction, reached on scientific grounds, as to the value of alcohol in the treatment of disease, but rather by the tradition and custom prevailing at the time both at the medical schools and among the public generally.

On the top of the main upward and downward trends in alcoholic expenditure in these and other institutions many irregular and sudden rises and falls occur, which are probably due to the personal influence exerted by one or more members of the honorary staff in the prescribing of alcohol, or to the influence of fresh resident house surgeons or house physicians, who bring with them the teaching and the practice of the teachers or professors under whose influence they have been trained at the particular medical school to which they belong.

But, apart from these minor disturbances, we can trace,

in the long history of institutional alcoholic expenditure, certain periods of maximal and minimal consumption, which for the most part coincide with periods of high and low national consumption, and these again depend on, or are associated with, corresponding periods of good and bad trade, with years of national prosperity and years of national poverty.

These institutional falls seem to have been due to certain psychological factors, partly medical and partly national in character. Among these we may perhaps include the effect of general education and the influence of certain temperance reformers in the earlier period, and the growing volume of scientific knowledge and of instructed medical and lay opinion on the real action of alcohol on the human body in the later period.

On a fair and reasonable review of the evidence before us we cannot, I think, claim that the hospitals of this country have acted as *pioneers* in moulding public opinion or in influencing to any great extent national conduct in regard to the use of alcohol, though they do seem to have discountenanced its use as a beverage, especially in latter years. In this matter hospitals have, no doubt, like other sections of the population, been influenced by the economic conditions prevailing at the time.

Thus it would seem that a reconsideration of the problem, and a revaluation of the so-called benefits conferred by alcohol on the individual and on the community, is called for both from the national and the institutional point of view.

The evidence suggests that the nation worked harder and more efficiently and got on better during the War in a time of national stress, *without* alcohol, or with a very

restricted amount. The hospital records also suggest that both civil patients and wounded soldiers made good recoveries, and did well, when treated with very little or no alcohol. This leaves for consideration the so-called pleasurable or euphoric effects which are no doubt produced by alcohol on the nervous system of those who use it.

The real problem which the medical profession and the nation have yet to settle is, whether these pleasurable experiences, this euphoric effect of alcohol on the neuro-psychic equipment of the individual, and through the individual on the community—an effect shown in the narcotising influence of alcohol on the higher co-ordinating nervous centres physiologically, and in the inhibition of judgment and self-criticism psychologically—the real question is, whether these experiences which do undoubtedly follow the taking of alcohol, even in moderate doses, are really valuable, and worth while, or whether they do not constitute a grave danger to the individual and to the nation by producing an illusory sense of “well-being” and “well-doing,” and thereby tend to prevent the putting forth of strenuous effort and the doing of efficient work, which alone can lead to national progress and reconstruction. We also want to know, from the medical point of view, whether this pleasure-producing effect of alcohol, this sense of euphoria which comes from the temporary putting out of action of the higher centres, is of value in the treatment of disease, and the extent, if any, to which it may be regarded as helpful in tiding over the emergency of illness when it occurs in the life of the individual.

Modern scientific investigation seems to have established the fact that, regarded as a “stimulant” in the true sense of that term (both in relation to the circulation and the

nervous system), alcohol has little or no value, and that it is in regard to its narcotic effect on the nervous system, and especially on the higher and more recently evolved centres, that the final judgment as to the use of alcohol in the treatment of disease must be pronounced.

These records of hospital expenditure on alcohol over a long period of years show very clearly that the administration of alcohol by the medical officers of hospitals in the treatment of disease has largely followed national habit and custom. Records of high *national* consumption of alcohol as a beverage have coincided with periods of high *institutional* expenditure on alcohol as a therapeutic agent in the treatment of disease, irrespective of the number of patients or the severity of the cases so treated.

What is still urgently wanted is a fuller teaching of the facts concerning the action of alcohol on the human organism in health and disease (in so far as these are established on a firm scientific basis) to medical students. And, further, that these medical students, when they become medical practitioners, and act as honorary medical officers and resident medical officers to the hospitals of the country, should themselves use the knowledge so gained to promote a wiser administration of alcohol as a therapeutic agent in hospital practice.

If this were done, and if medical practitioners themselves kept true to the scientific tradition and to sound teaching, then the hospitals, in this matter of alcohol consumption, would begin to assume their proper place in our system of national education. They would act as developers, instead of followers, of public opinion and of national habit in the use of alcohol.

The valuable experience derived by medical men in the

treatment of disease would then be reflected in a restricted and wiser use of alcohol as a beverage and as a so-called "stimulant" by the public generally.

THE EFFECT OF ALCOHOLIC INTEMPERANCE ON THE FINANCIAL POSITION AND ON THE MEDICAL AND NURSING SERVICES OF THE VOLUNTARY HOSPITALS

But if the voluntary hospitals have not acted as pioneers in temperance reform, there is still another side to the picture, and one which shows the great debt which the nation owes to these institutions for the "salvage" work they have done in rescuing the victims of alcoholic excess from the effects of their self-indulgence, and in minimising the loss of life, limb, and health, which would otherwise have resulted from the drinking habits of our population.

But this salvage work on a national scale has only been carried out at great cost to the institutions concerned, and with a loss of energy, effort, and hospital beds which should have been available for the service of the more industrious and temperate sections of the population. It is these citizens who after all are bearing the burden of the loss of health and efficiency due to intemperance. It is the old story of prevention as against attempts to cure.

I have been at some pains to ascertain the magnitude of the call thus made on the accommodation and on the medical and nursing services at one large hospital over a period of two and a half years, from November 1910 to April 1913, by persons who were treated as patients there while directly under the influence of drink.

A record kept by responsible officials of the institution, supplemented and controlled by the medical diagnosis

of the cases applying for treatment, shows during this period a total of 243 drunken patients so treated. This gives an average of about 100 for twelve months, or nearly two per week. In one week the number mounted up to thirteen, and in holiday times, during periods of prosperity, for several weeks together the average weekly number has been five or six.

No attempt has been made to separate out-patients from in-patients in this connection, and it is clear that an in-patient admitted *into* a hospital in an intoxicated condition means not only a serious case, presenting its own peculiar calls on nurses and doctors, but that it is also a source of great discomfort and annoyance to other patients in the same ward.

Thus we find that in one hospital of about 300 beds about 100 patients¹ were admitted annually for treatment in an intoxicated condition, and as the direct result of their intoxication. If we multiply this by the number treated annually in the voluntary hospitals of the country, with their 30,000 beds, we arrive at the large figure of some 10,000 persons who annually make a call on hospital services as the direct result of intoxication.² But these actually intoxicated patients, with their cut heads and broken limbs, and delirium tremens, give only one side of the picture. Hospital wards are largely used by, and hospital out-patients' departments are crowded with, patients whose diseases and disabilities are the indirect result of alcoholic indulgence. This burden of illness due to the indirect results of alcohol, when added to the burden which results from its direct effects, amounts to a call on the funds

¹ This was before the War. The numbers would be less in recent years.

² This is probably an under-estimate.

and resources of hospitals, and on the time and energy of doctors and nurses, which is a heavy handicap on the charitable public, and on the steady and industrious section of the population.

Surely the time has come for hospital authorities and hospital administrators to speak out plainly on this matter. Not, indeed, with any threat to withhold advice or treatment to any person who, as the result of any cause whatever, may be in need of institutional help and medical treatment, but with the object of letting the country and the charitable public know how they stand in this matter of hospital aid for persons whose sickness or disability is the direct or the indirect result of their own misconduct.

The suggestion has recently been made, and was also tentatively put forward in the Geddes Report, that each industry should be called upon to bear the burden of its own unemployment ; but if unemployment, why not such sickness among its workers as is directly caused by the industry concerned ? If this be a reasonable proposition, why should not the same proposal apply to the drink industry, including in that industry both producers, purveyors, and consumers of alcohol ? Two difficulties suggest themselves : firstly, the very large size of the fund which would be necessary to ensure the industry against the claims that would be made upon it ; and, secondly, the fact that the State receives such a large revenue from the sale of the goods produced and consumed, that it might be supposed by some to be in the position of a partner in the industry, and therefore liable to bear its share of the burden of the unemployment and sickness which results from it. In any case, if a right public opinion is to be aroused, if a right public attitude is to be taken up on this matter, it is essential

that the public should know the magnitude of the financial burden and the great loss in institutional time, money, and service which is now spent on remedying the injury which is done by ignorant, selfish, and anti-social conduct on the part of a certain section of the population. One point is very clear. One of the best ways in which the public at large can now help the voluntary hospitals of the country at a very critical time in their history is by appreciating the wastefulness and the selfishness of the undue claim which is made upon these institutions by thoughtless persons and by ceasing to think that hospitals should be expected to make good at their own expense the injury done to the life and health of the community by the selfish indulgence of one section of the population only. Thus, both in their own interests as well as in the interests of the more public-spirited and temperate sections of the population, it is very essential that hospitals should keep a very tight hand on their own expenditure on alcohol.

THE POSITION OF HOSPITALS WITH MEDICAL SCHOOLS

But if this is desirable in the case of all hospitals, it is doubly necessary and desirable in the case of those institutions in which medical students are being trained. It is essential that hospitals up and down the country should cease to be swayed in this matter of the use of alcohol in the treatment of disease by fashion and by tradition. It should not be possible for some member of the visiting staff of any hospital to keep alive a bad tradition, or for any young resident officer, straight from the influence of a particular medical school, to set the fashion in the use of alcohol as a therapeutic agent.

What is wanted is a rising generation of medical practi-

tioners familiar with the scientific facts concerning the action of alcohol on the human organism and its proper use in health and in the treatment of disease.

And it is for Professors of Materia Medica and Pharmacology, Physiologists, and Professors of Medicine and Surgery to join together in all our medical schools to set forth sound teaching and wise practice on this very important aspect of medical education.

CHAPTER VI

HEALTH IN THE GREAT STATE ¹

THE twofold object of the following essay is to put forward a worthy conception of Health in its widest and fullest sense, and to sketch in brief outline some of the possibilities which will exist in the coming time for the attainment of a healthier Life by the citizens of the Great State.

What then must be our conception of Health ?

Knowledge concerning disease has increased so much in recent years, and the focusing of individual and public attention on disease organisms and insanitary surroundings has been so keen, that there exists to-day a real danger of our losing sight of the true proportions of the Health Problem. We are apt to forget that, while the Healthy Life includes recovery from the attacks of disease organisms, it should also, for the citizens of the modern State, embrace resistance to every one of the injurious influences in the environment which tend to depress vital activity or to direct it into wrong channels. And it includes even more than this. Health is more than mere existence: it means in its widest sense "*Joy in Life*"; it presupposes a capacity of response to the beautiful, the health-giving, the soul-elevating stimuli of the surrounding world, as well as the power of overcoming the depressing factors which make for disease.

¹ From chap. v, *Health and Healing in the Great State*, H. G. Wells and others. Harper Bros., 1912.

This is no merely modern view. Let us glance for a moment at the attitude of the old Greeks to this same problem. The citizens of Athens in her best days conceived of the true, the healthy Life as an harmonious development of mental and bodily powers, and as a true adjustment of the man to his environment. Self-realisation meant to the Greek the union of a virtuous soul in a beautiful body, and this was the outcome of the ordered use of natural faculties under the control of a well-balanced mind. It is difficult for us to realise the conditions of life which prevailed among the slave population in the poorer quarters of ancient Athens and imperial Rome. We have reason to think that the less fortunate inhabitants of even these noble cities were familiar with squalor, with poverty and disease; but in spite of this there can be little doubt that if the free Greek or Roman citizen were to catch a glimpse of life in our crowded cities to-day, though he would be lost in wonder at the industrial activity, at the care for the sick and the suffering, and at the complexity of our modern life, he would no less certainly marvel at the dim eye, the inelastic step, the listless demeanour of many of our toiling workers—and he would read in these tokens the signs of a reduced vitality, of a lost joyous activity, and of an absence of that Harmony to which he was so deeply attached. Highly trained in physical culture, familiar with fountains and baths, he would wonder also at the lack of personal cleanliness, the dirt, the ugliness of our surroundings, the evidences of monotonous toil, and he would search in vain in our crowded courts and sunless streets for the grace of movement and the dignity of bearing which come from life in the air and the sun. And he would marvel yet more when he learned that those whom he met were not slaves, but free citizens, and that

they might, if they wished, be rulers in their own city and masters in their own homes.

But, after all, this Life of Health and Harmony and full development was only realised by a small portion of the Greek community. In spite of its democratic form of government, the "Many," even in Athens, never lived the fuller Life, and this was indeed one of the causes of her fall. We now realise that the possibility of a healthy and happy Life must be within the reach of every citizen, rich and poor, in every community if that community is to escape the stagnation and decay which eventually overtook these ancient civilisations. The Greek knew but little of the evolution of Human Societies; he was ignorant of the forces which control organic development and of the real causes of disease and decay. Although we may fail to apply our knowledge, we, on the other hand, do at any rate know to-day that Health depends on successful adaptation, on adjustment to a very complex social as well as natural environment, and we are beginning to realise that Perfect Health means living in harmony with all that is best in our physical, intellectual, social, and moral atmosphere.

If, then, modern life is the outcome of ages of evolution and struggle, if Healthy Life is a matter of adjustment to both good and bad influences, then the pursuit of Health must be carried out in accordance with the laws which control Hereditary Capacity and Adaptive Response in other fields of human activity.

Neither are we left in entire ignorance as to what these life-controlling forces are. We know that all adaptation, all individual and social development, depends on the mutual interaction of certain factors. These are:

1. Hereditarily transmitted capacity to respond in

different ways and in different degrees to diverse environmental stimuli.

2. The conditions under which this capacity is exercised.

3. The acquirements which are made by the individual or the community as the result of the exercise of this capacity of response ; and

4. The various environmental stimuli which have to be responded to, the factors towards which adjustment has to be made.

These are the biological foundations on which the truly Healthy Life must be built. These are the factors with which all who attempt to reconstruct Human Society must reckon, and it is on these lines that the interests of the citizen must be promoted and secured in the Great State. We must safeguard the supply of innate individual capacity. We must stimulate the exercise of this capacity in all healthy directions. We must improve the conditions under which the Response of Life is carried on. We must utilise to the utmost the Acquirements already made. But this means that we must deal with both the individual and his environment, we must invoke the aid of Individualism as well as Socialism in the Great State. Now if it be true, as it undoubtedly is, that the conditions of modern industrial life tend to depress rather than call forth the highest activities of our citizens ; and if it be also true, as we know it to be, that, while the individual does to a certain extent control his environment, the environment also helps to determine the type of individual, then we must recognise the disquieting fact that present-day conditions of life in our large cities, although they may be consistent with a low death-rate, do not make for national health in its widest and best

sense. Before we can set up a standard of Life worthy of the citizens of the Great State, two things must happen. Individual capacity to live the fuller life must be further developed, and the conditions under which this capacity for wider existence is exercised must be vastly improved at both ends of the social scale. If then, bearing in mind our biological limitations, we define Perfect Health as that state of body and mind which is most resistant to injurious and most responsive to beneficial stimuli, we see at once that it is not enough to banish disease organisms or to bring about immunity against infection. We must not rest content with the removal and purification of sewage, with the regulation of food and water supply, the ventilation of factories, and the control of unhealthy occupations and of licensed houses, we must do these things, but we must also ensure that the atmosphere of the home and the work-room is flooded with moral sunshine; we must strive by intellectual effort and by artistic surroundings to prevent atrophy of mind as well as stunting of bodily stature.

It is here that we come in contact with all that is meant by Education, with ethical training, with intellectual culture, with progressive legislation—in fact, with all the factors which make for human progress. Judged by this standard, the parent, the schoolmaster, the artist, the man of science, the religious instructor, the municipal councillor, the legislator, all are or should be physicians of the mind or of the body, or both.

For there are only two ways of bringing about harmonious adjustment in matters of life and conduct as well as in matters of health. We must either adapt ourselves to our surroundings, or we must adapt our surroundings to ourselves. The first is the method of primitive organic evolu-

tion. Whereas it is by the second method that social man has been enabled to surround himself with the complex environment of civilisation and with the possibilities of physical and psychical development that civilisation brings.

There is no more striking object-lesson in the different application of these two evolutionary methods than that which is afforded by the attitude of civilised and uncivilised societies respectively to harmful environmental agencies like alcohol and disease. In the primitive community, mutual protection and co-operation (the conditions which favour recovery from disease) hardly exist. If primitive man, like the animal, contracts disease, he perishes, hence he must be preadapted, and through the stern process of natural selection in weeding out susceptible individuals he has evolved an innate resistance to those diseases of which he has had sufficient racial experience. But with social man it is different ; improved medical treatment, mutual protection, and care during sickness all favour recovery from disease. It follows that the necessity for being immune by nature grows less as the possibility of becoming immune by art grows greater. Hence it comes about that civilised man has evolved a capacity of acquiring immunity by individual experience in such diseases as allow of recovery, while he still retains some of the natural Immunity against lethal diseases possessed by his earlier ancestors.

One long chapter in the history of civilisation contains the record of the gradually increasing power of control by social man over that part of his environment which has to do with disease, and the success which has attended his efforts to banish disease must provide the sanction for further effort along these same lines of environmental control. But such methods take us further and further away from

crude natural selection. Constant vigilance on the part of Society is urgently needed if we are to escape the dangers of decadence of capacity and relaxation of individual effort which modern social conditions render possible. Moreover, such methods depend on mutual co-operation and they involve some curtailment of individual liberty. For this reason in the coming age it will be wrong to be ill if the illness be avoidable. Under the old regime of natural selection the penalty for non-adaptation was extinction, and, though under the new regime of mutual co-operation and environmental control, destruction may be avoided, yet some sort of penalty must still remain; either the individual or society or both must suffer in the long run for the lack of efficiency and the want of adaptation which ill-health implies. As under the old regime so under the new, the price of harmonious adaptation to a widening environment—in other words, the price of health in a progressive community—is constant vigilance. Unless the citizen is immune by nature, or unless he becomes immune by Art, or until the organisms of disease are permanently banished from the environment of the Great State, the struggle must still continue, though the methods of warfare may become far less cruel. And when the victory is secured, one result, and that perhaps the greatest, will be the setting free of a larger volume of vital energy in new departments of Life and Labour, new springs of Being, new responses to higher calls in religion, science, and art, and then will gush forth again the eternal fountain of hope and of joy in Life, which has now for a season sunk so low.

Our very familiarity with suffering and disharmony has clouded our vision: we accept the presence of disease as

necessary, and we forget the enormous waste of human life which these ages of wandering in the wilderness of disease have caused. We can with difficulty gauge the gain in capacity for productive labour that the saving of even a few infant lives implies. Ignorance and Vice, Vice-caused Disease and Disease-produced Vice—these have also contributed towards the bankruptcy in Health of our city toilers and city dwellers. Disease and Poverty, leanness of body and leanness of soul, these work hand in hand, and these also must disappear in the Great State in the new era of Free Trade in human capacity as well as in material possessions.

But besides these failures in adjustment to diseases which come from without, there are also disharmonies which come from within. There are deficient capacities as well as injurious surroundings, there are errors in individual development of an hereditary kind.

These inborn deficiencies represent isolated flaws in that mosaic pattern of mental and bodily constitution which recent biological research tells us is the hereditary equipment of each individual ; they may even represent a total failure in hereditary design, such as we find in the innately criminal and the congenitally feeble-minded. For such as these there will be neither use nor room in the Great State. Even now the problem of how to eliminate this residuum of human unimprovability urgently presses for solution. The drain of unproductive existence on productive activity is already far too great, far greater than is necessary, as we believe, to favour the growth or to call forth the exercise of benevolence. The altruistic feelings of mankind can be more efficiently promoted by exercise in other fields and on worthier objects.

Man has no more power to overtake the results of anti-social conduct in the field of race production than in any other field of human activity. Here, as elsewhere, the only way of escape is to set about the elimination of capacity for anti-social conduct, or, if this be as yet impossible, to prevent as far as may be its exercise by those unfortunate individuals who inherit it. Our hope of success lies, not in a return to the old regime of natural selection, but in an extension of the newer method of environmental control. We must learn, and that quickly, to apply to the problem of Race Culture those methods which we have already employed successfully in our struggle with disease. If, owing to lack of knowledge, further advance along Positive Eugenic lines should be at present too difficult, we can at any rate make a beginning by preventing the perpetuation of those innate characters which lead to race destruction.

It is impossible to consider this vital problem of Race Culture in its relation to National Health without recognising that a movement of world-wide importance has set in in nearly all civilised and progressive communities, in the direction of a voluntary reduction of the human birth-rate. This movement is unconnected with questions of food-supply, standards of life, or human fertility. It has originated in the Upper and Middle Social Classes among the more educated portion of the population as the outcome of recently acquired knowledge concerning the transmission of human life from parents to offspring and the application of this knowledge to a definite end, the voluntary control of the family. From our present point of view it is of especial interest because it affords another instance of the gradual emergence of modern society from the control

of crude natural selection. It is another example of the extension of the method of environmental control by Social man into regions of human life formerly almost entirely free from such interference, and, like all other movements which interfere with the free play of natural selection and which aim at rendering the conditions of life less exacting, it is fraught with great possibilities for both good and harm.

Like other examples of the exercise of environmental control by Social man, this movement must also be judged by the motives which inspire the conduct in each individual case. If these be unworthy, if the thing aimed at be selfish indulgence, if the satisfaction of individual desires be set before social welfare, then it is a crime against society. If, on the other hand, the end aimed at be better chances of Life for offspring, if due regard be paid to the relative claims of individual and social welfare, then neither the verdict of public opinion nor ecclesiastical disapproval can convert the exercise of foresight and control, when prompted by worthy motives, into an immoral act.

But, however we may judge of this movement, it will eventually be judged by its fruits, by the effect it has on those communities which practise it.

Whether it be destined to bring about the self-destruction or the self-renovation of Human Society will depend on the type of citizen it tends to perpetuate—that is to say, whether it encourages capacity in the individual to appreciate right aims and to exercise self-control in right directions. Much also depends on whether public opinion appreciates in time the magnitude of the movement and directs it along right, that is, along eugenic lines. For, though at present it is chiefly limited to the Middle and Upper classes

of Society, it is gradually reaching the Lower strata and will eventually permeate the whole. And herein lies a possibility for good. The movement may provide a way of escape from some of the greatest of the burdens which oppress Humanity. The warlike nations are those in whom an expanding population is shut up within circumscribed boundaries, and increase of population has a greater influence than peace tribunals on the Peace of the world. Other vital sociological problems, such as the restriction of competition, the possibility of earlier marriage, and the attainment of a higher standard of Life by the working classes, and the reduction of Prostitution, are all also intimately related to this question of the voluntary control of the birth-rate. This at any rate is certain, that the voice of public opinion and the voice of social custom, if they are fundamentally opposed to true social welfare, will eventually fall on deaf ears.

Some students of Sociology have sought in this voluntary reduction of the human birth-rate an explanation of the decay of past civilisations. It is true that Empires and civilisations, like individuals, die from above downwards. But the real cause of the decay of nations, as of families, is the growth of environmental control—that is, opportunity for satisfying desires—out of proportion to natural capacity to use these opportunities to worthy and public ends. Material civilisation outstrips ethical civilisation. The fatal facilities afforded by luxury lead to a damping down of effort in worthy directions, and unless innate capacity rises above its surroundings this leads eventually to stagnation and decay.

In so far, then, as this exercise of voluntary control over the increase of the population is exerted for selfish ends, it

does constitute a grave danger to Society ; if, on the other hand, its aim be the removal of some of the worst results of unrestricted competition and faulty life conditions, it may, if properly directed, prove a powerful means of progress.

The danger lies not in the increased power of environmental control nor in its employment in the field of race culture, but in not using the increased power to right ends ; and the remedy is to be sought, not in a return to Natural Selection, but in a further extension of the newer method of artificial selection under proper control.

The only efficient way of dealing with this important problem of the voluntary control of the human birth-rate is to bring about such social and industrial conditions as will render the fulfilment of the duty of race production and of rearing healthy offspring economically possible on the one hand, and to develop by eugenic methods, and to foster the exercise of an innate love of parenthood and a sense of parental responsibility in the citizens, on the other. We must, in fact, deal with this as with all social problems, by attacking it on its individual as well as on its environmental aspect. If the social and economic conditions of modern life are such that a high standard of parental responsibility cannot be exercised, the mere substitution of easier circumstances will not evolve a love for parenthood in citizens in whom it is by Nature absent.

This in effect means that the whole attitude of society to these vital problems of sex and parenthood needs revision in the daylight of modern knowledge and testing by modern conceptions of public and private duty. At the same time we must not forget that in thus speaking as though we ourselves were in this way or that solving social problems,

what we really mean is that in this way or that these problems are in the course of social evolution solving themselves.

We may now summarise our conceptions of Individual and Communal health by regarding it as harmonious adjustment on the part of the individual citizen and the State to both the good and the bad agencies in the environment, and not merely as the absence of insanitary surroundings and of disease organisms. But Public and Private Health so regarded is under present social conditions unattainable except by a few of the more richly endowed or happily circumstanced members of the community. Like the slaves of ancient Athens, a large part of Society is still disinherited as regards the legacies of Health. Under present industrial and social conditions healthy activities may be over-exercised, and healthy desires may go unsatisfied. Capacity for labour, over-exercised to the point of exhaustion or exercised in monotonous toil, without the relief which comes from change of occupation, or the stimulus of delight in the object toiled for, capacity for feeling, and action unexercised or exercised under wrong conditions—these things are responsible for much of the disharmony of our artificial city life; these things are incompatible with perfect health.

There are only two ways of righting disharmony in every department of Life. Either the environmental conditions must be improved to allow of the exercise of the larger faculties, or the capacities must be reduced to the level of the narrower environment.

It will not be enough even in the coming time that there will be no waste of infant life, the result of lack of knowledge or lack of care, or that, by the control of accidental, and

the removal of preventable causes of disease, the life of the adult citizen will be prolonged to the full span of human vital capacity. The citizens of the Great State will ask for more than this. They will claim to be delivered from the strain on body and soul which comes from disharmony between capacity and the conditions under which capacity is exercised, as well as from the drain on vital energy which now results from suffering and disease. After the satisfaction of the immediate needs of existence they will look for a reserve of energy which may be spent in enlarging the horizon of life, and in this clearer atmosphere they will taste once more the Joy of Living. It is in this way that the problem of Health in its widest sense is linked up with the problem of Education, on the one hand, and the possibilities of social, economic, and industrial reform, on the other.

Among Health-promoting factors two of the most important, at any rate under the depressing conditions of our modern industrial life, are "Healthy Recreation" and "Change of Occupation." Other writers will deal with these aspects of life under the better conditions of the Great State, but when that freer interchange which we all hope for has been brought about between the life of the country and the life of the city, when the fresh air and the freedom and the rest of the country can be obtained by the town dweller, and the means of easy communication and opportunities for social intercourse reach to the country, then some of the lifelessness that results from exhaustion and monotony will be done away with.

We now realise that the biological foundations are the only firm foundations on which we can build up Health or resist Disease, and in the coming time we shall also learn

that Innate Capacity, the conditions under which it is exercised, and the acquirements that it makes, must also provide the fundamental principles by which the education of the child, the life and labour of the adult citizen, and the duties of the State must be guided and controlled.

CHAPTER VII

SOME CAUSES OF RACIAL DECAY ¹

AN ENQUIRY INTO THE DISTRIBUTION OF NATURAL CAPACITY IN THE POPULATION. THE NEED FOR A NATIONAL STOCKTAKING

INTRODUCTION

BEFORE commencing our study of the distribution of Natural Capacity ² in the population, a few words on the causes of the decay of earlier civilisations from the biological point of view may not be out of place.

Periodicity—the cyclical process of ascent and descent, of integration and disintegration, of birth and death—seems to be inherent in the universal scheme of things. Civilisations and nations, like individuals, are born; they pass through successive stages of growth, maturity, and decline, and they eventually die or pass away. We are, however, so familiar with death in the individual that we regard it as natural and inevitable. The life of a nation or race, on the other hand, extends over a period not included within individual experience. Hence decay is here less familiar, and is regarded in a somewhat different light. We recall Herbert Spencer's (1) well-known comparison between the life of the individual and the social organism,

¹ The Francis Galton Memorial Lecture, Eugenics Society, February, 1928.

² By natural capacity is meant the ability to respond effectively to, or to become adapted mentally and physically to, a changing or widening environment in space and time.

and more recently Spengler's (2) description of human societies and cultures as *necessarily* passing through successive stages of childhood, youth, manhood, and old age.

In associating periodicity with the life-history of races I merely wish to imply that civilisations and races have, as a matter of historical fact, passed through these successive stages. The periodicity in their case, however, must not be regarded as identical with the same cyclical process as seen in the life of the individual organism. It is also necessary, as MacIver (3) says, to draw a distinction between culture and civilisation, just as we distinguish between life and organisation. It is the *life* of a people which decays, and which is, or which may be renewed by the infusion of more vigorous racial characters. The decline of the civilisation or the culture follows later.

THE DECLINE OF EARLIER CIVILISATIONS

It is also important, when discussing the fall of earlier civilisations, that we should bear in mind the fact, pointed out by Major Darwin (4) and others, that the causes in each case have been not one but many. Further, as Perry (5) has shown, a culture may perish while the population which produced it may persist.

Flinders Petrie (6), in his book on *The Revolutions of Civilisation*, gives a chart on p. 80 which shows in graphic form the rising and falling waves in the eight stages of early Egyptian civilisation. He concludes that in each phase there has been a stage of advance through strife and effort to a period of maximum wealth production. This coincides with the crest of the wave, and is followed by a

period of decline, and this again (after an interval) by another rise. The stage of ascent is characterised by autocratic, the summit of the wave by oligarchic, and the falling phase by democratic rule. Petrie also states, and this is important from our present standpoint, that "in every case the rise which followed the fall was preceded by the incursion of a new race." Our knowledge, however, of the racial qualities of these invading peoples is very scanty. He also goes on to say that the complete mixing of the population, through the fusion of the new with the old race, occupies some seven hundred or eight hundred years—that is, until the period of maximum ability has been reached.

When we speak of a stage in any culture when "Wealth accumulates and men decay," we must remember that some accumulation of wealth is a necessary accompaniment of every civilisation. As Keith (7) truly remarks, "Without capital (i.e. biological capital) we can neither preserve nor absorb knowledge." In the same way, forms of government—autocratic, oligarchic, democratic, and plutocratic rule—are, like wealth accumulation, accompaniments rather than causal factors. They interact with human activities in various fields, and promote or hinder progress. The real factors which determine the rise and fall of nations and civilisations are the racial qualities and the innate capacities of the citizens themselves, and the way in which these capacities are exercised.

But what is the significance of the fact that the period of maximum wealth production has, in so many cases, coincided with the crest of the civilisation wave, and has accompanied the beginning of the fall? Surely this: That it is not the accumulation of wealth but the lack of

capacity to use wealth to right ends—that is, to ends which promote racial welfare—which is responsible for the decay. It is the inability to resist the enervating effects of luxury, the ceasing to put forth effort. It is the loss of these essential qualities, rather than forms of government or accumulation of material wealth, which have initiated and promoted decline. Thus we are brought back to biological factors as the chief source of the decline of past civilisations and of earlier races.

The demands of a growing and complex civilisation increase out of proportion to the growth of the innate mental and moral qualities of the people. *Social* outruns *biological* growth. Meanwhile, as Fisher says (8), “The fate of a civilisation may be sealed by so small a thing as the economic advantage of the less fertile stocks”; in other words, by a differential birth-rate exercising a dysgenic effect on the population.

THE INDIVIDUAL AND THE RACE

Provided we strictly observe these limitations as to periodicity we may gain some light on the problem of racial decline from a study of the life-history of the individual organism. We know from the work of Hughlings Jackson and other eminent neurologists, among whom I may mention my friend the late Sir Frederick Mott, that advancing age, disease, and other injurious influences exercise their earliest and chief effect on the more highly organised and the more recently evolved centres in the brain. We also know that the fully grown functionally active nerve cell does not give rise to new nerve cells. So, too, with the epithelial skin cells: the older cells die, and are thrown off, and their

place is taken by younger, less specialised cells, which grow up from below.¹

The life of a nation in the same way is normally renewed from below by individuals and families of less social achievement perhaps, but of greater racial potentiality. It is true that the lowest social groups are to-day (in this country) contributing far too large a share to the population. But this is abnormal, both biologically and sociologically. These lowest groups contain a large proportion of bodily and mentally defective individuals. They are like the parasitic cancer cells in the individual organism, in which specialisation and functional capacity have given place to excessive cell multiplication.

Thus, while decline arising in the *more* specialised units is a common feature of both individual and social life, decay arising in the *less* specialised units is abnormal and more serious. It is a sign of disease and degeneration in both the individual and the nation, and indicates the commencement of racial decline.

Again, we speak of a "natural span of life," which varies in length in animals of different species and in different human families. Galton's own family descent on his mother's side provides a striking example. In the human individual longevity depends mainly on hereditary qualities, on a capacity to resist disease and the wear and tear of life. The same is probably true of different human races.

But while this capacity for continued life is not renewed in the individual, a people or a race can be rejuvenated

¹ It is true that when grown in pure culture, under suitable conditions outside the body, highly specialised cells, perhaps even nerve cells, do show some capacity for reproduction. But the fact remains that when growing in the body under normal conditions reproductive activity is in inverse proportion to specialisation.

by an infusion of new qualities from a more vigorous race.¹

Carr-Saunders (9) suggests that just as domestication increases the fecundity of wild animals, so civilisation (a form of domestication) may have increased the fecundity of the human species. In regard to this point, however, we must remember that selective breeding for productivity has played a considerable part in the domestication of animals. Further, although moderately civilised peoples do have, no doubt, large and growing populations, a highly elaborate civilisation like our own brings about unhealthy modes of living and artificial conditions of life which resemble the effects of captivity rather than domestication in the case of wild animals, and thus tends to reduce rather than to increase fecundity, both in animals and in the human species. It may be that under the influence of natural or artificial selection, a type or types of the human race will arise which can become highly civilised without losing fecundity. Such would be a very valuable quality from the survival point of view, and might prove to be the deciding factor in race survival in the future.

However this may be, there can be no doubt as to the increasing value of "capacity for citizenship" in our modern civilisation. By "capacity for citizenship" is meant power to contribute by productive labour or by some other form of useful service to national welfare. This constitutes civic worth. But there is another kind of worth of equal importance, viz. racial value, which represents the capacity to hand on these good qualities through offspring to succeeding generations.

¹ I am not now considering the possibility of the occurrence of rejuvenation in the individual, as the result of organ-grafting or of organotherapy.

But civic worth and racial value are not always found in accurate association in the same individual or in the same family. It is true that, speaking generally, and when dealing with large numbers, they are associated; but our trouble begins when we try to apportion civic worth and racial worth to particular groups of the population at different social levels.

Now this inverse relationship between specialisation and reproductive capacity is a fundamental phenomenon running throughout life. It has its parallel in the experience of the stock breeder. It also probably plays an important part in the well-known sterility of inter-special hybrids. In the mule, for instance, blending of parental characters occurs in the F.I. generation, in which, though the hybrids may possess normal or even increased vigour, they are sterile *inter se*. It may also be concerned in the phenomena of dominance, recessivity, and segregation in Mendelian inheritance.

But in addition to its general genetic interest, this anti-thesis between specialisation and reproduction has considerable importance for us in the study of eugenic problems. For instance, in tracing the transmission of a particular talent in families of the same ancestral stock, it is frequently found that the special gift is handed on by members who have not achieved distinction, rather than by the geniuses themselves. The same thing holds good in the case of mental abnormalities and defects. A particular defect may be handed on by "carriers" who do not themselves show any abnormality.

There is also the exceptional case of men and women of genius, of creative power, reformers and pioneers in the realms of thought and conduct. In many cases such indi-

viduals have been ignored by Society, or they have been outcasts or persecuted. While their contribution to the social heritage of mankind has been very great, their racial legacy, in the shape of offspring gifted like themselves, has frequently been small or even absent. They resemble the highly organised and specialised brain cells which govern and control the individual organism, but leave no descendants.

Thus it comes about that economic status, wage-earning capacity, and position in the social scale, though on the average useful, are not wholly reliable criteria of racial worth. This difficulty, however, is less when we come to deal with the groups at the bottom of the social scale. These lowest level groups—the mentally defective, the habitual criminal, the inebriate, and the hereditary pauper classes, possess no civic worth. They contribute nothing to national welfare ; they also possess no racial value, but are at the same time highly fertile. Though, as Carr-Saunders (10) has shown in the case of the mentally defective, and Goring (35) in that of the criminal classes, their contribution to the next generation according to their numbers (absolute fertility) may be less than that of the rest of the population.

If then, as in a general way and when dealing with large numbers the evidence compels us to do, we assume a high degree of correlation between civic achievement or social status and racial worth, and if we use wage-earning capacity or social status as tests of social worth, except in a general way, we become liable to certain errors, against which we must be on our guard.

We do not attach enough importance to those upward and downward currents which are constantly spreading through Society and which disturb the normal association between civic and racial worth. An effective social ladder

is no doubt (as McDougall (11) says) an important agency in the advance of a civilisation. It tends to collect good mental qualities in the upper social strata. But it also leaves the lower strata depleted. Then, if these good qualities (owing to reduced fertility above) are not perpetuated, the ultimate effect of such a social ladder may be to hasten the time when the reservoir of good qualities, from which the life of a nation is renewed, becomes empty. In this way social growth outruns innate capacity, and the ladder becomes a factor in decline.

We see the same thing in the life-history of certain families. A family rises in the economic and social scale. It contributes to national welfare. It possesses, in fact, civic worth, and it also shows (or until the introduction of the practice of conception control, did show) normal fertility. Then after a period of economic and social stability of varying length, a period of decline sets in, probably from inter-breeding with less gifted families, with loss of both civic status and racial worth.

In the lowest level groups, on the other hand, civic and racial value are both lacking, while fertility alone remains. It is true that in these groups (as Lidbetter (12) has shown), mating of like with like occurs, and this tends to bring about some degree of isolation, whereas in the group immediately above this lowest section—the group which includes the lower grades of unskilled labour, the habitually poor, and the slum dwellers—the danger of the dissemination of inferior qualities is greater. The members of this group mingle freely with and intermarry with members of the groups above. Hence a constant deterioration goes on in the population which, if continued long enough and on a sufficiently large scale, must lead to racial decay.

This is the direct biological effect of such inter-breeding. But there is also an indirect sociological effect of much importance. The support of this economically incapable group is largely borne by the more capable citizens above. Their ability to rear their own families is thereby reduced. If, therefore, in addition to bearing this burden their ability to bear it is also diminished, a double injury is inflicted on the nation.

Thus we must regard the great middle section of the population as the main reservoir from which the life of the nation is renewed ; and as long as the " heart of a nation " remains sound, incipient decline may be arrested. Our aim must be therefore to increase the relative fertility rate in this large and important group of average citizens, and in those above the average. We may, I think, leave the topmost social group, the so-called " cream of Society," outside our consideration. The present low fertility rate in this small section is not the direct result of poverty, and if on the other hand it be due to loss of natural fertility, or to a desire to escape the duties and responsibilities of parenthood, the race will not suffer if these characters are not perpetuated.

But if our British race is to maintain its proud position at the head of the nations we must see to it that we do not, among other good qualities, lose our capacity for citizenship.

Now capacity for citizenship in this administrative and higher sense is of comparatively recent growth in the history of human development, and like all the more recently acquired faculties, it is one of the first to be lost when a nation or a race begins to decline. Under the conditions now prevailing in the modern world the danger of our losing this essential quality lies in breeding from inferior anti-

social stocks in our own population rather than from wholesale admixture with an alien race. This capacity for leadership, this organising ability, is one of the most valuable of all racial qualities, especially in an Imperial people like our own.

It would not, I think, be safe to conclude that because there is less crime of certain kinds nowadays that no deterioration is going on in the mental qualities or in the capacity for citizenship of our population. The mental make-up which led some citizens to violent, adventurous conduct regarded as anti-social and criminal when practised in the old country, no doubt helped the Botany Bay transportees and the settlers of a hundred years ago to make good, and to contribute to the making of a new nation in the freer atmosphere of the new Australian continent. The question is whether the particular kind of criminal conduct which is associated with *mental defect* shows a similar decline.

No doubt more might be done to develop the exercise of this quality by instruction in our schools in the duties, responsibilities, and privileges of citizenship. For it is by education that a racial conscience must be awakened, and a sense of responsibility to future generations cultivated, for, as Havelock Ellis (13) has said, it is "we who generate the race and we alone can regenerate it," that is, in so far as biological factors are concerned.

THE NEED FOR AN ENQUIRY

We have now considered some of the causes which have led to the decline of civilisations in the past. We have also compared the life-history of the social and the individual organism. The time has come to ask the question whether

all is well with our own British race, or whether, in view of the disquieting statements in certain official reports, a fuller enquiry on a national scale, a national stocktaking, a census of the quality as well as the quantity of the population, is not urgently called for.

I am indebted to Sir Arthur Keith for valuable information concerning previous enquiries, in which he and our President, Major Darwin, took an active part. In recent years notice was first drawn to this subject of physical deterioration immediately after the Boer War by the late General Sir F. Maurice (14). In the following year the Army recruiting statistics (15) showed that 40 per cent. of the men offering themselves for military service during the previous ten years had been rejected owing to physical defects. Then came the *Report of the Scottish Royal Commission* (16), and a little later, in 1904, the *Report of the Inter-departmental Committee on Physical Deterioration* (17). This committee, influenced by the absence of all data of comparable value, recommended that a census of the people should be taken in order to reveal physical defects if present ; and they also outlined a scheme.

Nothing, however, was done, and Lord Londonderry, replying on behalf of the Government in the debate in the House of Lords, said that one difficulty was a possible objection on the part of parents to any measurement of their children. Later efforts by the anthropological section of the British Association and the Royal Anthropological Institute failed to bring about any advance.

In 1908 the Act was passed authorising the compulsory medical examination of school children. This medical examination of (at that time) some two million children of school age, "entrants" and "leavers," formed the first

step towards an anthropological survey. The very important facts thus revealed concerning the incidence of physical defects in the school children of the country have been forcibly brought to the notice of the Government and the public in the valuable annual reports of the Chief Medical Officer of the Board of Education, Sir George Newman (18).

It is encouraging to find that the latest report, that for 1926, shows a definite improvement. The Report states (p. 12) that the English child is growing in stature and in weight (wisdom, an innate quality, is not mentioned). This is good hearing, as far as the prevention and cure of disease, better nutrition and better environmental conditions are concerned, and although mental health and vigour would, if tested, no doubt also show a corresponding improvement, this does not necessarily mean that any forward step has been secured in the elimination of innate physical and mental defects. The fact that the condition of the children of pre-school age does not show a like improvement is important from this point of view (19).

Two lines of action seem to be open to us in dealing with our child population. We may—indeed, we must—promote physiological living, and provide good food, fresh air, sunlight, exercise, and sleep, in order to build up a healthy adult population. But if we concentrate, as we are inclined to do, on the children with hereditary mental and bodily defects, we may no doubt save individual lives that would otherwise have perished, but, unless we take, at the same time, effective steps to prevent the perpetuation of these defects, we shall be promoting racial deterioration, and we shall inflict an injury and not a benefit on the nation.

While fully recognising the great work done by the

medical inspection of school children, one may perhaps be permitted to question the statement in the opening paragraph of Circular 576 issued by the Board of Education in November 1907: "That the mental and moral improvement of coming generations will be a natural corollary of the physical improvement in the school children which it is the aim of the Board to bring about"—not, one fears, unless we cease breeding from the less vigorous and lower-grade stocks which our well-intentioned efforts have kept alive, and have enabled to reach the reproductive age. It is, however, encouraging to read (p. 13 of the Report) that "It is anticipated that the Report of the Anthropometric Committee on Physical Measurements will be available in a few months." It is also to be hoped that this will be followed by a survey of the native intelligence of the children.

In 1916 the Royal Society called a conference of the scientific societies of the country, with Major Darwin as Chairman, to which the Board of Education, the Local Government Board, the Ministry of National Service, and the Registrar-General sent representatives. This conference again urged the importance of such a national survey, but it recommended that each Government Department should carry out its own enquiry. It also became evident that any scheme to be complete must include the whole, or at any rate samples of the womanhood of the country. In 1918 came the report of Sir James Galloway's Commission (20), appointed by the Ministry of National Service. This examination in 1917-18 of two and a half million (the exact figures were 2,425,184) men of military age revealed a very unsatisfactory condition as regards the physical state, vigour, and health of this section of the population.

In short, it showed that, on the average, of every nine men of military age in Great Britain in 1917, only three were perfectly fit and healthy ; two were on a definitely lower plane of health and vigour ; three were incapable of undergoing more than a moderate degree of physical effort, while one was a confirmed invalid.

In assessing, however, the value of these results, we must remember that in a certain proportion of cases these defects, if not inborn, would disappear, and in fact did disappear under the influence of an open-air life, regular exercise, and military training. On the other hand, we cannot ignore the fact that the standard for peace should be at least equal to the standard for war, the ideal in both cases being a sound mind in a sound body.

In addition to official and semi-official reports, dealing with physical defects, we have some evidence in regard to the equally important problem of the *mental* qualities of the population. Reports issued by the Board of Control (21) showed that in January 1925 the number of notified insane persons under control in England and Wales was 131,551, while the mental defectives under care numbered 19,376, although these figures do not represent the total numbers in the population. Dr. Tredgold, in an important address to the Royal Sanitary Institute Congress in July (22) 1926, pointed out that there were 50,000 mentally defective children of school age, excluding imbeciles and idiots. He estimates that in June 1926 the insane and mentally deficient persons composed 1 per cent. of the population, and, of great importance from our present point of view, he states that in his opinion four-fifths of all cases of mental deficiency are due to inborn causes. Carr-Saunders (10) estimates the number of mental defec-

tives as between 350,000 and 380,000 or 10 per thousand of the population.¹

The Report of H.M. Inspector of Constabulary for the year 1924 (23) states that out of every 100 men who applied for admission to the police force in ten years, only five were admitted as physically and mentally fit to undertake the responsible and onerous duties of a police constable. I should also like to draw attention to the valuable enquiries conducted by Mr. Lidbetter and other observers into the life-histories of a number of families of the pauper and habitual criminal class.

In addition to these reports and enquiries, some evidence of a more general character is available. Thus Sir A. Keith, dealing with physical defects, finds from a comparative examination of the skeletons and skulls, especially the jaw bones and teeth, of early and modern inhabitants of these islands, that very important physical changes have taken place and that some of these changes are degenerative and detrimental in character. Medical men, too, practising in large cities, with an experience extending over more than one generation of urban dwellers, have from time to time expressed the opinion that degeneration among city dwellers is going on.

To sum up, we must conclude that there are real grounds for thinking that the physical and mental condition of a considerable section of our population is not satisfactory, and that some deterioration is going on. Secondly, that in view of the urgent need for accurate data and the great assistance such information would be in revealing directions in which steps might be taken to arrest decline, a survey

¹ Since this was written the Report of the Interdepartmental Committee on Mental Deficiency has been published.

of the physical and mental condition of the population, or of representative samples of it, should be undertaken without delay.

THE INCREASING IMPORTANCE OF MENTAL QUALITIES

So far we have been mainly considering physical characters. But if, as we believe, the civilisation of the future will develop on psychical lines, then intellectual and moral qualities, personality, character, and capacity for citizenship will assume a growing importance in the social environment of the future. Hence we must endeavour to ascertain the extent to which these essential mental qualities are present to-day in different social groups in the population, in order that accurate comparisons may be made between present and future records. It is only in this way that we can find out whether mental improvement or deterioration is going on.

No doubt there are difficulties. It may, for instance, be said that it is only possible to judge of mental qualities by observing the behaviour of the individual, man or animal, as the case may be; and inasmuch as behaviour depends on experience and training, as well as on innate mental capacities, uncertainty is thereby introduced which may vitiate the results of the enquiry. It is certainly difficult in some cases accurately to assess the relative value of acquirements made and capacity to acquire. But the disentanglement of these two factors is being carried out with increasing success as experience widens. Apart, however, from the difficulty in estimating instinctive and temperamental tendencies, another difficulty of a somewhat different kind might also be supposed to minimise the value of any enquiry into mental characters.

We are ignorant, so it is said, of the real nature of mental operations, i.e. of the working of the mind, and cannot therefore form any accurate conception of mental manifestations. But without entering on the insoluble problem of the relation between the body and the mind, we may, as Mott (24) has said, "regard the brain as a transformer of cosmic into neural energy."

Light waves and sound waves and other external impressions are transformed into waves of neural energy as they enter the recipient sense organs and pass through the conducting channels in the brain. In the cerebral cortex, the seat of psychical manifestation, these are again reunified with previously received or memorised impressions into one neuro-psychical whole, one personality. Thus consciousness appears coincidentally with this transforming and reunifying process.

Although we know little of its real nature, we can measure the rate of spread of a neural wave as it passes along a nerve, and we can estimate the retardation which ensues when such a neural wave travels from lower to higher brain centres by a circuitous instead of a direct route. We also know that these differences in speed, according to route traversed, are associated with corresponding differences in the psychical manifestations which accompany them.

The evidence suggests that neural, like electrical energy, consists of energy of only one kind which varies in volume, in intensity, and in rate and distribution of flow, according to the molecular structure, insulation, and complexity of the nerve channels and the synaptic areas (the dielectric) through which the wave passes. If this be so, then the corresponding variations in mental capacity which distinguish genius from moderate intelligence will also depend

on quantitative changes in energy of one and the same kind, and not on qualitative changes, or in energy of different kinds. High intelligence would thus be associated not necessarily with a heavier or a larger brain, but with a brain which contains a larger number of cortical cells and a more complex system of associated nerve centres and nerve paths (25).

This conception is in harmony with the teaching of the comparative anatomy and physiology of the nervous system in animals and man, which tells us that psychical evolution proceeds *pari passu* with the evolution of a nervous system of more elaborate structure and of finer texture. Such a view is also in harmony with the recorded subjective impressions of men and women of genius concerning the mode of working of their own minds. It is, at any rate, a suggestive fact that these psychical manifestations which represent the highest form of energy known to man, should be associated with molecular activity in the most highly organised form of matter, whatever may be the ultimate nature of matter, of which we have any experience or knowledge, namely, the human brain (26).

This suggestion, that differences in intellectual capacity are essentially *quantitative*, although more suited perhaps to a philosophical or metaphysical discussion, is nevertheless a subject which bears on our present enquiry. The more complete and adequate our conception of the nature of neuro-psychical energy and its mode of action, the more accurate will be our knowledge of the working of the human mind, and the more reliable our estimate of the relative influence of nature and nurture in the formation of character and conduct in our fellow-citizens. Thus, in measuring *native intelligence*, we measure capacity to make acquire-

ments in the intellectual field of mental life, and so also in other fields we know that the psychological manifestations which accompany the exercise of this capacity are uniformly associated with corresponding neural states or molecular activities in a *physical mechanism*, or organ, the brain. We also know that this neural organ, or physical mechanism, with its varying degrees of complexity of organisation in different individuals, is hereditarily transmitted by the same genetic method as that by which bodily characters are handed on from parents to offspring.

THE DIFFERENTIAL BIRTH-RATE AND THE PRACTICE OF CONCEPTION CONTROL

I must now add a few words concerning the birth-rate in different sections of the population. Our immediate object is to form some reliable estimate of the contribution made by different social groups, not only to the numbers but also to the quality of the population. The first is a comparatively easy, the second a more difficult task.

The Registrar-General's statistics (27) show that, speaking generally, the birth-rate is now lowest in the upper social strata and in the professional and salaried groups in the big middle section of society, and that it rises as we reach the ranks of unskilled labour. There are two important facts about this movement. Firstly, it has grown, and is still growing in a remarkable manner in recent years, and secondly, it is operating on a very large scale. If it continues at its present rate it must have a very marked effect on the population as a whole.

Now the modern practice of conception control is more prevalent among the educated and upper and middle classes, and diminishes as we reach the unskilled labour

ranks, while it is practically absent in the lowest degenerate sections of Society. This means that, as at present practised in this and other countries, the so-called birth-control movement is exercising a dysgenic effect on the population, by reducing the effective fertility of the more worthy and fit groups, in relation to the less desirable sections from the racial point of view.

The remedy, however, is not, in my opinion, to be sought in any attempt to curtail (28) the spread of knowledge, but in a wider diffusion of such knowledge, in so far as it is sound, to all classes of the population, poor as well as rich. In this world-wide experiment, so potent for harm and good, we must, as Major Darwin (4) has said, carry on a *dual* campaign. We must, by awakening the eugenic ideal, and by the "arousal of a racial conscience," bring home to the minds and consciences of our citizens the double duty—on the one hand, the responsibility which rests on all married citizens of healthy parentage and sound stock to bear and rear under the best possible conditions an adequate number of healthy and vigorous offspring, and on the other hand, the equal responsibility and duty of avoiding parenthood in the case of all who are the subjects of hereditary disease, and those who have sprung from unsound or defective stocks.

There will still remain, however, the lowest groups, those which include degenerate, defective, and irresponsible persons, non-responsive to all educational and moral appeals, those on whom, like Caliban in *The Tempest*, "nurture will not stick," those without capacity for citizenship and possessing no racial conscience. With such groups other measures must be employed, such as compulsory segregation during the reproductive period of life, while under

certain conditions and in some cases sterilisation may be desirable.

I believe that adequate knowledge of the factors which affect fecundity and of the means of controlling conception are necessary steps in the evolutionary process whereby man will be enabled to exercise a growing influence over human destiny, and by which also the possibility of increasing the racial stock of innate capacity will be brought within human control. If this be true, then we must not condemn the practice of contraception, provided it has no injurious effect on individual or racial health, and provided that its potency for harm when used improperly, or for unworthy ends, is fully recognised. However this may be, the other alternative, uncontrolled increase and population pressure, must become a serious menace, not only to the peace of the world, but to the standard of life in civilised countries and to the future of our civilisation.

THE KIND OF ENQUIRY NEEDED

We must now consider shortly the form that any enquiry into the distribution of natural capacity in the population should take.

The idea of a national stocktaking seems to have originated in a correspondence between Sir Francis Galton and Florence Nightingale (29). In 1924 Major Darwin formed a small committee to advance this project, and communications have taken place between the Eugenics Society, the Medical Research Council, the officers of the British Medical Association, and the Ministry of Health.

I do not propose to enter into details, and will only indicate the main principles on which it should be framed.

Since our object is to ascertain the physical and mental

qualities of the citizens, especially in the large middle section which includes the average citizen and forms the bulk of the population, the enquiry must be so formulated as to reveal the incidence of civic worth in association with racial value in the population, particularly in this middle group. The suggestions are :

1. The inclusion in the census schedule of 1931 of the questions of racial importance (as to size of family, etc.) which were included in the census of 1911, but were omitted from that of 1921. This suggestion has already received the support of the Council of the Eugenics Society ;

2. A review of our present system of birth certification and registration, with a view to the inclusion of the ages of parents, and other data of genetic importance ;

3. In addition to the fuller information which could be obtained from a census of the whole nation, much might be learned from an intensive study of a selected sample or samples of the population. The questions should be so standardised and arranged as to make the answers strictly comparable with the results of future enquiries. Such a sample might (as Fisher and Carr-Saunders suggest) be taken from among the school children of a certain age.

The enquiry should include : (a) *Anthropometrical measurements*, (b) *medical data*, and (c) *psychological records and scholastic tests*.

The anthropometric data would include stature and weight, eye and hair colour, and other important bodily characters. The medical examination would have reference to development and general health, condition of eyes, teeth, etc., and absence of disease. The mental state would be examined under two headings : (a) Psychological,

concerned with native intelligence; and (b) scholastic, dealing with verbal and linguistic attainments.

This is, of course, merely an outline. The details would require careful preparation. Any suggestion whereby the examination could be so improved as to distinguish more accurately between capacity to make acquirements and acquirements made, should receive careful consideration.

If in addition to this intensive study of a sample (or samples) of children of school age, records could also be obtained from the whole or from a portion of the industrial population additional valuable material would be secured.

On June 28, 1927, a deputation, organised by Miss Olga Nethersole and the People's League of Health, introduced by Lord Burnham, waited on the Minister of Health to urge that all entrants into industrial life, under the National Health Insurance Act, should undergo a medical examination on entry, and periodically at subsequent intervals (30). Such an examination, if strictly standardised, would give valuable information as to the condition of the working-class section of the population of both sexes.

4. At the present time a very large number of records are being collected by various societies and Government and municipal departments in various sections of the population. If these enquiries, which in the aggregate affect large numbers, could be standardised, and made comparable among themselves and with future records, much valuable knowledge as to the physical condition of the population would thereby become available.

The results from these four lines of enquiry would probably supply the greater portion of the information needed, and would be practicable from an administrative point of view. In other directions the intensive study of smaller groups,

so successfully employed by Mr. Lidbetter in the case of certain habitual pauper and criminal families, might be continued. This was the method employed by Galton in his famous enquiry into natural inheritance and hereditary genius.

Such enquiries, however, are concerned with extreme groups. It is equally or even more important that data should be obtained in regard to the distribution of mental and bodily characters in that larger section, or a sample of it of the nation, which includes the average citizen and forms the bulk of the population. For it is not so much from the extreme types—the men and women of genius on the one hand, or the degenerate groups on the other—but from the average level of innate capacity of intellect and character in the population as a whole, that any true estimate can be formed as to the occurrence of improvement or deterioration.

What is wanted is a census which will reveal *quality* as well as numbers, one which will show in what sections of the population *civic* is associated with *racial* worth.

EUGENICS AND MEDICINE: THE HEREDITARY FACTOR IN DISEASE

There is still another aspect of the subject to which I wish to draw attention. In a discussion on the biological foundations of sociology twenty-two years ago, I spoke of the pressing need for the teaching of the science of heredity as a part of the medical curriculum (31). This has not yet materialised. We still await the great impetus which would be given to eugenic progress by enlisting the interest and active co-operation of the medical profession in heredity problems. Moreover, the advantage would be a mutual

one. On the eugenic side, because medical men engaged in general practice possess unrivalled opportunities for collecting family records of mental and bodily characters hereditarily transmitted through several generations. On the medical side the gain would be equally great, for increasing medical knowledge continually emphasises the great importance of the hereditary factor in disease.

Excluding accidental injury, the main cause of death in the large majority of the population arises from the action of some poison, either elaborated within the body, or more frequently introduced from without. Now it is largely the hereditary factor which decides whether any individual man or woman will succumb to auto-intoxication or to some microbic poison introduced from outside. The same factor also helps to decide the actual organ or tissues which will be primarily affected, and even the particular portion of (for instance) the nervous system which will bear the brunt of the attack.

Such then is the all-important part played by *capacity of resistance* in combating disease. Medicine and the medical profession would greatly gain by a more intimate knowledge of this biological factor, this capacity of resistance against disease.

It is not, however, only or even chiefly in bodily ailments that genetic factors play a decisive part. The study of mental abnormalities and mental defects would be similarly advanced by a closer analysis of hereditary influences—and, as we have already seen, mental qualities will be the deciding factor in the future of our race.

A working alliance with medicine would also be helpful in another direction. The problem of the rise and fall of nations and races is partly a psychological one. In such

a study the hereditary transmission of both normal and abnormal mental qualities is a factor of great importance, and one in which medical men, trained in physiology, psychology and genetics, could render most valuable service.

But before we can hope to secure the interest and the active co-operation of the medical profession in eugenic problems, certain preliminary steps will be necessary: (1) A favourable mental attitude to genetics must be obtained in the General Medical Council, in the medical faculties, in our universities and medical schools, in the Ministry of Health, and in the public medical services—in fact, in all bodies concerned in medical education. (2) Medical students must be taught the principles which underlie, and the methods employed in the study of genetics in animals and in man. In short, the study of genetics and of eugenics must form an integral part in the theory and the practice of preventive medicine.

In thus drawing attention to natural resistance and immunity against disease as a striking example of that *natural capacity* which we have been discussing, I am reminded of the words of Aristotle, written more than two thousand years ago: "Men are called healthy in virtue of the inborn capacity of easy resistance to those injurious influences which may ordinarily arise; and unhealthy in virtue of a lack of that capacity" (32).

THE CIVILISATION OF THE FUTURE

Since we know so little about the lines along which human evolution is developing, or of the nature of the civilisation which will form the environment of the future, we cannot, so it may be objected, form any true conception of the

mental and bodily qualities which the citizens of the future must possess if they are to live in successful adaptation to such a greatly altered mode of life, and that any artificial attempt to produce such unknown qualities must fail.

It is no doubt true that we do not know in detail what human life will be like even one hundred years hence. But we may be sure of this, that the evolution of the human race will proceed along psychical lines, and that the environment of the future will be mental rather than physical, social rather than individual, a world in which brains will count for more than muscle. There will be no room there for mental deficiency.

In such a world and in such surroundings it is also certain that not only intellectual power, but moral qualities, character and personality, capacity to lead successfully the social rather than the individual life—in short, capacity for citizenship and adaptability to an ever-widening environment in space and time—will count for much. One of the main characteristics of the citizens of the dominant race of the future will be ability to assess in moral and spiritual values, and to apply to worthy ends, that growth in material prosperity which a constantly-increasing power of control over natural forces ever brings in its train. We have already seen that failure to accomplish this has been one of the main factors in bringing about the fall of ancient civilisations and earlier races.

“ There are only two ways of righting disharmony in every department of life. Either the environment must be widened to allow of the exercise of the larger faculties, or the capacities must be reduced to the level of the narrower environment ” (33).

Surely the former is the better way.

CONCLUSIONS

We must now sum up the main conclusions at which we have arrived.

In order to deal successfully with any disease, the first essential is to know its cause. There can therefore be no doubt that a national survey of the population, a census of quality as well as quantity, is urgently needed before any reliable comparisons can be made between the physical and mental qualities of our citizens to-day and the same qualities some years hence. If, as is very probable, such a survey should reveal presumptive evidence of deterioration, especially in the field of native intelligence, then we shall at least know how we stand and what steps to take in order to arrest the decline. Among the many remedial measures which have been, or which might be, suggested, the first place must be given to education.

Eugenic ideals must be established and a racial conscience awakened in the mind of every citizen capable of responding to such appeals, especially in the adolescent section of the population. This will be difficult and will take time, for the "national conscience" is a very heavy sleeper. But even so, the degenerate groups, the irresponsive residuum at the bottom of the social scale, will still remain untouched. Segregation during the reproductive period of life must be the main remedy in this group, supplemented where necessary and in suitable cases, after judicial enquiry and expert advice, by sterilisation.

In regard to the large middle section, which includes the average citizen and forms the bulk of the population, an attempt must be made to increase the relative fertility in this group by well-considered economic measures such

as family endowment, relief in income tax according to number of children, and in other ways designed to relieve the present heavy burden on parenthood. Such relief, either by family endowment or reduction in income tax, must be discriminative, and should, in my opinion, be limited to the first four or possibly five children in the family. It would thus tend to reduce the number of children in the too large families in the lower groups, and to increase the number in the, at present, too small families in the middle section of Society.

In thus advocating the employment of economic measures as a means of promoting fertility in the worthier social groups, I am aware of the objections which have been raised by Drysdale and others. If, however, we really believe that the future of mankind depends on a wise exercise of human control, then surely it is necessary that such control should be exercised not only in the social and biological but also in the economic sphere of life.

In this middle section also education on eugenic lines must be relied upon, and will be especially useful. All such eugenic instruction, based on sound biological principles, must form an integral part of education and training for life as a whole. Nay, it must (as Galton urged), receive a religious sanction and possess the driving power of a religious belief. Indeed, if it were not for the wiser attitude taken up by a few leaders in Church and State in regard to this question of biological teaching in our schools, one would be alarmed by the general indifference manifested to this vital problem.

I look to the spread of a knowledge of heredity to bring about a great change in our mental attitude one to another. I believe such knowledge will lead to a far better under-

standing of the nature of individual responsibility, and to a truer conception of the principles which underlie good and bad conduct. It will also, surely, help us to realise in what way we can best help our neighbour, and will tend to promote a more reasonable and a less barbarous mental attitude to crime and criminals.

As has been truly said, "Biology is the science of life" (that is, of individual, national, and racial life), "and the science of life must be pondered (and taught) continuously and reverently if the art of living is ever to be developed" (34).

The second suggestion is this, we must try to bring about some degree of segregation along social, economic, and biological lines between the fit and the unfit sections of the population. Sound and healthy families of good stock must not intermarry with the hereditarily diseased and the genetically defective. For the latter will never voluntarily sever their connection with the former. This does not mean that the strong and healthy are no longer to help or to take any interest in the weak and the disabled. This would be to cease to exercise those inestimable qualities of sympathy and kindness which form the basis of true citizenship, and mean so much for the future of mankind. But these virtues must be exercised wisely and with due regard to racial welfare. Mere benevolence is not enough. It must be a benevolence which seeks to prevent as well as to relieve suffering. Nature, as we know, is careless of the individual. Her concern is with the species and the race. Man in his desire to help the individual is apt to overlook the race.

The great problem of the future will be how best to harmonise individual with racial interests.

Many of our present difficulties arise from this mingling and intermarrying of the fit with the less fit. A stricter demarcation along lines of civic and racial worth would not only help to form a sounder public opinion on eugenic questions, it would also facilitate the eventual elimination of the unfit from our population.

Moreover, it is very important that we should look at this problem of racial deterioration from a wide standpoint. It may be that, as by the elimination of the unfit individual the welfare of the community is secured, so by the removal of the decadent race the evolution of mankind is promoted. If this be so, we ought to welcome the extinction of the degenerate race, that is, if it be incapable of regeneration and re-birth. There is also this consolation. If, as we believe, the older and cruder method of natural selection is being gradually superseded by the less wasteful and more humane method of artificial selection under human control, then we may reasonably hope that a kinder and a better way of eliminating both decadent races and degenerate stocks will be found, and that way will be by non-perpetuation rather than by extinction by war, famine, and disease.

We have already seen that it is impracticable and useless at present to endeavour to produce genius by breeding with that end directly in view. The mountain peaks of genius which arose in Greece in the time of Pericles soared from a tableland of a high level of intelligence among the Athenian citizens prior to the classic age. If we of the British race firmly resolved to make a wise use of our newly acquired power of human control, we might, even in the course of a few generations, so raise the average level of intelligence in our own population as to render possible an outcrop of

men and women of genius like those of the Elizabethan and Victorian ages.

But this will need a better way of living, and a new attitude to life. It is no doubt true that man has grown but little in mental stature during historic times. But the signs are encouraging ; the dawn of a new era is approaching. The power acquired by civilised man to control—to-day perhaps only the quantity—but to-morrow the quality of human life will also enable man to change human nature and to raise mental and moral capacity to a higher level. But we are building not for the present but for the future, and we must exercise patience. We must think in generations, and in *ages*, rather than in *years*.

Finally, whatever may be the future of our British race, we are entitled to regard the future of Mankind with confidence and hope. Progress, both biological and social, has occurred in the past, and it would be unreasonable to imagine that now, when man is beginning to exercise control, all evolutionary progress will cease.

But this artificial selection under human control must be of the right kind, and it must be used in the right way. At the present time it is not so used. Education on eugenic lines will help to bring about a wiser mental attitude to both social and racial problems and to the way in which they react on each other. Of this at any rate we may be sure, that the dominant race of the future will be that race which succeeds in eliminating the unfit and the degenerate from its ranks.

Thus we arrive at our final conclusion : The future of a race depends on the possession of *civic*, in close association with *racial* worth ; that is, on the possession of qualities of mind and body which will enable a people to respond to

the good and to resist the bad influences in the environment, together with the capacity to hand on these good qualities to offspring, adequate in numbers to perpetuate the race effectively.

At present our only, or main test of racial worth (in the human species) is the existence of civic achievement in the individual, the family, or the stock ; and this, as we have already seen, although statistically useful, is not an entirely reliable criterion.

I will conclude my address with a final reference to the life-work of Francis Galton—we eugenists shall do well to copy his judicial and scientific attitude of mind and his deep appreciation of the complexity of the problem before us. Ours is a great mission, and our aim the promotion of human progress along *biological* lines. It will need all our courage, patience, and tact.

Our immediate object must be to bring home to the minds of statesmen, Government departments, local authorities, and the public, the fact that our present sociological methods are not based on sound biological principles. All such methods for improving the conditions of life must not only rest on a sound biological foundation, they must also deal with human beings having some capacity of response, if they are to be successful in promoting progress, not only in individual, and national, but also in racial life.

BIBLIOGRAPHY

1. Herbert Spencer : *Social Statics and Principles of Sociology*, chap. xii.
2. Spengler : *Untergang des Abendlandes*, vol. i.
3. MacIver : *The Modern State*. Oxford University Press, 1926.
4. Darwin, L. : *The Need for Eugenic Reform*. Murray, 1926.

5. Perry, W. L. : "The Disappearance of Culture," *Eugenics Review*, July 1924.
6. Petrie, Flinders : *The Revolutions of Civilisation*.
7. Keith, Sir Arthur : *Concerning Man's Origin*, 1927.
8. Fisher, R. A. : "The Problem of the Decay of Civilisation," *Eugenics Review*, 1926.
9. Carr-Saunders : *Population*, 1925.
10. Carr-Saunders and Caradog Jones : *Social Structure of England and Wales*. Oxford University Press, 1927.
11. McDougall : *National Welfare and National Decay*.
12. Lidbetter : *Report of the World Population Conference*. Arnold, 1928.
13. Ellis, Havelock : *The Problem of Race Regeneration*, 1911.
14. Maurice, General Sir F. : *Contemporary Review*, January 1902.
15. *Army Recruiting Statistics Return*, 1903.
16. *Report of the Scottish Royal Commission*, 1903.
17. *Report of the Inter-Departmental Committee on Physical Deterioration*, 1904.
18. Newman, Sir G. : *Report to the Board of Education*, 1926.
19. Wheatley, Dr. J. : *Public Health*, November 1925.
20. *Report of the Ministry of National Service*, 1919.
21. *Report of the Board of Control*, 1925.
22. Tredgold : *Address to the Royal Sanitary Institute Congress*, 1926.
23. *Report of H.M. Inspectors of Constabulary*, 1924.
24. Mott, Sir F. W. : *Nature and Nurture in Mental Development*, 1914.
25. Berry, R. J. : "The Study of Mental Abnormality," *British Medical Journal*, January 14, 1928.
26. Myers, C. S. : *Proceedings of the Royal Society of Medicine*, 1925.
27. Stevenson, Dr. T. H. C. : "Fertility of Various Social Classes in England and Wales," *Journal Royal Statistical Society*, April 1920.
28. *Report of the Special Committee on the Ethics of Birth Control and Medical Aspects of Contraception*. National Council of Public Morals.
29. *Life of Florence Nightingale*, Appendix, abridged edition.
30. *Report of the People's League of Health*, 1927.
31. Bond, C. J. : "Discussion on the Biological Foundations of Sociology," *Sociological Papers*, 1906.
32. *Aristotle, Categoriæ*, chap. viii, 9, a, 21. Oxford Translation.
33. Bond, C. J. : *Health and Healing in the Great State*, chap. v, 1912.
34. East, E. M. : *Heredity and Human Affairs*. Scribner, 1927.

35. Goring, C. : *The English Convict*, 1919.
 Plato : *The Republic*.
 Freeman, Austin : *Social Decay and Regeneration*, 1921.
 Rentoul, R. R. : *Race Culture or Race Suicide*.
 Parsons, Professor F. G. : *The Englishman of the Future*. (B.A. Leeds, 1927.)
 Fisher, R. A. : "The Actuarial Treatment of Birth Records," *Eugenics Review*, 1927.
 Pearson, Karl : *The Chances of Death*. London, 1897.
 Bell, A. G. : *The Duration of Life and the Conditions associated with Longevity*. Washington, 1918.
 Barnes, D.D., Bishop of Birmingham. *Galton Lecture*, 1926.
 Still, Dr. : "Influence of Place in Family," *Lancet*, October 15, 22, 1927.
 Pearson, Karl : *National Life from the Standpoint of Science*, 1901.
 Schuster, Edgar : *Eugenics*.
 Galton, Sir Francis : "Restriction in Marriage"; "Studies in National Eugenics," *Sociological Papers*, 1905. *Hereditary Genius. Studies in Natural Inheritance*.
 Morgan, T. H. : *The Physical Basis of Heredity*.
 McDougall, William : *Social Psychology. The Group Mind*.
 Blacker, C. P. : *Birth Control and the State*.
 Jennings, H. S. : *Public Health Progress and Racial Progress. Are they Incompatible?* Baltimore.
 Myers, Professor J. L. : "The Causes of Rise and Fall in the Population of the Ancient World," *Eugenics Review*, April 1915.
 Ward, L. F. : *Applied Sociology*. Boston, 1906.
 Kelly, T. L. : *The Influence of Nurture on Native Differences*. New York, 1926.
 Laughlin, H. H. : "Eugenics in America," *Eugenics Review*, April 1925.
 Schiller, F. C. S. : "The Ruin of Rome," *Eugenics Review*, 1925.
 Whetham, W. C. D. and C. D. : *An Introduction to Eugenics*, 1912.
 Bond, C. J. : "Our Critic Criticised," *Sociological Review*, January 1914.
 Fremantle, Lt.-Col. : *The Health of the Nation*, 1927.
 Carr-Saunders : "A Criticism of Eugenics," *Eugenics Review*, October 1915.
 Moore, Eldon : *The Spectator*, January 14, 21, 28 ; February 4, 1928.
 Rathbone, E. F. : "Family Endowment," *Eugenics Review*, January 1925.
 Darwin, L. : "Letter to *The Times*," January 17, 1928.

CHAPTER VIII

ON THE MAKING OF "USE ACQUIREMENTS" ¹

SINCE the time of Weismann's publications there has been a tendency to regard the variations which arise during Germinal Reproduction and the modifications which arise during individual experience as two essentially dissimilar processes. We are apt to draw a fundamental distinction between Innate and Acquired characters.

It is the object of this paper to indicate reasons for thinking that the process of Use Acquirement, by which the individual cell becomes adapted to environmental change, is essentially the same process as that by which organisms (both unicellular and multicellular) become adapted to changed conditions through the selection of innate and favourable variations. In the following remarks, however, we shall not be concerned with the actual origin of these variations; their occurrence is assumed.

The difference between the Direct form of adaptation on the one hand and the Indirect form on the other depends in fact, on the nature of the units concerned in the adaptive response, and on the conditions under which that response is made.

In Indirect adaptation through natural selection the units concerned are organisms or species of organisms, while in Direct adaptation by Use Acquirement they are

¹ A Communication to Section D, British Association Meeting, 1912.

the physiologically differentiated parts of which individual cells are composed.

The question is—Does the process of selection which controls adaptation by ensuring the survival of the more fit varieties among individual organisms, also control adaptive changes in the living units which make up the individual cell, for if the cell is to become adapted to new stimuli its component parts must be rebuilt and re-ordinated in harmony with the altered conditions?

We know, more or less, what the conditions are under which selection takes place among organisms when they are exposed to changed conditions of life.

They are :

1. A struggle for existence.
2. More or less rapid reproduction of organisms.
3. Destruction of unfit organisms.

Use Acquirements are made during those functionally active phases of cell-life in which the repeated wear and reconstruction of cell parts render possible the origination of qualitative differences among these parts. Germinal variations, on the other hand, are associated with cell division, and the phases which immediately precede and accompany cell division, and cell division gives an opportunity for the origination of qualitative differences between individual cells rather than between cell parts. Every highly organised somatic cell about to divide undergoes a process of "Entdifferenzierung," or dedifferentiation—the voluntary muscle cell loses its striation, the epithelial cell its cytoplasmic granules. Cell division, preceded by dedifferentiation, provides the opportunity for variation among cells as units, and through the selection of fitter units for adaptation of the Indirect kind.

On the other hand, the highly differentiated fully organised adult nerve cell undergoes neither dedifferentiation nor cell division.

This is a very suggestive fact, when we remember that it is the nerve cell that exhibits the faculty for Use Acquisition in the highest degree.

The question is therefore during what phase in the life of the nerve cell these acquisitions are made. The nerve cell is pre-eminent among somatic cells in capacity for rapid reconstruction and rearrangement of intra-cellular parts. The whole life of the functionally active nerve cell is one long process of adaptation of the Direct kind. That Indirect adaptation should be associated with cell division and that Direct adaptation should be associated with functional activity are surely facts of much importance. They favour the suggestion that both forms of the adaptive response depend on variation and selection acting on units of a different order.

THE NEURO-PSYCHIC RESPONSE

We must now consider the neuro-psychic response in the light of this conception of Direct adaptation by Use Acquisition as a process of variation and selection among intra-cellular units.

It is probable that among the many responses made by cells of different types during individual development, that made by the central nervous system of man, and some of the higher animals, is the only one which is made directly to the Use Stimulus, and is the only one therefore which ought to be regarded as a Use Acquisition.

In confirmation of this view we find no evidence of any

struggle for existence, or cell destruction, or cell regeneration *among* nerve cells when the neural response falls within normal limits. The functionally active nerve cell does not die nor undergo cell division, at any rate in the human subject during adult life. In fact, in proportion as the nerve cell develops a capacity to respond directly by Use Acquirement it loses the capacity to respond indirectly by cell division.

This absence of destruction or regeneration of nerve cells is inconsistent with any explanation of neural adaptation through the selection of favourable varieties of nerve cells as units, but it is consistent with the explanation of neural adaptation as being the result of the selection of favourable arrangements of nerve-cell parts—that is, as a Use Acquirement on the part of individual nerve cells.

But if our conception of a Use Acquirement as a process of variation and selection among the physiologically differentiated parts of individual cells be correct, then there should be some evidence of the presence of the three conditions, Struggle, Regeneration, and Destruction among nerve-cell parts (though not among nerve cells) during neural adaptation. Such evidence does exist.

Hodge (1), Gustav Mann (2), and others have recorded the effect of natural fatigue and of prolonged stimulation in reducing the size and number of Nissl bodies in nerve cells—the effect of effort is to use up, the effect of rest is to restore the number, size, and integrity of these intracellular units. Mott (3), Marinesco (6), and others have also shown that the degenerative process in the neuron primarily affects these same chromophilous bodies.

Where competition for nourishment exists among units, and where units are being destroyed and re-formed, there

the conditions exist which favour the origin and selection of favourable varieties among the units concerned.

The lower we descend in the zoological scale the more obvious is the fibrillary continuum between the different neurons and the simpler the motor adaptive responses made ; thus in phylogenetic evolution complexity of motor adaptation accompanies neuronic independence, Mott (4).

Ramon y Cajal (5) and others have shown that both the phylogenetic and the ontogenetic evolution of the psychomotor neurons take place by increasing the number and complexity of cell processes rather than by increasing the number of cells.

How do these facts fit in with our conception of neural adaptation as a process of *intra-* as opposed to *inter-*neuronic variation and selection ?

Surely they indicate the importance of intra-cellular changes in nerve-cell parts rather than the importance of variations among nerve cells. They suggest that structural organisation, and fibrillar continuity between individual neurons, accompany the preadaptive or reflex rather than the post-adaptive or voluntary mode of response. They suggest, that for the exercise of capacity to learn by experience and for the making of Use Acquirements, the complex proteid and lipoid living material which exists in the neurons and forms the nerve cells and fibrils, must possess in a high degree, capacity for rapid molecular change and molecular rearrangement—that is, for variation among its component parts.

It will doubtless be objected that Nissl granules and fibrils are artifacts. It is no doubt true that all that can be seen by the highest powers of the microscope in the cytoplasm of the living nerve cell are numbers of refractile

granules exhibiting some movement in a clear colloidal medium. But artifacts must have pre-existing phases in the living substance in which they are formed, and when differences in pre-existing modes of cell metabolism are found in association with differences in the artifacts which follow them, then such artifacts become important.

For whether (with Macdonald (7)) we regard the neural discharge as associated with the translation of electrolytes in a living medium, or (with Macallum (8)) with a redistribution of potassium ions and other inorganic salts during differences in surface tension, in either case qualitative and quantitative changes in a living medium are associated with, and provide the material basis for, those functional and structural variations from which neural adaptations arise.

We have then arrived at this point: the absence of regeneration and destruction of nerve cells during the neural response shows that neural adaptation cannot be due to the selection of favourable varieties of nerve cells.

The fact that the nerve cell does not develop structural or functional differentiation, or become adapted in the absence of the Use Stimulus, shows that the adaptive change is not wholly the result of growth tendencies in nerve cells set going by nutritional stimuli.

Moreover, the evidence is conclusive against the Direct action of the environment as the efficient cause of neural adaptation independently of inherited cell potentiality.

Hence we are driven to the conclusion that the neuro-psychic response, like other responses of an adaptive kind, is the result of an interaction between environmental influence and cell potentiality; and the question is therefore: What share does each factor take in the response?

If the above conception of a Use Acquirement as a process of intra-cellular variation and selection be true, then the part played by the nerve cell must be that of initiating various modes of neural intra-cellular activity, and the part of the environment the selection of that particular mode which is most in harmony with the stimulus on the one hand and the life of the cell on the other.

For if direct adaptation is not caused by environmental influence alone, nor by inherent cell activity alone, but by the interaction of both these factors, then it is difficult to conceive of any way in which the cell could contribute to the reaction except by providing a number of alternative modes of intra-cellular activity, from among which, the environmental stimulus determines the one which is most suitable under the circumstances, and most in harmony with the life of the cell.

THE NEURO-PSYCHIC RESPONSE AS A WHOLE

When we come to consider the response made by the nervous system as a whole we find further evidence of the operation of this intra-cellular variational and selectional influence.

The chief functional characteristic of the human brain is Educability, or capacity to profit by experience.

The making of neuro-psychic acquirements, that is, the learning of new ways of thinking and acting in response to new sensory impressions, is a process of neural selection ; it consists in the testing of many and the selecting of one out of a number of modes of neuro-psychical response, some of which exceed and some of which fall short of the requisite volume, intensity, and direction of discharge of neuro-psychical energy.

The neuro-psychic response on its physical side is, in physiological language, neural path-making, the materials used are the differentiated units which compose individual neurons and neuronic arcs.

In proportion as any nerve path is habitually traversed it becomes easy and direct. In proportion as competition and selection cease among the biochemical units which compose a nerve cell, the neuro-psychic responses which they subserve cease to be voluntary and become automatic.

The replacement of one mode of intra-cellular arrangement by another more favourable mode, without causing the destruction of the nerve cell, constitutes a great advance on the older method of racial evolution in which preadapted units or organisms are destroyed and replaced. The fact that the Direct or post-experiential mode of adaptation now overshadows the Indirect or pre-experiential method in the human brain depends largely on this possibility.

The hereditary basis on which capacity to learn by experience (or educability) depends is a capacity on the part of nerve cells to initiate variations of the intra-cellular kind.

THE NEURO-PSYCHIC COMPARED WITH THE MUSCULAR RESPONSE

It is interesting to compare the neuro-psychic response with that made by muscle cells when exposed to increased stimulation. Muscular hypertrophy, the result of increased muscular effort, is a Use Acquirement, but it differs in its mode of origin from the Use Acquirement made by nerve cells. When a muscle enlarges as the result of increased effort the increased bulk is due to cell division of muscle

cells, and not to any variation in the intra-cellular units which compose those cells. The increased stimulation results not in any modification of intra-cellular structure and function, but in repeated cell division of muscle cells.

Muscular hypertrophy represents a Use Acquisition on the part of the organism, but it does not represent a Use Acquisition on the part of each muscle cell.

Use Acquisitions are thus brought about in different ways—by variation and selection among intra-cellular units on the one hand, and by increased cell division on the other.

Thus we see how necessary it is to judge of Use Acquisitions, not by their mode of manifestation in the individual organism, but by their mode of origin in the individual cell.

It is also important to remember that though Use Acquisitions made by somatic cells and tissues are not normally transmitted to offspring, yet the capacity to initiate intra-cellular variation on which their making depends is a germinal or innate character and is transmissible to offspring. Moreover, some Use Acquisitions, though not transmitted to offspring, are transmitted to the cell descendants of the cells which make them, e.g. as in acquired immunity. This apparent anomaly is explained when we realise that such Use Acquisitions arise in intra-cellular variation.

A clearer recognition of the fundamental similarity of the two processes—Readaptation in Racial Evolution, and Use Acquisition in Individual Development—and of their common origin in a similar process of variation and selection among units of a different size, order, and complexity, will, I venture to think, tend to promote greater unity in our biological conceptions about adaptation.

CONCLUSIONS

This conception of the nature of a Use Acquirement (as a process of intra-cellular variation and selection) throws some light on the relationship of adaptation to normal function.

The passage from function to adaptive response depends on the possibility of intra-cellular variation, that is, on the substitution under conditions of environmental change of a new mode of intra-cellular activity for an older mode previously fixed by conditions of environmental stability.

In the case of the higher nerve centres (in man and in some of the higher animals) normal function and adaptive response are one and the same process because, in the neural response, normal function consists essentially in the making of intra-neuronic variations in response to changing stimuli.

Among the adaptive responses made by the human individual to environmental change, that made by the highest nerve centres is the only one which fulfils all the essential conditions, and is the only one therefore which can be called a pure Use Acquirement.

1. It is made in response to the Use Stimulus.
2. It is brought about by a process of variation and selection among intra-cellular units.
3. It is not accompanied by injury to or regeneration of individual nerve cells.
4. It is made not only during the life of the individual organism, but during the life of the individual cell.
5. It is not transmitted to offspring.
6. It is not even transmitted to any cell descendants of the nerve cells which make it.

7. The inherited germinal character on which it depends is capacity on the part of certain nerve cells to initiate intra-cellular variations.

Among other adaptive responses made by the individual organism that of *Acquired Immunity* is also a Use Acquirement from the point of view of the individual, but it is the result partly of a process of inter-cellular variation and selection among phagocytic body cells, and partly the result of a process of intra-cellular variation and selection in certain other body cells.

It is not transmitted to offspring.

It may be transmitted for a variable number of cell generations to the cell descendants of the cells which become immune.

The inherited germinal character on which it depends is a double one—it is capacity on the part of some body cells to vary among themselves when undergoing cell division during the struggle for existence, caused by the presence of the diseased organisms, and capacity on the part of certain body cells to vary in themselves when exposed to the toxins of the disease organism.

It is made during the lifetime of the individual, but not necessarily during the lifetime of the individual cell which becomes immune.

The Muscular Hypertrophy Response is a Use Acquirement from the point of view of the individual, but from the point of view of the muscle cells it is the result of increased cell division in response to increased stimulation, and not to intra-cellular variation on the part of individual muscle cells.

It ceases with the cessation of the stimulus.

It is not transmitted to offspring, nor to the cell descendants of the cells which make it.

The inherited germinal character on which it depends is capacity for increased cell division on stimulation, and not capacity for intra-cellular variation on the part of the units concerned in the response.

Other Use Acquirements, such as the assumption of new *characters by epithelial cells* according to the nature of the environment (moist or dry) to which they are exposed and according to the kind of stimulus (pressure, friction, etc.) to which they are subjected, depends on the exercise of latent growth tendencies by cells which arise from cell division, and grow to maturity under the new conditions.

Use Acquirements must be judged therefore by their mode of origin in the cell and not by their mode of manifestation in the individual.

The difference between the method of racial evolution and the method of individual development (or that part of individual development which depends on response to the Use Stimulus), is essentially a difference in the units which vary and undergo selection.

In the case of racial evolution, these are individual cells or organisms; in the case of individual development, they are the physiologically differentiated parts of which individual cells are composed.

The value of the method of direct adaptation by intra-cellular variation lies in the fact that it allows of the adaptive response taking place without any destruction, of individual cells.

This possibility has largely contributed to the evolution of capacity for post-experiential adaptation, or educability in the human brain.

Progress in racial adaptation depends on variation *among*

germ cells. Progress in individual adaptation depends on variation *in* somatic cells.

Thus adaptation in both cases depends on a capacity to vary or to initiate change in cells or in cell parts.

In racial evolution the selection value of the variation is tested by the cell descendants of the cell in which the variation arises. In individual development the value of the variation is tested by the cell in which it arises.

This shortening of the testing process in individual development explains not only the acceleration of the evolutionary process in proportion to the degree of individual development, but also the increasing importance of the individual as a factor in evolution.

BIBLIOGRAPHY

1. Hodge : *Journ. of Morphology*, 1892, vol. vii, p. 95.
2. Gustav Mann : *Journ. of Anat. and Phys.*, 1894, vol. xxix, p. 100.
3. Mott : *Croonian Lectures*—" Degeneration of the Neuron," 1905.
4. Mott : "The Present Position of the Neurone Doctrine," *Proc. Roy. Soc. Med.*, 1909.
5. Ramon y Cajal : (Quoted by Mott : *Croonian Lectures*).
6. Marinesco : (Quoted by Mott : *Croonian Lectures*).
7. Macdonald : *Trans. Brit. Assoc.*, 1911.
8. Macallum : *Trans. Canadian Institute*, Toronto.

CHAPTER IX

DO GERM CELLS MAKE "USE ACQUIREMENTS" ?

IN Chapter VIII a theory of the way in which Use Acquirements are made was put forward, and the neuro-psychic response was considered in detail from this point of view.

We now proceed to enquire to what extent this conception of a Use Acquirement, as the result of a process of variation and selection among intra-cellular units, is applicable to the germ cells, and to the evolutionary process as it occurs among individual organisms. We seek, in fact, an answer to the question—"Can germ cells make Use Acquirements in the same sense that nerve cells make them?" or in other words—"Do germ cells respond to environmental stimuli by a process of variation and selection among the intra-cellular molecular parts of which they are composed, or does racial evolution depend on the selection and survival of certain germ cells which are better endowed than others for the struggle of life?" Does the underlying evolutionary process represent the Direct or the Indirect form of adaptational response?

Now there are certain known facts about the life-history of the mammalian germ cells which are important from our present point of view.

In the first place, the germ cells (in the female, at any rate) occupy a very secluded position in the body of the host. Under normal conditions they do not come under the direct influence of environmental stimuli, such as light or sound,

in the same way that nerve cells do. The influences, on the other hand, to which germ cells are exposed are largely nutritional in character.

During the earlier stages of growth the germ cells are in direct contact with the blood and lymph-streams, and the hormonal and other substances which these fluids contain. They are not influenced by direct contact with neighbouring cells in the same way that their descendant cells are influenced during embryonic development.

Recent work by Carrel, Strangeways, Drew, and other observers has revealed the importance of the processes of dedifferentiation and redifferentiation in the growth and activities of body cells, when cultured *in vitro*. Dedifferentiation, accompanied by an intimate mingling of nuclear and cytoplasmic materials, also occurs in the germ cell before the mitotic division, in which the chromosomes are halved in each cell, and also before the extrusion of the polar bodies in the case of the female cell.

These, and perhaps other critical stages in the life of the germ cells, while they provide opportunities for qualitative cell division and for the distribution of diverse potentialities to different cells, do not afford facilities for the occurrence of variation among the intra-cellular parts of which the individual cell is composed. They do not, in fact, promote the making of Use Acquirements, for, as we have already seen, cell multiplication, cell destruction, and cell selection are not essential parts of this latter process, although these do accompany the inter-cellular and inter-organismal selectional process by which racial evolution is carried out. In this latter case, the different germ cells hand on to their cell descendants a potentiality of acquiring or developing (during embryonic development) different modes of activity

which may be transmitted to the next generation of germ cells, while, in the former case, the body cell itself acquires a different mode of functional activity which is not handed on to cell descendants, at any rate in the case of the nerve cell. The process, in fact, is one of variation and selection in both cases, but the units which vary and are selected differ. These represent individual cells in the one case and intra-cellular cell parts in the other.

There is indeed no direct evidence that any such responses, in the shape of Use Acquirements, are made by germ cells at any stages of their life-history.¹ Moreover, the germ cell being, as it is, an undifferentiated cell, and though possessing toti-potential characters, it contains, as far as we know, no neural organisation capable of responding to light or sound waves, such as the nerve cell possesses, whereas capacity to make Use Acquirements depends on a high degree of differentiation and specialisation.

The function of the germ cell is to transmit to cell descendants potentialities of response rather than ready-made responses.

It does this by a process of differentiation which goes on step by step during the formation of successive generations of cell descendants. In fact, the capacity of the germ cell to transmit potentiality seems to vary inversely with its capacity to transmit actuality. If the germ cell is to be able to hand on to cell descendants the power to make Use Acquirements, it cannot at the same time make Use Acquirements itself while in its undifferentiated condition.

Adaptability in the making of Use Acquirements (as

¹ It is true that the spermatozoon acquires mobility and the pollen tube traverses the tissue of the stigma, but the nuclei which convey the germinal material take no active part in the process.

in the case of the neuro-psychic response) means capacity to vary on the intra-cellular level. Marked neuro-psychic adaptability, as exemplified in man, is associated with a marked capacity on the part of the human nerve cells to make Use Acquirements.

The fact that when an egg cell after fertilisation by a single male cell divides into two, as occasionally occurs in the case of uni-ovular twins—the twins so formed are identical, in the sense that they possess similar innate characters and like potentialities of response—is in itself a proof that little or no variation has occurred prior to cell division among the intra-cellular units which compose that individual egg cell, otherwise we might expect to find such differences present in the two individuals which arise from the single ovum, but these, as we have already seen, are identical or almost identical in innate composition.

If then germ cells do not make Use Acquirements, and if, in the apparent absence of any adequate machinery for the transmission of Use Acquirements from body cells to germ cells, or for the reception and incorporation of such acquirements in the molecular structure of the undifferentiated germ cell itself, how—it will be asked—do we account for the undoubted fact that the numerous germ cells produced by any one individual do vary among themselves in regard to the germinal characters which they possess and which they transmit to their cell descendants?

At what stage in the life-history of the germ cells do these variations occur? Do they occur during the process of the formation of germ cells in the body of the individual host, or do they come about later, as the result of Mendelian segregation?

That such variations do occur is recognised by all, and

the fact that they are transmitted to offspring, and are there tested and selected according to their survival value, forms the basal fact on which the theory of evolution by natural selection rests.

Now there are two chief phases in the life-history of mammalian germ cells in which opportunities exist for the occurrence and selection of favourable variations, favourable, that is, in relation to the kind of environment to which they are called upon to become adapted.

First, there is the period which follows discharge from the sex glands preceding fertilisation, during which the male germ cell is exposed to many vicissitudes and many dangers. The mortality among the male cells is very great during this period.

Here then the conditions exist, namely, variation and destruction of less fit varieties, which we know to be the conditions associated with the inter-cellular rather than with the intra-cellular form of the adaptational response. These are the conditions which favour the survival, through environmental selection, of such germ cells as possess valuable potential qualities which may enable their cell descendants to become more fully adapted to an old, or more readily adapted to a new, environment.

There is, in fact, abundant evidence derived from observation of the transmission of lethal characters in both plant and animal gametes during this critical phase to show the intensity of the struggle for existence which goes on among germ cells at this period.

Further, there is the selective process which goes on continually on a far larger scale during the lives of the individual organisms which develop from and act as the hosts of future germ cells.

Germ cells are tested not only while developing in the sex glands, and not only during the interval which elapses between their discharge from the gonads and fertilisation, they are further tested and selected even more rigorously in the persons of their cell descendants, that is, during the lifetime of the individual organisms which spring from them.

In each of these three stages the selective and adaptive process is indirect rather than direct. The selection takes place among germ cells and not among the parts or units which compose the individual germ cell, as in the case of the nerve cell in the making of the neuro-psychic response.

The answer then to the question, "Do the germ cells make Use Acquirements in the same sense that nerve cells make them?" must be in the negative.

But a further problem arises. Even if the germ cells do not make Use Acquirements themselves, and even if, as the facts of inheritance show, the Use Acquirements which are made by the body cells, as in the neuro-psychic response, are not ordinarily transmitted to, or incorporated by, the germ cells in the actual form in which they are made by the body cells; is it possible, since the individual organism functions as a unified whole, that the environmental influences when acting on body cells, in a way which brings about the response we recognise as a Use Acquirement, may at the same time also influence the undifferentiated, but highly complex, germ cells in a way which brings about a similar response in those cells in a potential rather than in an actual form?

If this be so, then it would mean that the germ cell so influenced can transmit to cell descendants a deferred power to develop the same response at a later stage, when the appropriate stimulus arises.

But in order to bring this result about we must assume

that certain environmental stimuli initiate changes of an intra-cellular kind, and that these changes remain for a time latent, but stored up in a form in which they can be released and assume actuality under appropriate conditions in cell descendants.

CELL MEMORY

But this raises the question of the ancestral memory theory which we owe to Hering, Samuel Butler, Francis Darwin, and others. The ancestral-memory theory suggests that the adaptive response, or the response made by body cells to various environmental stimuli, brings about changes in mode of cell activity of a more or less permanent character.

So-called "engrams" are formed in the cell which are handed on to daughter cells, and eventually reach the germ cells, otherwise they would not be hereditarily transmitted.

But this conception does not remove our difficulty. It does not explain how the engrams formed within the body cells are transmitted to or incorporated by the germ cells, so as to be handed on to offspring. If, on the other hand, we assume that the germ cell, as the result of environmental influence, forms its own engrams, then we come up against the difficulties we have already encountered when considering the problem of the capacity of germ cells to make Use Acquirements; whereas, if taking up an intermediate position we assume that environmental stimuli act on both body cells and germ cells alike, with actuality as the result in the one case and potentiality in the other, then we must explain how it is that the same stimulus can produce an immediate result in one case by the aid of intra-cellular variation and selection, and a deferred result in the other

by the method of variation and selection among inter-cellular units.

But there is still another difficulty. In the case of the response made by the nerve cell (the most perfect form of Use Acquisition known to us) the nerve cell does not transmit any acquisition or engram to its cell descendants. Nerve cells leave no cell descendants. On the other hand, the germ cell leaves innumerable cell descendants but, as far as we can see, germ cells make no Use Acquisitions and register no engrams. And yet, although they make no Use Acquisitions themselves, they do transmit a capacity to make such acquisitions to cell descendants.

This conception of the evolutionary process as the outcome of the operation of ancestral memory rests on the capacity of living matter to put forth effort and to effect change in its own molecular constitution in response to environmental influence. It presupposes that the making of the effort produces, or is associated with, the formation of structural change, and that these structural changes or engrams are handed on to cell descendants, and that these cell descendants in their turn, recalling as it were previous efforts made by their ancestors, make the same or slightly different efforts in a similar direction.

Thus the answer given by this school of thought to the age-old question would be that Function precedes Structure.

But if it be true that the evolutionary process is an indirect process, indirect, that is, in the sense that the reaction between the cell, or the cell part and the environment, depends on the choice of one among a number of alternative modes of response, then it is, I think, clear that "doing" does not precede "being." Both function

and structure originate together. They represent in fact the two sides of one underlying reality.

But we still have to account for the fact that the process of variation and selection (by means of which, as we believe, racial characters of an adaptive kind have been evolved) takes place mainly in and through the germ-cell line of descent, in so far, that is, as racial evolution is concerned. The struggle is in fact among genotypes and not through phenotypes, except in so far as these act as the hosts of genotypes.

This brings us back to the fundamental question, What are the factors, intrinsic or extrinsic or both, which originate the variations which distinguish one germ cell from another ?

We can form some conception of the agent which *selects* the more fit variety—it is the environment ; but we are profoundly ignorant of the nature of the agent or agents which *initiate* these variations.

How, in fact, does it come about that the evolutionary line followed by racial evolution runs parallel with, though not identical with, that followed by the evolution of the individual organism ?

Why should this be so if the experience of the outer world possessed by the phenotype is not also available to the genotype ? None of the theories yet advanced to account for the coincidence seem to me to adequately explain it.

I have said that these two evolutionary lines of development run along parallel but not identical lines.

It may be that when we know more about the differences which distinguish these two lines of development we shall understand better the interdependence of germ-cell and body-cell evolutionary experience.

Does the secret lie hidden, not in the unfolding process by

which the individual organism develops from the germ cell, but in the infolding process during which the experiences and the acquirements made by previous generations of body cells are gathered up in a potential form and stored in the germ cells of the next generation?

But in opposition to this view it is not without interest to observe that this centripetal process still occurs for the most part at an early stage of individual development as we ascend the scale of organic life. In many organisms those cells which are to function in the future as germ cells, are set apart at a very early stage of embryonic development. They take no part in the differentiating process which occurs among the body cells, thus realising to some extent Weismann's idea of the continuity of the germ plasm. In the more complex forms, including man, the elaboration of germ cells out of the primitive sex cells occurs at a somewhat later, but still comparatively early stage, of embryonic development.

This is a suggestive fact, because if the germ cells are to profit by the experience and the acquirements made by the body cells, then we might reasonably expect that the appearance and development of the primitive germ cells would take place after, and not before such acquirements have been made.

The fact that it is not so tends to support the conclusion either that the germ cells and the body cells respond equally to environmental influences although by different methods along parallel but not strictly identical lines, or that the main current of evolution runs through the germ-plasm line, rather than through the somato-plasm line of descent.

The condition of things, in fact, recalls the case of the queen and worker bees in the hive community. Here the

experience is gained by the workers, but the capacity to make the Use Acquirements under the stimulus of experience is transmitted to cell descendants, not by the workers but by the queen, while there is at the same time no evidence pointing to the existence of any machinery or method by which the experience gained by the worker can be transmitted to the queen bee.

THE ORIGIN OF VARIATIONS

We must now consider in more detail this fundamental question of the origin of variations.

We know that Darwin, in the absence of more exact knowledge, regarded the germinal variations with which natural selection works as arising "spontaneously" in the germ cells, though he by no means excluded the possibility that Use Acquirements made by body cells might be handed on to, and incorporated in, the structure of the germ cells and their cell descendants. It was indeed in order to envisage some possible method of transmission that Darwin formulated his well-known hypothesis of Pangenesis. It will be useful for us to ask the same question in the case of the body cells. Do the Use Acquirements which the nerve cell makes arise "spontaneously" in the cell, and if not, how do they originate and how are they formed?

I have already suggested that Use Acquirements are the outcome of a process of variation and selection among intracellular units—that is to say, different modes of molecular aggregation, differences in metabolic activity occur among the organised units of which the nerve cell is built up, and the appropriate mode (appropriate, that is, in relation to the well-being of the neuron as a whole) is selected and survives. It is in this way, by a process of trial and error,

rather than by the *direct* action of the environmental stimulus on the nerve cells, that the neuro-psychic response is built up, and that other Use Acquirements are made. In like manner those differences which possess survival value among different germ cells, those cells which possess a greater capacity to transmit such characters in a potential form to cell descendants, those survive.

In both cases the process is one of variation and selection, acting on *intra*-cellular units in the case of the body cell, and on *inter*-cellular units in the case of the germ cell. That is to say, the variational and selectional process occurs among units of a different order of size and complexity.

If we are right in regarding the evolutionary process, as it takes place among germ cells, as dependent on the selection of more favourable inter-cellular units, then we must go on to enquire whether any evidence exists which points to a greater variability among male than among female germ cells. Spermatozoa are not only produced in much larger numbers than egg cells; they are also subject to a far higher mortality, and they are exposed in the course of their hazardous journey in search of the ova to many risks and vicissitudes. Now these constitute the very conditions which, as we have already seen, favour inter-cellular selection and so promote evolutionary adaptive response on a large scale.

If it can be shown by direct observation that the innate qualities contributed by male and female gametes respectively to the hereditary constitution of the resulting zygotes show a greater variability from parental standard in favour of the paternal or male gamete, then this would go far to establish the fact that male gametes vary more than female in genetic qualities.

Further, if it can be shown that mutations arise more frequently among those characters which are contributed by the male gamete, rather than by the female, to any given zygote, then this fact if established would point in the same direction.

At present such observations are very few, but this may be due to the fact that they have not yet been looked for on any adequate scale.

In the case of the human species, marked deviations from the normal standard, both in the plus and minus direction, seem to occur more frequently in the male than in the female individual zygote.¹ But while this does not necessarily mean that these deviations from normality are absent from the constitution of the female (they may be, and in certain cases are, no doubt present in the latent or recessive form), yet it does mean that actuality is characteristic of the male and potentiality of the female, and this fact is suggestive and important when considered in relation to this question of greater variability in the male than in the female germ cell.

We may take hæmophilia as a typical illustration. This deviation from normality remains latent in the female to become patent in the male zygote. Further, a study of the palæontological record shows that it is mainly among the male individuals of any species that we find those abnormal overgrowths of organs and structures, and the apparently non-adaptive sexual and other adornments, which in some

¹ On the other hand, Miss R. M. Fleming's observations give a higher percentage of heterochromia iridis (odd eyes) among British than among half-caste children, and show that girls vary more in type of growth than boys. She also quotes Rodenwaldt as saying that among the Mestryos of Kisar the women are more variable in type than the men (*Eugenics Review*, January 1930).

cases have tended to arrest further development, or even to favour extinction.

It may be said that the doctrine here put forward takes no account of the purposive striving which is now regarded as characteristic of all living organisms. But the cell or the organism is neither compelled to develop along a certain line by environmental influence alone, nor does it proceed along one definite course to the exclusion of other lines through its own inherent capacity for development. The evidence in favour of orthogenesis is by no means conclusive. The cell makes efforts along many lines, and develops not only in one but in various directions.

Adaptive evolution is thus the result of a partnership—a co-operation between environmental influence on the one hand and so-called "spontaneous" efforts by the organism on the other, and it is because of this duality that a choice of alternative modes of action in the neuro-psychical response appears to us to make that response unconditioned. This, however, is not the place to embark on a discussion of free will or determinism.

It will no doubt also be thought by some readers that no complete explanation has here been offered concerning what is after all the most fundamental point, namely, the origin of these variations in body cells and germ cells, on which so much depends. This is no doubt true, but in our present state of ignorance concerning the factors which underlie organic life all we can do is to acknowledge, with Darwin, our difficulty, and call such variations "spontaneous." This means that they arise within the cell mainly in association with nutritional changes, and are not thus the *direct* outcome of environmental influence.

It is also well to remember that spontaneity has always

been regarded, along with irritability and certain other qualities, as a special characteristic of living units.

Some recent researches in the field of physics—for instance, in the analysis of inorganic material, and of some organic material, by X-Rays—seem to suggest, as pointed out by Sir William Bragg, in his Huxley lecture, that orderly orientation of molecular aggregates in a linear series is very characteristic of Nature's method of dealing with organic material.

This at any rate is certain, that living matter in its efforts and strivings makes many mistakes. It makes efforts not in one only, but in many directions. We see some of these in the grotesque and fantastic failures present in many plants and animals. Misfits arise not only under the regime of natural selection, but also under that of artificial selection under human control.

The long path of the palæontological record is strewn with the fantastic shapes of animals and plants, examples of overgrowth and undergrowth, which have died out owing to lack of adaptation to some change in the environment, or they have given place to some new fancy which has originated in the stock-breeder's mind.

Body cells and germ cells strive and vary in many directions, variations arise of which "many are called but few chosen," and the selection is made by the individual organism in co-operation with environmental influence. I say the environment *and* the individual, because both take part and both are necessary. In fact, they act in a sense as one, because while the environment influences individual development, the individual, in the case of the more highly evolved organisms and notably in the case of socialised man, alters the environment to his own ends. In fact,

civilised man is now being called upon to exercise direct control over this "capacity to vary," and in so doing he is helping to raise or lower the quality of the human life produced.

Thus we see that this conception of individual and racial evolution, as dependent on a process of variation and selection among *intra-* and *inter-cellular* units, is not the fortuitous affair that some might think. It is an ordered and orderly procession of events under the control of universal law.

RECAPITULATION

From the evidence now reviewed we conclude that germ cells do *not* make Use Acquirements in the sense that nerve cells do, when responding to certain environmental stimuli.

The response made by germ cells is mainly to stimuli of the nutritional kind, and to those which initiate cell division. The blood and lymph with their highly complex contents form the environment of the germ cell prior to fertilisation, when the life of the undifferentiated germ cell becomes merged in the lives of its cell descendants, the body cells of the individual which itself becomes the host of the next generation of germ cells.

The process by which germ cells of varying quality are selected and by which racial evolution is carried on is of the *inter-cellular* not of the *intra-cellular* kind.

It takes place during the unequal cell divisions which accompany the formation and extrusion of polar bodies in the ovum, and tetrad formation in the spermatozoa—in the qualitative cell divisions which underlie Mendelian segregation, and later during the lives of the individual organisms which represent not only the cell descendants of

one generation but the hosts of the next generation of germ cells.

The conditions, namely, cell multiplication and cell destruction of unfit varieties on a large scale, are those which are associated with the indirect or *inter-cellular* form of selection. They are not the conditions which attend the response made by the highly differentiated nerve cell to the environmental stimuli of light, sound, or touch. In this latter direct, or *intra-cellular* selectional process, neither cell multiplication nor cell destruction occurs under normal conditions.

Such then are the differences between germ cells and body cells in the method of selection and survival. We have considered the factors which initiate variation among *inter-cellular* and *intra-cellular* units respectively.

We have already seen that the germ cell, as long as it remains a single cell, retains, unlike the nerve cell, its undifferentiated condition, though at the same time it possesses great potential capacity of cell division, and cell development in its cell descendants.

The nerve cell, on the other hand, is a highly differentiated cell with no capacity of cell division.

The germ cell at certain stages of its career undergoes very complete dedifferentiation accompanied by an intimate mingling of nuclear and cytoplasmic material, a process which the adult nerve cell, a typical body cell, does not undergo.

The germ cell responds apparently only to nutritional stimuli, and to stimuli which initiate cell division, while the nerve cell responds not only to nutritional but also to other environmental stimuli like light, sound, and contact, while it does not react to the stimuli which have to do with cell division.

Weismann long ago regarded differences in response to nutritional stimuli, that is, differences in mode of cell metabolism, as the cause of germinal variation, and as representing the early beginnings of those differences on which natural selection works in bringing about racial evolution—those variations which Darwin, in the absence of fuller knowledge, called "spontaneous" in origin.

No doubt in the ultimate resort the same is true of the nerve cell as of the germ cell. We must look, in the nerve cell, to slight variation in mode of response to nutritional stimuli on either side the mean, to supply those differences in mode of metabolic activity from among which that particular mode is selected which is most in harmony with the environmental influences to which the nerve cell is peculiarly sensitive. For at this early stage in cell life, nutrition and functional activity are one, and both arise out of the inherent activities and common properties of living matter. The nerve cell, however, has surpassed the germ cell in differentiation and specialisation, and has developed on the top of the nutritional response a further response to outer environmental stimuli.

Thus, while in both cases, in the germ cell and in the nerve cell, we have reached a point in the history of variation beyond which we cannot, in our present state of knowledge, go, we have yet noted certain important differences in the two cases.

In the nerve cell a further mode of response to environmental stimuli arises out of, or on the top of the nutritional response. Selection of intra-cellular modes of activity occurs, and Use Acquirements are made. In the germ cell response to environmental influences other than nutritional seems to be very limited. A capacity for cell

multiplication and for transmitting various potentialities of development, on the other hand, is handed on to cell descendants, and selection takes place on the *inter*-cellular scale.

Finally, we ask to what extent, if any, this conception of the method of the evolutionary process as fundamentally alike in the case of the germ cell and the body cell and as then pursuing a different course, with *inter*-cellular selection in the case of the germ cell and *intra*-cellular selection in the case of the nerve cell, helps us to understand how it is that, in the course of racial evolution, the response made by germ cell and body cell, by genotype and phenotype, has followed similar and parallel, although not identical, lines, that is, when we bear in mind the apparent lack of any means of communication between germ cells and body cells in the life of the individual organism.

I think it does help by showing us where to look for the early beginnings of both transmitted similarities and transmitted differences in the common inherent activity which resides in living matter. It may be that this coincidence of development along parallel lines depends not on any transference of experience or acquirement from nerve cell to germ cell, but on a common mode of response to the common stimuli of nutrition.

It is, at any rate, true that in biological as in other spheres of cosmic evolution, the tendency is from the less to the more differentiated, from potentiality to actuality of development.

CHAPTER X

THE IMMUNITY PROBLEM AND THE ATTITUDE OF CIVILISED COMMUNITIES TO DISEASE ¹

AN analysis of the conceptions formed by different individuals of the process by which immunity against disease is brought about in the individual and in the race, would, I venture to think, reveal a certain amount of uncertainty, even in the minds of members of a learned society, as to the exact relationship between the individual or acquired form on the one hand, and the racial or natural form of immunity on the other.

And yet, until we have realised the steps by which acquired immunity or direct adaptation to disease has been developed in the individual, we have left a large gap in our knowledge of the history of human progress unbridged.

By this I do not mean that we should discuss the biochemistry of the immunity reaction. For our present purpose it does not matter whether the struggle between the body cells and the disease organisms takes place at close quarters and depends on a contact reaction between phagocytes and bacilli, or whether it occurs at longer range, between the fixative and digestive secretions of the defensive cells and the toxins of the disease organisms after these have been shed into the blood stream.

We are not concerned with amboceptors or with hapto-

¹ An Address to the Oxford Medical Society, 1912.

phore and toxophore groups, or with endotoxins and exotoxins, except indirectly. We are concerned rather with the manner in which certain capacities of "defence" on the part of the body cells are exercised in response to certain capabilities of "attack" on the part of the disease organisms, and more especially with differences in the making and in the bringing into action of this offensive and defensive machinery.

As a matter of fact, many of us have a more consistent, if not a more fully detailed, conception of the indirect or racial than of the direct or individual form of the immunity response.

We know that races become naturally immune to lethal diseases—such as tuberculosis or yellow fever, in which recovery is difficult—by a process of selection of the more naturally resistant individuals, and, although we do not know the origin of these individual differences in natural susceptibility and still call them "spontaneous" variations, we do know that their origin is a matter of breeding, and a question of the transmission of hereditary characters, and that it is only influenced indirectly by environmental factors.

We know also in the same way, that the capacity to recover from non-lethal diseases—such as measles or scarlet fever—is a question of natural endowment, a question of racial evolution, a sort of half-way step between natural insusceptibility to attack on the one hand, and the purely individual non-inherited form of acquired immunity on the other.

My purpose this evening is to try to analyse our conception of that form of individual adaptation known as Acquired Immunity, to see how it stands when compared

with Natural Immunity from the evolutionary point of view, and with other use acquirements made by the individual to changed conditions of life.

In the first place, we start by recognising certain features about immunity. We appreciate the fact that the body cells of the individual acquire these new characters by the exercise of an innate capacity of recovery from disease, and the real question awaiting solution is, How does the exercise of a capacity of recovery bring about in the cells which exercise it, a state of insusceptibility to subsequent attack by the same disease organism ?

At first sight it looks as if the exercise of an innate capacity of one kind—namely, a capacity to recover—has resulted in the establishment of another kind of capacity, a capacity to resist invasion. Whereas, if we regard the state of artificial immunity which results from recovery from disease, not as a new capacity but as a Use Acquirement on the part of the defensive or body cells, then it is necessary to account for its persistence or transmission in heredity to the cell descendants of these cells, for, as we know, modern biological conceptions doubt the possibility of the hereditary transmission of acquired characters.

Hence it is very important to know the fundamental nature of this newly acquired character, this capacity to resist invasion. We want to know whether it does represent a Use Acquirement, and, if so, what is the essential nature of a Use Acquirement. We want to know whether the method by which the defensive cells acquire this artificial immunity against subsequent attacks of the same disease is the same method as that by which the nerve cell learns or acquires a new form of neuro-psyhic response.

In both cases alike (from the individual point of view)

a new adjustment has been made as the result of the exercise of an innate capacity, which in the case of the defensive cells is that of recovery from disease.

I

Now the first proposition that I wish to put forward, and that I hope to substantiate, is: that "becoming different," the assumption of new characters on the part of any individual cell or group of cells is in every case the outcome of variation and selection among units of a certain order, size, and complexity.

Just as the evolution of new characters by any race or species is the outcome of a process of variation and selection among the germ cells from which the individuals of those species spring, or just as the acquirement of new characters by any cell group or organ during the lifetime of the individual in the outcome of a process of variation and selection *among* the cells of which the organ is composed, so also the acquirement of a new character on the part of the individual cell is the result of a process of variation and selection among the intra-cellular molecular groups of which the individual cell is composed.

Thus while the capacity on the part of any individual organism or individual cell to make Use Acquirements depends on the exercise of a capacity to vary, either among cells or among cell parts, the nature of the Use Acquirement made is decided by the nature of the environmental stimulus towards which this capacity to vary is exercised.

The factors which bring about adaptation in the individual are, environmental change in interaction with capacity to vary, either on the part of somatic cells or on the part of the intra-cellular elements which compose the individual

somatic cells. Just as in racial adaptation it is the germ cells which vary.

II

And the second proposition that I wish to put forward is: "That in every case of the assumption of a new character by any individual cell or cell group, the ultimate test of the nature of the new character assumed—that is to say, the criterion as to whether it has come about by Use Acquirement or as an innate variation—must be the order of units amongst which the change has occurred and the presence (or absence) of destruction and regeneration among them during the process."

It is only by applying this test, it is only when we know the order of the units making the change, and know also whether during the process of making it they do or do not undergo death and replacement by fitter units, that we can say whether the new character is a Use Acquirement or an innate variation, whether, in fact, it is due to "inter-cellular or "intra-cellular variation and selection.

For we must remember that an adaptation which is a Use Acquirement on the part of the individual may be an innate variation on the part of the cells in which it arises.

This, of course, involves a reconsideration of what we mean by a Use Acquirement. It means that we must judge of a Use Acquirement not from the point of view of the individual organism in which it appears, but from the standpoint of the individual cells which make it. We must judge of it, in fact, not by its manifestations, but by its mode of origin.

Judged then by this test, i.e. by the size and quality of the units which make the adaptation, and by the way in which

it is made (that is to say, whether the making of it has been associated with destruction and regeneration of individual cells or by a reconstruction and rearrangement of intra-cellular parts), the ways of making Use Acquirements in the individual human being are few. In fact, the defensive cells and nerve cells seem almost alone in this capacity.

We may illustrate this conception of direct adaptation as a process of intra-cellular as opposed to inter-cellular variation by two or three of the so-called Use Acquirements made by the individual.

The occurrence of muscular hypertrophy in response to increased muscular effort has been regarded as an excellent example of an acquired character, and when regarded solely from the point of view of the individual it is so. It arises in response to extra calls for muscular effort, that is increased stimulation, during the lifetime of the individual. It disappears when the stimulus ceases to operate and it is not transmitted to offspring.

But the method by which it is brought about is not the same as that by which acquired immunity is brought about. In the enlarging muscle the increased volume is due to multiplication of muscle cells and not to the occurrence of new characters in the muscle cells themselves. The increased nerve stimulation and the increased blood supply are responded to, not by variation in muscle cells, but increased cell division of muscle cells. Thus, although the individual acquires a new character, a larger biceps, the individual muscle cells do not acquire any new characters, the increased size of the muscle being due to increased numbers of muscle fibres.

Here, then, during the process of making the acquirement, although there is no injury or death, but only a

proliferation of muscle cells, there is no intra-cellular variation in the muscle cells themselves. The hypertrophy is the result of a quantitative and not a qualitative cell division. It is the result of the exercise by the muscle cells of a highly developed innate capacity to undergo cell division, when stimulated in a certain way.

The *characters acquired by epithelial tissues when transferred* from a mucous to a skin surface, or vice versa, when transplanted, in fact, from an aquatic or moist to an aerial or dry environment, may be taken as another example. A portion of epithelial tissue, or a skin graft, transplanted to a moist mucous surface loses its horny stratified character, or squamous cell arrangement, and becomes a layer of mucus-secreting columnar cells.

I say epithelial tissue because we have no reason to think that the fully grown, functionally active epithelial cells themselves undergo this change. What happens is that the younger epithelial cells which spring from the undifferentiated "mother" cells grow up into this new condition in harmony with the changed environment, while the older, fully developed cells perish and are thrown off. Young undifferentiated epithelial cells inherit a capacity of developing in one of two directions, according as the environmental conditions favour one or the other line of growth.

Thus in this case also, a supposed example of the origin and transmission to cell descendants of a new character or acquirement turns out on examination to be an example of hereditary development along one of two alternative lines.¹

¹ Mr. C. Walker (see *Nature*, April 12, 1930) applies the same explanation to the case of the so-called acquired characters in *Alytes* which reappear in offspring, and also to Nægeli's Alpine plants.

In the making of this acquirement a destruction has taken place of those cells which are unable to adapt themselves, and a proliferation and multiplication of those cells which are capable of surviving and of functioning under the new conditions. Again, there has been *inter-* not *intra-*cellular selection.

NEURAL ADAPTATION

Now let us contrast these supposed examples of Use Acquirement with the case of the nerve cell responding to quantitative and qualitative alterations in the stimuli of light or sound or to new nerve stimuli, still confining ourselves, of course, to the life-history of the individual. Here we have the most perfect example known of a typical Use Acquirement, the result of adaptation on the part of individual cells to altered environmental conditions.

From our present point of view there are two main features about this process of neural adaptation of special interest.

First, it occurs in perfection in a cell (like the nerve cell) which of all animal cells possesses the greatest capacity for rearrangement of its internal molecular composition.

The researches of Marinesco, Gustav Mann, Hodge, and others into the changes in the Nissl bodies, and nuclei, and other component parts of nerve cells, as the result of fatigue, all bear witness to a capacity for rapid change in the neural intra-cellular substance.

That which is true of fatigue in lesser degree is true also of response to altered stimulus, to Use Acquirement in greater degree. For if we ask ourselves the question,

What is the difference between a renewed response to an old stimulus and a new response to a new stimulus? we are bound to conclude that the difference is a matter of degree. It is a question of the amplitude of the swing of the metabolic pendulum.

Moreover, that which is true of the nerve cell is true of the nervous system as a whole. When a higher level neuron group, or when the brain as a whole learns a new language, it makes a Use Acquirement. Not only so, when it forgets an old language it also makes a negative adjustment, and much of our mental equipment is made up by substitution, by a process of forgetting an old and learning a new mode of response.

Neuro-psychic adaptation rests on the possibility of alternative nerve channels, on the selection and establishment of one out of a number of possible nerve routes or synaptic paths for the passage of the neural wave. Our notion of voluntary action as the outcome of deliberation and choice is in harmony with this view.

Further, all this takes place in a tissue the component cells of which, in the adult human subject, are incapable of cell division, and as a consequence are incapable of handing on the acquirements they have made to any cell descendants.

In the case of the nerve cell a very high capacity for intra-cellular change has been evolved at the expense of capacity for cell multiplication and regeneration. Just the reverse of what has happened in the case of the muscle cell. And along with absence of cell division and cell regeneration goes the equally important absence of cell destruction during neuro-psychic adaptive response.

The process of making Use Acquirements on the part of

the neurons to changes in environmental stimuli—as long, at all events, as those changes fall within the limits of nerve-cell capacity—is unaccompanied by any injury to, or death of, the neurons. This is a very important fact, and is in striking contrast to the wholesale destruction and regeneration of cells which takes place in other tissues when exposed to new conditions.

When we also recall the fact that, although there is no destruction and regeneration of individual nerve cells during the process of neural adaptation, yet destruction and reconstruction does occur on a large scale among the intra-cellular elements of which the nerve cells are composed, we are led to the conclusion that these marked differences in the behaviour of cells during adaptive response must be associated with a difference in the method whereby the adaptive response is made, that is, with a difference in the size and kind of units which vary, and which undergo selection when exposed to the new conditions.

Judged, then, by the standard laid down, the neuro-psychic response fulfils all the conditions of a true "Use Acquirement" both when regarded from the point of view of the individual organism, and of the individual nerve cells. Variation and selection take place among units of an intra-cellular and not an inter-cellular order. The adaptive response is not accompanied by any destruction or regeneration among the nerve cells. It is brought about by the stimulus of environmental change in interaction with the exercise of a capacity for intra-cellular variation on the part of individual nerve cells, and it is not hereditarily transmitted to cell descendants, though the capacity to vary intra-cellularly is an hereditary character.

COMPARISON BETWEEN THE IMMUNITY REACTION AND THE
NEURO-MUSCULAR RESPONSE

We are now in a position to compare the immunity reaction with the nervous and muscular responses from the same point of view.

There is no more striking Use Acquirement from the individual point of view than that by which, after recovery from disease, the individual acquires immunity against subsequent invasion by the same disease organism.

From the individual point of view such an adaptive response fulfils all the tests of a Use Acquirement. It is brought about in response to environmental change, and it is not transmitted to offspring.

But it is necessary to examine the reaction, not only from the point of view of the individual, but also from the point of view of the body cells which make the adaptation, and more especially from the point of view of that somewhat ill-defined group of wandering and fixed cells, which have intimate connections with the blood and lymph streams, and which we call the defensive group of cells.

The immunity reaction, as a whole, falls into two great divisions: the natural immunity, which comes about through the selection of more resistant individuals during racial experience of disease, and the acquired immunity, which results from the exercise of an innate capacity of recovery after individual experience of disease. So also the response of the central nervous system is made up of two primary divisions—the racially acquired innate method of reflex, and instinctive action, and the individually acquired ideo-volitional mode of response.

It is chiefly with the second or acquired aspect of the immunity reaction that we are now concerned. And although it will be necessary to compare the acquired with the natural form, both in its mode of origin and mode of action, it is chiefly with differences between them in completeness, in persistence, and specific relationships, in so far as these illustrate the different phases of a Use Acquirement that we are now interested.

Acquired immunity, again, like immunity as a whole, also assumes two more or less distinct aspects.

On the one side we have the short-range cellular reaction between phagocytes and disease organisms, and on the other hand the long-range blood reaction between the fixative and digestive secretions of the defensive cells, and the toxins of the disease organisms after these have been shed into the blood stream.

The first takes place for the most part locally against organisms like the tubercle and the leprosy bacilli, which rely for their offensive powers on the elaboration of intracellular toxins. In the second, the disease organisms manufacture exotoxins, which circulate in the blood stream and to which the defensive cells respond by the formation of antibodies.

These two aspects represent the *antimicrobial* and the *antitoxic* divisions of the acquired immunity reaction.

Now it is of interest from our present point of view that the persistence of acquired immunity bears some sort of relationship to these differences in mode of action of the defensive cells.

For instance, the immunity which follows a localised reaction like vaccinia, or a localised streptococcal or staphylococcal infection, or a disease like tuberculosis or osteo-

myelitis, characterised by inflammation and perhaps sup-puration, is less persistent than the immunity which follows a generalised reaction to a disease like smallpox or measles. In the one, phagocytosis or local destruction of defensive cells, as well as disease organisms occurs to a considerable extent. In the other the reaction is more general, and destruction of body cells may be absent.

Or if we regard the two phases from the exotoxic and endotoxic point of view we find the same relationship. Thus, if we examine the reaction made to an organism like the tubercle bacillus which secretes little or no exotoxin, and against which it is difficult for the body cells to manufacture an efficient antibody, and in which resistance must take the form of a local tissue reaction, and recovery takes place by the destruction of the bacilli at close quarters, then we find that in tuberculosis, acquired immunity is often a question even of local distribution—it is incomplete and of short duration ; in fact, recovery from tuberculosis is made up of a series of localised reactions against localised attacks by tubercle bacilli of varying degrees of virulence. These reactions are followed by phases of incomplete and transitory immunity, and these again by recrudescences of the local disease.

On the other hand, in a disease like smallpox or measles, the disease organisms secrete an exotoxin, and the defensive cells liberate fixing and neutralising antibodies, and the struggle is fought out in the blood stream and body fluids. The persistence of acquired immunity under these conditions is much greater and generally lifelong. But even in measles and scarlet fever the persistence of the immunity which follows recovery varies considerably.

I have, through the kindness of colleagues in general

practice, collected some records which suggest an hereditary or familial element in some cases of these diseases.

In such cases the persistence of the acquired immunity—that is to say, the number of generations of cell descendants to which the new character of insusceptibility to reinvasion is handed on—bears some relation to the completeness with which these defensive cells have reacted and exercised their capacity of recovery, since mild attacks in childhood are generally followed by severe attacks in later life.

Moreover, this fact, that early loss of acquired immunity runs in families, suggests that the early loss is associated with an hereditary difference in the capacity of recovery by the exercise of which the acquired immunity is brought about.

For it is, as we know, only in the individuals of those races which have evolved some capacity of recovery by racial experience, and only in those diseases of which the race has had previous adequate experience, that acquired immunity is present as a mode of adjustment to disease.

It will be a matter of considerable interest to ascertain whether, and if so, to what extent, this hereditary transmission of innate capacity of recovery follows Mendelian lines. For if it does, then we may expect to find Mendelian features in the persistence of the acquired immunity which results from its exercise.

Thus then we may state in general terms that the persistence of acquired immunity depends to a great extent on (1) the number and kind of body cells which have exercised the capacity of successful response; (2) the completeness with which the response has been made; and (3) on the extent to which the characters so acquired have been

transmitted to the cell descendants of the cells which acquired them, just as the completeness and persistence of natural immunity both depend on the amount of experience which the race has had of the disease, and the stringency of selection it has undergone in regard to it.

Further, when, in acquired immunity the capacity of recovery has been exercised under normal conditions of response—that is to say, when the reaction has been made to an organism of a full degree of virulence normal to its species, and where the reaction has not been cut short by the premature destruction, through treatment, of the disease organism or its toxins in the body of the host—then the protection afforded by recovery is usually lifelong and as durable as that afforded by natural immunity.

Further, acquired immunity, like natural immunity, is a specific reaction, but in both forms the protection afforded by recovery from invasion by a certain disease organism extends to the attacks of different varieties or strains of the same organism within certain limitations. Thus the acquired immunity which follows vaccination protects against smallpox, and natural susceptibility to smallpox also applies to vaccinia.

There is yet another point of interest about the relationship of acquired to natural immunity.

If a large number of non-immunised individuals possessing innate capacity of recovery are exposed at the same time to the infection of a certain disease, only a certain number will contract the disease on that occasion, while of those who escape some will contract the disease on a future occasion. Whereas if a large number of naturally susceptible individuals—that is to say, individuals belonging to a race that has had no experience of the disease, and who con-

sequently do not possess any innate capacity of recovery—are exposed to the same disease at the same time, they will all contract it at once.

This fact, that susceptibility to invasion varies more in individuals who possess an innate capacity of recovery than in individuals who do not possess this capacity, suggests that this capacity of resistance itself varies in potency and efficiency at different periods of the individual life-history: at one time it enables its possessor to resist invasion, while at another it only enables him to recover after invasion; and whereas the older established form of natural immunity is either fully present or wholly absent, the more recently evolved form of capacity of recovery is present in a more irregular and capricious manner—in a more active or in a less active condition.

Insusceptibility a Use Acquirement

We have now critically examined acquired immunity from the point of view of the cells which acquire it, and we have compared it with natural immunity, both in its mode of manifestation and mode of origin, and we find clear evidence of the operation of variation and selection in the production of acquired immunity, just as we find clear evidence of the operation of the same factors in the production of natural immunity. We also know that from the point of view of the individual, the immunity which succeeds individual experience of disease is a pure Use Acquirement.

How can we reconcile these two conceptions of acquired immunity? How can we reconcile its function in the individual as a Use Acquirement with its origin in a process of variation and selection? Only, I think, by remodelling

our conception of a "Use Acquirement." It is only by regarding a portion, at any rate, of the acquired immunity reaction as the result of a process of variation and selection on the intra-cellular scale, that we can harmonise these contrary views.

If we suppose that in the making of the Use Acquirement of insusceptibility to subsequent invasion, the body cells exercise a capacity of varying intra-cellularly (that is in the construction and arrangement of the groups which compose their protoplasm) when stimulated by changes in the nutrient fluid which surrounds them, if we suppose further that that particular molecular composition and arrangement, which survives and persists in each cell, is the one which is best suited to the altered nutrient conditions brought about by the toxin of the disease, and that therefore the particular kind of intra-cellular response selected will depend on the kind of disease organism to which it is made, then we are able to understand why this new and acquired form of cell metabolism is transmitted to cell descendants. It is so transmitted because it really arises as an innate variation among the intra-cellular units in the individual cells which acquire it.

So regarded, innate capacity of recovery or resistance to disease on the part of the body cells becomes innate capacity to vary intra-cellularly when exposed to the new conditions introduced by disease organisms. And this capacity to vary, although possessed in different degree by all the individuals of a race that has had sufficient experience of the disease in question, remains latent in such individuals until roused to exercise by exposure to disease. Thus, by the exercise of this capacity for intra-cellular variation on the part of the cell, and by the selection of the most appro-

priate kind of molecular response, a new character arises in the cell, that of a capacity to resist reinfection, representing from the point of view of the individual organism a Use Acquirement.

Moreover, by so regarding individual reaction to disease, we are bringing the Use Acquirement of the immunity reaction into some sort of relationship with the use acquirement of neural response which we have already seen reason to think is also the outcome of a process of variation and selection among the intra-cellular elements in nerve cells.

Just as the latitude of the neural response is determined by the hereditary limits of innate neural capacity, so the latitude of the individual immunity reaction is determined by the extent of the hereditary capacity of recovery or resistance to the disease.

But the question remains, How much of this insusceptibility to subsequent invasion is due to "intra"-cellular and how much to "inter"-cellular selection? How much, in fact, is represented by Use Acquirement, and how much by innate variation?

As pointed out previously, our test for this problem must be the order of units among which variation and selection occur, and the presence or absence of destruction and regeneration among the individual cells concerned in the response.

When judged by this standard the acquired immunity reaction again falls into two divisions: An antimicrobial or phagocytic side, characterised by local tissue reaction to organisms which chiefly manufacture endotoxins and in which destruction and regeneration of wandering cells occur, and local reaction, inflammation, and suppuration may be present; and an antitoxic or humoral side, charac-

terised by general, body-fluid response, to organisms which secrete exotoxins and in which local reaction is insignificant and cell destruction mostly absent.

Judged then by this test, the antimicrobial or phagocytic side of the immunity reaction represents innate variation, and the antitoxic or humoral side of the reaction represents Use Acquirement, although, when regarded from the body-cell point of view, both arise through a process of variation and selection, in the one case among inter-cellular and in the other among intra-cellular units.

It is interesting to note that of these two divisions of the acquired-immunity response the phagocytic or antimicrobial is an older character, phylogenetically, than the more recently evolved antitoxin reaction.

It is also interesting to note that the two most prominent instances of use acquirements in the human individual—the neural adaptation to changes in nerve stimuli and the immunity reaction on the part of body cells to the toxins of disease organisms—have both arisen in two fields of human activity in which development has in historic times been most rapid and in which selection has been most stringent. Mental activities, and evolution against disease, have exercised a predominating influence on modern civilisation.

Thus a critical examination of the immunity response leads us to the conclusion that all forms of immunity—the natural and the acquired—arise in a process of variation and selection among units of different size and complexity.

In the racially acquired form of natural immunity these units are the germ cells from which the more resistant individuals spring. In the antimicrobial aspect of acquired

immunity response they are those individual body cells which react to the disease organisms. In the antitoxin aspect they are the intra-cellular elements of which these cells are composed.

Judged from the point of view of the individual organism, adaptation to disease is a Use Acquirement ; judged from the point of view of the units which undergo adaptation, it is a process of innate variation.

The Immunity Problem from the Bacterial Side

Probably much more light will be thrown on the difficult problem of the mode of origin of the immunity reaction when more is known concerning the way in which disease organisms adapt themselves to changing conditions, and gain or lose in virulence.

When we know whether exalted virulence in bacteria is brought about by innate variation or Use Acquirement, by inter-bacterial or intra-bacterial variation and selection, we shall probably also know how body cells become immune.

Following the principles laid down, we must first ascertain the order of units among which the variation and selectional process takes place during bacterial adaptation. And to do this we must ascertain the prevalence and incidence of cell destruction and cell regeneration among disease organisms when they undergo adaptation to the defensive activities of different hosts on the one hand, and to different culture media on the other.

We know already that in most cases the process of invading the resistant human, or animal organism, by disease organisms is associated with a considerable death-rate among the invading organisms. We also know that a

considerable number of generations of organisms must live and perish in the culture fluid or in the partly immunised host before a strain is born of a virulence capable of flourishing under the new conditions.

But we do not yet know whether, under any circumstances, individual disease organisms themselves acquire increased offensive capacity when exposed to altered nutrient conditions. We do not know whether the increased or diminished virulence is obtained by innate variation among the bacteria or by Use Acquirement on the part of individual organisms. A knowledge of these facts would indicate the order of units among which variation and selection are taking place.

A comparison, if such were possible, between the death-rate among disease organisms when acquiring exalted virulence, by repeated passage through different hosts of varying degrees of immunity, and the death-rate among the same organisms when acquiring exalted virulence by growth in different culture media, would go far to determine the relative share taken by inter-cellular and intra-cellular variation in these two forms of adaptation. It is a suggestive fact that in order to bring about increased offensive capacity, or exalted virulence, in any strain of disease organism it is necessary to pass the organisms through a series of hosts of different degrees of immunisation, or to grow successive generations in different culture media. In both cases the essential requirements are a large number of bacterial generations exposed to different environments. These requirements are incompatible with direct adaptation, but favour the occurrence of inter-cellular variation and selection.

Organisms which cause disease are organisms of enormous

fertility and very great variability. They are capable of a far greater and more rapid relative increase than the body cells to which they are opposed.

Further we must not lose sight of the fact that, if it is to flourish as a race, each species of pathogenic disease organism must possess the capacity, not only to multiply rapidly within the body of the host, but also to pass from the body of one host to another after the death of the first. It must be able to survive during transit through air, earth, or water, if it is to bridge the gap between intra-corporeal and extra-corporeal life. In this sense then the task required of a disease organism is greater than that required of a defensive cell.

Now this very marked fertility and variability among disease organisms is itself suggestive of adaptation by inter-cellular as opposed to intra-cellular selection during bacterial acclimatisation.

For we know that among disease organisms, as amongst animal cells, the destruction of unfit and the multiplication of fit varieties are just the two conditions which favour the selection of more virulent strains of organisms during the progress of disease, and that these conditions are incompatible with adaptation by Use Acquirement which presupposes a capacity on the part of each individual organism, or cell, to persist and adjust itself to the new conditions.

The crucial difference between indirect adaptation by innate variation and direct adaptation by Use Acquirement is this: In the first, the organisms which are exposed to the new conditions perish and are replaced by organisms of greater resistance. In the second, the organisms which are exposed to the change themselves undergo the adjust-

ments necessary to adapt them to it. The first is a *pre*-experiential, the second a *post*-experiential change.

We can hardly doubt, therefore, that when in the process of invading the human or animal organism, and while still exposed to the resistance of body cells and body fluids, disease organisms become adapted to their new environment, and develop strains of altered virulence, they do so for the most part by the old method of the natural selection of more resistant individual organisms. But there is some evidence that the other, the direct method of individual Use Acquisition, is not altogether absent among some unicellular organisms when exposed to altered conditions.

Although susceptible of either explanation, Ehrlich's experiments in the immunisation of trypanosomes against fuchsin and arsenic suggest an increased struggle for existence among the organisms during the process of chemo-immunisation, and Ehrlich himself suggested that the adaptation was brought about by a partial starvation of individual trypanosomes by a blocking of their nutri-receptors by antibodies derived from the cells of the partially immunised hosts.

But we may also recall the observations of Metchnikoff and Dallinger and others on the effect of environmental change on unicellular animal organisms. The researches of Cohn, Balbiani, Danysz, and many others have shown that infusorians and other protozoa do become adapted to nutrient media of different chemical, and even toxic composition, by a gradual process of acclimatisation, and, if this process is sufficiently gradual, adaptation is brought about without causing the death of the organism.

Dallinger showed that the same thing occurred in changes in the physical environment. He gradually acclimatised

infusoria to a water temperature of 23° C. without causing their death, and later to a temperature of 70° C.

Metchnikoff says, in regard to Davenport's and Neal's experiments on the acclimatisation of stentors to four times the lethal percentage of mercury chloride, that the immunity cannot be attributed to the selection and persistence of those stentors which possess a natural resistance to the sublimate, but that it is the result of a gradual and direct chemical influence on the protoplasm of the stentors which, once acquired, enables all the animals to survive doses lethal to unacclimatised control individuals.

The experiments of Stahl are also very suggestive from this point of view of acquired immunity. Plasmodia of myxomycetes were habituated to, and were finally attracted by, solutions of glucose of a strength formerly injurious to them, and to which they manifested negative chemiotaxis, and Metchnikoff brought about the same result with arsenical solutions. In this case, as in Dallinger's infusoria, the adaptation seemed to be associated with hydrolytic changes, the protoplasm of the adapted individuals contained less water.

Thus the evidence points strongly to the possibility of adaptation to environmental change taking place in some unicellular animal organisms by a process of individual Use Acquirement unassociated with the death of any of the organisms exposed to the change, and therefore independent of any process of variation and selection among the organisms concerned. Possibly the same explanation may apply to some extent to pathogenic organisms.

If the conception of a Use Acquirement which I have just put forward be true, then we must regard the adaptive change on the part of these organisms under such conditions

as the outcome of a process of variation and selection in, and of reconstruction and rearrangement of, the intra-cellular elements of which the organisms are composed.

Function and Adaptation

It may be thought that in selecting the neural response as an example of Use Acquirement I have confounded normal function with direct adaptation. But when we come to analyse our conception of function we realise how it merges into Use Acquirement by intra-cellular variation, and how both spring from the fundamental property of irritability inherent in all protoplasm and from its capacity of response to stimulus.

The alternating or partly overlapping cycles of anabolism and katabolism which we call function, or response to stimulus, either proceeds along lines of hereditary cell potentiality, in which case we call it normal function, or it proceeds along lines, and in a direction away from original cell potentiality, when it represents the making of a new acquirement.

In both cases there is a "becoming different," a "changing of state" on the part of the cell in response to environmental influence of some kind or another.

Adaptation implies shifting the mode or plane of functional response, and this shifting is done in the case of direct adaptation or Use Acquirement by the action of environmental change, not in originating but in selecting one particular mode out of a number of modes of action, which in the intra-cellularly varying cell cluster round the habitual mode of normal response. After a time this particular mode becomes established as the normal mode

of response under the new conditions, and we then call it altered function.

Pfeiffer has shown that the adaptive movements of bacteria under the influence of increasing stimulation obey the same psycho-physical law as that which governs the response of the nervous system to alterations in nerve stimuli; both reactions conform to the Weber-Fechner law. This is an important fact, and suggests that the two reactions have a common origin in the fundamental property of irritability common to all protoplasm. In this sense adaptation and function are essentially one.

Every nerve cell, above the reflex and instinctive level, makes a Use Acquirement when it responds to changes in a nerve stimulus, and every group of neurons which makes new acquirements, which forgets an old and learns a new language, is establishing a new response to a new stimulus, and in doing so it is carrying on normal function. The reason why normal function and the making of new acquirements are, in the case of the nerve cells, one and the same thing is, that the nerve cell possesses the capacity of intra-cellular variation—in other words, of educability—to a marked degree.

Another example will make this even clearer. The pigmented skin cells of the frog (as Lord Lister showed) respond to alterations in the intensity of the light stimulus by changes in the distribution of pigment in the chromatophore skin cells. This is their normal mode of response, their normal function, and each time that the pigment cell responds thus, every time that it changes intra-cellularly and concentrates or diffuses its pigment granules, it also makes a Use Acquirement. The response occurs among units of an intra-cellular order, and it is not accompanied

by injury, death, or regeneration of the cell as a whole, under normal conditions. The alternating cycles of cell response in this case represent acquirements which correspond with the lines of hereditary cell activity.

Thus, Use Acquirements can be brought about in several ways—by the simple rearrangement of intra-cellular parts as well as the destruction of old, and the reconstruction of new and different intra-cellular parts. Both methods involve intra-cellular change and intra-cellular selection.

Under the old regime of natural selection, the evolution of a new kind of response meant variation among individuals. It involved the destruction of old and the selection of more fully adapted individual organisms during the process of readjustment to the new conditions of life. Under the new regime of Use Acquirement the evolution of a new response means variation among intra-individual or intra-cellular units; it means the substitution of new for old parts in the machine, instead of the destruction of the machine itself.

Just as the rapidity with which races become adapted to new conditions depends on the rate of destruction of the unfit and the regeneration of the more fit, so the rapidity with which the individual organism, or the individual cell, acquires a new character and adjusts itself to new conditions, depends on the rate of intra-cellular variation and intra-cellular selection, or of intra-cellular rearrangement.

It is well known that the process by which the individual cell adjusts itself to new conditions occupies a considerable time. It is a gradual process of becoming accustomed to an environmental change which must not be too violent or too rapid; if it is, then it involves the death instead of

the readjustment of the cell. The time is taken up by the process of variation and selection which goes on among the intra-cellular elements during this process of adjustment.

If the variations are large and discontinuous and in the right direction, the Use Acquirement will be rapidly made, the new response will be rapidly learnt. If the variations are small and fluctuating, or if the stringency of selection set going by the environmental change is not great, then the cell will be a long time in adjusting itself or in making the Use Acquirement.

In both cases, in functional discharge and in Use Acquirement, the limits within which functional activity can be maintained, or adaptive response made, are both determined by cell potentiality, or, in other words, by the hereditary capacity of the cell for intra-cellular variation.

It is, of course, true that in many adaptive responses some cells, like some unicellular organisms, are more apt at readjustment than others. This means that such cells differ in capacity for intra-cellular variation. This means also that such responses are partly indirect. In such reactions the principle of inter-cellular or inter-organismal selection is still present, and if the difference in capacity of adjustment is sufficient to cause death, or to injuriously affect regeneration and cell division in some of the cells, then this principle comes into active operation and the process of making the adaptation descends to the inter-cellular level.

It is, in fact, one of the essential conditions of the making of a pure Use Acquirement that all the cells or unicellular organisms concerned in the reaction shall be able to readjust their internal composition and mode of action sufficiently to enable them to live under the new conditions, otherwise

the units which vary in capacity and are selected are cellular and not intra-cellular units, and the making of the acquirement is associated with the destruction of unfit cells.

Neural adaptation to changes in nerve stimuli entirely fulfils these conditions. So also (if our conception of it is true) does that portion of the acquired immunity reaction which is unaccompanied by the destruction of any body cells.

THE ATTITUDE OF CIVILISED COMMUNITIES TO DISEASE

If, then, the acquirement of the immune state be a type of adaptive response in general—if we are right in regarding all adaptation as either individual or racial, direct or indirect, and as the result of variation and selection, either among cells or in cells—then it is clear that such a view must largely influence our conception of the true attitude of civilised communities to disease.

Among primitive societies the problem of adaptation to disease has been almost entirely a question of racial evolution under the control of natural selection. Savage peoples, in order to escape death from disease, must be naturally immune. Capacity to recover is of no avail unless the conditions of mutual protection and co-operation are present under which alone recovery is possible.

Hence under such primitive environmental conditions the acquirement of the immune state by individual experience and recovery is of little importance as a factor in adaptation against disease. Half measures and part adaptations are useless; it is necessary to be wholly and innately immune. For any individual to acquire immunity against disease two things are necessary: He must possess some innate capacity of resistance, and opportunity must

be present for its exercise. But as civilisation advances conditions of life arise which allow of these factors coming into play. The screening and protecting influence of individual acquirement modifies the stringency of natural selection, and, as Baldwin, Morgan, and others have pointed out, it directs the lines along which organic development shall proceed.

Conditions which conduce to recovery from disease, and which therefore favour adaptation by Use Acquirement, are, broadly speaking, the care of the sick during recovery on the one hand, and improved medical treatment, especially along bacteriological lines, on the other.

It is to the principle of Use Acquirement involved in all such measures of co-operation and environmental control that I wish to draw attention.

Advances in our knowledge of the prevention and the treatment of disease; improved methods of treating the sick and favouring recovery—those constitute a great object lesson in adaptation by Use Acquirement.

Advances in external sanitation by which disease organisms are banished from the environment, measures of internal sanitation, such as serum and vaccine therapy, by which the disease organisms are destroyed or their virulence reduced after they have gained an entrance into the body—all such measures lead us farther and farther away from the old regime of innate variation and natural selection. The necessity for being immune by nature becomes less as the possibilities of becoming immune by art become greater.

But someone will ask, What bearing has all this discussion about the intimate nature of acquired immunity on the practical question of the best way of treating disease?

What does it matter, someone will say, as long as we become insusceptible, whether we acquire immunity by a process of intra-cellular variation and selection during individual life, or whether we are born immune through the operation of natural selection during racial experience of disease ?

It matters just because the immunity reaction is a type of all adaptive response, and, since evolution is largely adaptation to a widening environment, a true solution of the immunity problem supplies the key to many other evolutionary problems also.

When narrowed down to essentials, there are only three ways of undergoing adaptation to environmental change, just as there are only three ways of becoming immune against disease :

1. Either adaptive change is entirely the result of external influence, and the organism is as clay in the hands of the environmental potter.

2. Or the organism initiates and directs its own adaptation independently of outside interference.

3. Or adaptation is the result of the interaction of environmental influence with cell potentiality.

Now the immunity problem sheds some light here. We know that the toxin of the disease organism does not directly build up by chemical influence the immune response in the body cell. Nor does the body cell evolve the immune state in the absence of the stimulus of the disease organism.

The state of acquired immunity is the outcome of the exercise on the part of the body cell of a capacity to become different, to vary intra-cellularly, not in one only but in several directions when stimulated by the toxin of the disease organism. When this hereditary capacity to become

different, to vary intra-cellularly, is inadequate to meet the new conditions, Use Acquirement is impossible; the cell perishes, and the process of adaptation sinks from the intra-cellular to the inter-cellular level.

The problem for the social reformer is how to promote the adaptation of the social organism to its environment without sacrificing the interests or the lives of the individuals during the process of reform. The problem for the physician is how to bring about immunity and resistance to disease in the individual organism, without at the same time injuring or destroying the body cells and so producing illness or disease itself.

The problem for both is how to raise the adaptive response to the intra-cellular level. Both must build on innate capacity for response, on capacity to vary or become different, in fact, on educability. Both alike should try to accomplish the result by stimulating the exercise of this capacity on intra-cellular and intra-individual lines, and should only resort to inter-cellular and inter-individual struggle, with its attendant destruction of competing units, when intra-organismal methods have failed or are incompetent to produce progress.

Now this cannot be done by a return to older methods. A return to crude individual competition and natural selection would only serve to destroy the forces of cooperation and mutual protection, which are essential conditions for the exercise of the capacity of recovery and for the production of acquired immunity from disease, just as they are essential also for the making of Use Acquirements in many other fields of human activity. Hope for future progress lies in the extension of the method of adaptation by Use Acquirement and environmental con-

trol, in the improvement of environmental conditions and the banishment of disease organisms from the human environment by measures of external sanitation, and in the destruction or the reduction of the virulence of disease organisms by vaccine- and chemo-therapy, if they should obtain a foothold in the body.

These are the methods of Use Acquirement and environmental control, and the methods by which, more and more, adaptation to disease on the part of the human race will be brought about.

And if, as I have already said, we may regard the great immunity reaction as a type of evolution and adaptation in other fields, if we may regard natural immunity through natural selection as a type of the earlier methods, and artificial immunity through the exercise of individual capacity to profit by experience and through environmental control, as a type of the methods of the future, then, bearing in mind the success that has been achieved by these latter methods in the struggle against disease, we may look confidently to an extension of Use Acquirement and environmental control in other fields, rather than to a return to innate preadaptation and natural selection, remembering always that both methods depend on innate capacity of some kind or other—capacity of being already adapted before experience, on the one hand, or capacity to become adapted and to learn by experience on the other.

Since innate capacity of recovery in the immunity reaction, like capacity to learn, or educability, in all adaptive responses are matters of heredity and breeding, it is essential, in discarding the older method of natural selection, that we take steps to safeguard the transmission and production of innate capacity by some measures of Eugenic control.

CHAPTER XI

THE HUMAN FACTOR IN INDUSTRIAL LIFE ¹

INTRODUCTION

I PROPOSE in this short address to deal with the problem of the human factor in our modern industrial life.

If we regard industry as a working combination between three partners—the master, the man, and the machine—then it is with the second partner, the human element, that we are now concerned.

It may seem to some of my hearers that the present is not a suitable time to discuss such problems as happiness and satisfaction in industrial life. It may be said that we should wait for a calmer atmosphere.²

My reply is that what I have to say on this question this evening has no direct bearing on politics. It has nothing to do with trade unions, or with strikes or lock-outs. It is not even primarily concerned with Economics.

I shall endeavour, in the short time at my disposal, to bring forward evidence to show that sound psychological study of industrial problems is in the true interest of the individual and the community, of employers and employed, because a more scientific and a fuller knowledge of the conditions under which industry is carried on to-day, and of the effect of such conditions on the mental and bodily

¹ An Address delivered in All Saints' Church, Northampton, on Sunday, December 10, 1926.

² This Address was given during the Coal dispute, 1926.

health and on the efficiency of the workers, will tend, in the long run, not only to increase the productiveness of industry, but will also promote happiness and contentment among those who toil.

It is no doubt true that, as the outcome of a certain reaction against the exaggerated claims of some disciples of certain modern schools of psychology, a tendency has recently arisen to decry all psychological study and knowledge, as a guide to human conduct.

But we must remember that much of the unrest and strife which afflicts our social and industrial life to-day is largely due to a lack of psychological knowledge: to failure to appreciate the other side of the question; to want of imagination to realise what will be the effect of certain lines of conduct on individual and communal well-being; to failure to "see ourselves as others see us"; in short, to unwillingness to regard our neighbour as we do ourselves.

But this is no modern development.

It was this very lack of psychological knowledge, that is, knowledge of the working of the human mind, which was in part responsible for the ecclesiastical intolerance of the Middle Ages, and which led to the barbarities and cruelties of the Inquisition.

On the other hand, was it not the amazing insight into the working of the human mind and spirit, in the greatest of all moral Teachers which enabled Christ Himself to regard human personality as a whole, and whilst rebuking untruthfulness and hypocrisy, to look upon human frailties with sympathy?

With these short introductory remarks we may now proceed to consider one or two psychological principles of great

importance which claim attention at the outset of our enquiry.

The first is, that human beings tend to exert mental and bodily activity in varying degrees and in diverse ways.

The second is, that every normal human being endeavours to obtain satisfaction as the result of effort, and failing this, his activities tend to diminish in volume, or to be diverted into other channels.

The third is, that the nature of the experience, the pursuit or the attainment of which is associated with this feeling of satisfaction, depends upon the innate capacity and the training, that is, on the character, the personality of the individual.

SOURCES OF SATISFACTION

Applying these elementary truths to the study of industrial life, we find that in order to obtain the fullest measure of industrial prosperity and individual welfare, it is necessary that those who labour should derive some measure of satisfaction from the work they perform.

But in order to experience satisfaction, workers must either be happy in their work, or they must derive satisfaction from the conditions under which their work is performed, or failing these sources of happiness, they must derive satisfaction through the monetary reward of labour, in so far as this enables them to obtain satisfaction independently of their work or of its surroundings.

In many cases, in factory, workshop, and office life to-day the work done (owing to its monotonous, or uninteresting, or exhausting nature) does not, by itself, produce any sense of satisfaction in the worker, although the monetary reward may provide facilities for obtaining this result in other

ways. But in this case the satisfaction experienced must be sufficiently great to secure a continuance of the industrial effort which by itself is not satisfying.

ILLUSTRATIONS

In order that we may appreciate more fully the real differences between these alternative ways of obtaining satisfaction—these different incentives to labour—one or two examples may be given in each case.

As illustrating interest and happiness in work itself, we may recall the satisfaction experienced by the true artist in the conception and execution of some work of art, or the delight of the craftsman in the result of his handiwork, or the interest which many skilled workers take in the daily routine which brings them into intimate contact with nature in her changing moods.

Everyone will agree that whenever the exercise of special powers leads to the attainment of success, the mental or bodily activity exercised in producing the result is accompanied with a sense of enjoyment and satisfaction.

We may now consider the second alternative, i.e. the extent to which in any occupation the actual conditions under which the work is carried on help to fill the gap by providing sources of satisfaction which the actual doing of the work itself fails to supply.

Life in the army to many men of the rank and file represents an occupation in which the actual duties performed are not, in peace time, of special interest.

The daily routine, the drill, the fatigue duties are not regarded by the average soldier as affording great satisfaction. It would seem then that we must look to the conditions under which the soldier lives and works—to the

camaraderie and sociability of his calling, and to other environmental factors which appeal to the *amour propre* of the young soldier for the real sources of satisfaction.

The same is true, to some extent, of factory and office life of to-day.

In many industrial occupations the routine work in the mill or the workshop is made more or less enjoyable, in some cases more or less endurable, by the club life, and the accessory interests which such occupations afford.

On the other hand there are occupations in which the conditions seem to influence those who engage in them in the opposite direction.

DOMESTIC SERVICE

Enquiry into the reasons why so many young women now avoid domestic service has shown that they do so, not because the actual performance of the duties in the parlour, or the nursery, or the kitchen, are distasteful or lacking in interest.

It is the conditions under which, in many households, these duties are carried out—the absence of so-called personal freedom—the lack of companionship, together with the atmosphere of an inferior social status which have rendered domestic service a shunned occupation at the present time.

But if neither the work itself nor the conditions under which it is performed afford satisfaction to the worker, there still remains the third alternative.

WAGES

The monetary reward of labour, the wages or the salary, provide the means whereby (after provision for the primary

needs of existence) the many desires, so different in different individuals, may be partly or wholly satisfied.

Thus, the payment of wages of some kind or other has been the chief incentive to labour since the passing of the days of slavery and serfdom, and in greater degree since the industrial revolution of the last century, not indeed because the monetary reward—the wage itself—promotes interest in the work, or because it enables the worker to obtain more pleasure in doing it, but because the wage provides the means whereby pleasurable experiences can be obtained and desires satisfied apart from the daily toil.

It is this divorcement between *work* and the satisfaction that should spring from *working*, that constitutes the chief indictment of our modern industrial system.

It is this tendency (under modern conditions of mass production) to separate the end result from the intermediate steps, whereby the finished article does not come under the notice of the worker engaged in the intermediate processes (though perhaps inevitable under present conditions and not without value in revealing the Co-operative Nature of Labour),¹ which tends to rob work of much of its interest.

It is partly because the actual performance of the routine duties in the factory and workshop does not, in many cases by itself, provide satisfaction in the doing, that the monetary reward of labour has to be sufficient not only to provide for the existence of the worker and his family, but also to supply those outside sources of satisfaction which the performance of the work itself fails to give.

Inasmuch, however, as human beings ever strive to satisfy increasing desires, the constant struggle goes on for higher wages and shorter hours. Higher wages by which

¹ De Lisle Barns, *The Philosophy of Labour*.

to obtain the means for the satisfaction of widening desires, and shorter hours, that is, more leisure, in which to satisfy them.

Thus we approach the heart of the problem.

This increasing effort on the part of the workers to satisfy growing desires in an ever-widening circle of human interests is in itself a good thing. It is the result of education, and indicates a widening and deepening of the social life. It is an important factor in the growth of civilisation.

The real point, however, is that the desires which we seek to satisfy (for we are all workers) must be such as will conduce to individual and communal well-being. The attempt on our part to secure facilities for their satisfaction must include some real and practical recognition of communal interests. In other words, the demand for higher wages and shorter hours must bear some relation to the economic conditions and the industrial possibilities in existence at the time.

It must also be accompanied with some real effort on the part of employers and employed to make the work more interesting, more economical in expenditure of time and energy, and more productive not only in material value but in satisfaction to the worker.

The extent to which these three methods of rewarding labour—these three incentives to industry—separately or together, provide adequately for the primary needs of a healthy existence and satisfy the legitimate desires of a working population—affords a truer index of the condition of the industrial life of any society at any given period, than a mere statement of average wages.

One of the most important, perhaps the most important, factor in social stability and welfare is that the citizens shall

be engaged in work which results in profit to the community and in satisfaction to the worker.

Reduced to essentials, the point at issue is—the relative value of, interest in work, and wages, as incentives to effort in our modern industrial life.

When we consider that all the best work in the world has been the outcome of interest in work and not of wages, we realise that, while wages, or some form of monetary reward, may be necessary under present conditions to enable a man to support himself and his family, and to obtain facilities for recreation and self-expression, yet we must still rely on interest in work to stimulate the best efforts and to produce the best results.

But if this be so, how does it come about that some form of monetary reward, or wages, remains the chief (in many cases the sole) incentive to effort in industrial life ?

No doubt one main reason has been that monetary reward, as an interchangeable token, provides a more mobile and more widely available method of remunerating labour than payment in kind, i.e. the provision of food, clothing, and shelter.

But although payment by wages has largely supplanted the older methods, and will no doubt continue to be the method of remunerating labour for a long time to come, this does not mean that the payment of wages, as the only reward for labour, has no disadvantages and no drawbacks.

The truth is, that our social and industrial development is as yet in a more or less primitive stage.

Partly owing to individual deficiencies, partly to defective training, and partly to defects in social adjustment, the ordinary citizens (men in the mass) still require the incentive of self-interest to stimulate them to continuous effort.

The citizens, speaking generally, are not yet prepared, or at any rate they have not yet been trained, to work for the good of the community as their main object in life.

One of the unfortunate legacies of the industrial revolution of the last century has been a tendency to make industrial toil less interesting and less satisfying, and at the same time to increase the monetary reward of labour—and this of necessity, because the wages provide the facilities for self-satisfaction, and thus act as a substitute (in many cases a poor one) for the loss of interest in the work itself. As the one goes down the other tends to go up.

Since, however, man can only live by working, and since interest in work is necessary to successful effort, and to individual and communal well-being, it is essential to our national progress that interest in labour should, by some means or other, be restored and maintained.

There are indeed signs that men and women—Society as a whole—are beginning to realise the unsatisfactory nature of the present conditions of our industrial life.

There can be little doubt that if to the stimulus of wages we could add the far more effective inducement to effort, which interest in work provides, then industry in this and other countries would take a great step forward, and industrial life would become more happy and more satisfying.

Surely the day will come when interest in the thing done will again sweeten labour, and when there will be no longer any need to ask the old question, “Wherefore do ye spend money for that which is not bread? and your labour for that which satisfieth not?” (Isa. lv. 2).

But this fundamental law of life, i.e. “the expenditure of energy in the satisfaction of desires,” applies to all phases of human activity—to anti-social as well as to social conduct.

The thief seeks to gratify his acquisitive tendencies without regard to the lawfulness of the means by which he tries to obtain his ends.

In like manner the pages of history contain many records of lives and deeds, of which the earthly reward has been suffering and death, but in the living and in the pursuit of which true happiness has been achieved and longing satisfied.

Everything then depends on the nature of the desires which we strive to satisfy, and this, in the last resort, depends on the innate tendencies—the character and training of the individual—that is, on the personality of the citizen.

UNSKILLED LABOUR

But every civilised community is faced with the problem of obtaining labour for work of a kind which, in itself, is not attractive to the worker and would, unless remunerated, remain unperformed.

Work of this unskilled, so-called menial kind, by its exhausting nature, or its repetitive character, or its unhealthy conditions, does not give satisfaction to the *ordinary* worker.

Some of it is work which calls for a large expenditure of muscular energy on a low neuro-psychical level.

SLAVE LABOUR

In primitive times, in earlier stages of civilisation, in Ancient Egypt, in the city states of Greece, and in Rome, and even in modern days, the performance of these services was carried on by enforced or slave labour.

Slave labour is, however, inconsistent with our modern ethics, it also contains serious intrinsic dangers which in the past have helped to bring about social disintegration, and national and racial decay.

For us, then, in these modern days there are only two alternatives :

1. To perpetuate a class of citizens of moderate intelligence, but of a physical capacity adapted to these unskilled and heavy mechanical duties, in other words, to perpetuate a low-grade form of labour.

2. Or on the other hand, to make the work less exhausting physically, and more interesting mentally.

But this means an increased application of scientific methods to Industry, an extended use of machinery, and more organisation of a social and industrial kind.

We must remember, however, that slavery is not only a question of wages and compulsion.

UNEMPLOYMENT

Enforced idleness, like enforced labour—compulsory unemployment, is a form of slavery, for individual freedom depends on the possibility of expending energy on work, which, while it is of value to the community, also gives satisfaction to and promotes the well-being of the worker.

Unfortunately, the unemployment of to-day, unlike the slave labour of earlier days, cannot be abolished at one stroke by Parliamentary Statute or national decree.

Both, however, agree in this, that they tend to lower the morale and to deteriorate the character of men and women exposed to their influence.

When the desires which the citizens at all levels in the social scale seek to satisfy are not such as conduce to

individual well-being and social welfare, then decay has already set in in that society or nation.

It will be useful to turn aside at this point, for a moment, and consider in a little more detail the bearing of this problem of unemployment on *communal welfare* and on *individual liberty*.

It will be agreed on all sides that continued unemployment on a large scale is one of the greatest dangers which can threaten a community from within. But it is also true to say that enforced idleness is incompatible with individual liberty.

If a man who is eager or willing to work is obliged through no fault of his own to remain idle, he cannot be truthfully said to be a free man. True liberty consists in freedom and opportunity to make the best of ourselves, that is, to exercise bodily and mental activity in ways which lead to self-satisfaction and to communal well-being.

Inasmuch then as freedom is essential to a sound and progressive individual and national life, it follows that one—perhaps the greatest—injury brought about by the compulsory unemployment of large numbers of citizens is the curtailment of freedom which is thereby entailed.

It is no doubt difficult, and it may be impossible in practice, to apportion fully individual and national—or even international—responsibility for the enforced idleness of the many thousands of citizens in our own and in some other lands to-day. But if, in regard to this matter of unemployment or enforced idleness, we could persuade each other—employers and employed alike—to ask this question—“Am I engaged in work which, as far as I can see, will result in profit to the community and in satisfaction to the better side of my own nature?”; in other words,

“ Is my occupation one which will promote my own welfare as an individual, and that of my family and my country ? ” —then we should have done something to determine, at any rate, responsibility for unemployment as far as the individual is concerned.

Further, if, after asking this question, every citizen, or at any rate those who are able to do so, would proceed to answer it in a practical way by relinquishing at the earliest opportunity harmful and wasteful occupations, and by taking up health-giving, wealth-producing, and welfare-promoting activities, then such a change would soon come over our social and industrial life as would rapidly abolish all avoidable unemployment, and would soon establish a higher standard of life for all sections of our people.¹

But someone will say that such a wholesale change is impossible without a corresponding radical change in human nature. No doubt this is true in part, and in order to bring this about we must look to the application of eugenic principles to human affairs on wise lines. Meanwhile, however, something (more probably than we think) can be done by education, and by a wise guidance of the young in the choice of occupations, and especially by a reinforced and a reformed public opinion.

But to this point we shall return later when speaking of vocational guidance and selection in industry.

ADAPTATION

Translated into biological language, the problem is essentially one of “ adaptation ” ; and this, in the industrial

¹ See letter to *The Times*, December 4, 1926, “ Spending on Luxuries,” by I. L. Vogel.

sphere, raises the question—"Is the present-day citizen adapted to, or fitted for, the work he has to do and the conditions under which he does it?" In other words—"Does he obtain satisfaction from his work, and does the community profit from his labour?" In short, is he a *happy* as well as a *productive* citizen? If he is not happy he is not likely to be productive, for the two conditions are intimately associated.

The further question then arises—"Is this failure to obtain satisfaction (this faulty adaptation) due to the nature of the work, or to faults in the worker, or to both combined?"

Is the work itself, or are the conditions under which it is done, exhausting or uninteresting? Or is the worker unfitted by nature or by training for that particular job?

Up to recent times little consideration has been given to this aspect of industrial life.

It lies, however, at the root not only of industrial prosperity, but of national well-being.

It merits the deep attention of statesmen, of captains of industry, and of the workers themselves.

We have now considered very briefly certain underlying psychological principles.

We have realised the fundamental part played by "desire for satisfaction and the satisfaction of desire" in the industrial as in other phases of human life.

We now proceed to consider some of the more important factors which may be partly responsible for the failure of industrial workers to obtain satisfaction from the work they do.

INDUSTRIAL FATIGUE

Amongst these factors one of the most important is *Fatigue*, arising during, or as the result of the expenditure of energy in, industrial labour.

Fatigue of this industrial kind may be *physiological*—that is to say—it may be the normal tiredness which follows effort, and which is removed by rest and food—or it may be *pathological* in character.

The night's rest does not entirely remove the tiredness incidental to the work of the previous day, with the result that the worker starts the following day at a slightly lower level of mental and bodily efficiency.

In the first case, he is living on physiological revenue, in the second on physiological capital as well.

It is with fatigue of this *pathological* kind that we are now concerned.

An important feature of industrial fatigue has reference to its origin in the nervous system.

Even in violent muscular exercise, when carried to the point of inability to put forth more muscular effort, the exhaustion occurs in the nervous machinery which starts and regulates the muscular actions.

This is shown by the fact that it is possible, by suitable electrical stimulation, to cause further contraction in muscles which have failed to respond to voluntary stimuli reaching them through the ordinary channels.

This protective mechanism acts as a safety valve and prevents injury to the muscles from repeated overstimulation.

The importance of industrial fatigue is very great.

It not only diminishes production and output, it lessens

the sense of satisfaction which the worker obtains from the day's labour, and it increases the *cost* of production by rendering the worker less efficient.

THE MAINTENANCE AND REPAIR OF THE HUMAN MACHINE

In estimating the cost of production in any business undertaking, one important item, often overlooked, is the maintenance and repair of the human machine, and it is in relation to this matter of keeping the human machine in efficient running order that fatigue becomes such an important factor.

We must now consider very shortly one or two only of the remedial and preventive measures, by a wise and timely use of which we may hope to remove some of the present handicaps in Industry, and thus help to brighten industrial life.

Among these, *Vocational Guidance and Selection* is one of the most important and most promising methods.

VOCATIONAL GUIDANCE AND SELECTION

It will, I think, be admitted by employers and employed, and indeed by all thoughtful citizens, that the conditions under which the industrial life of this country is carried on to-day are by no means wholly satisfactory.

Discontent, arising out of a disharmony between the worker and his environment in the social, as in the individual organism, is a sure sign that *adaptation* in industry has not been completely attained.

The question therefore arises whether this failure to find satisfaction in industrial work, this lack of adaptation, is due to the nature of the work, or to inability on the part of

the worker to find pleasure in doing it, or whether both factors are responsible, and if so, to what extent.

In dealing with this difficult problem it is important to remember that failure to obtain satisfaction from work may be due to : (1) A natural mental or bodily unfitness for that particular occupation ; (2) or to lack of technical skill due to defective training or experience.

It is clear that the remedy for these two different states must be different in each case. If the trouble is due to the monotonous or exhausting nature of the work, attempts should be made to alter it for the better. If, on the other hand, the workman is at fault, owing to lack of capacity or deficient training, then the remedy must be increased attention to technical training, or in the more marked cases of complete natural incompatibility—the round peg in the square hole—to the wider use of vocational selection and vocational guidance for the prevention of these industrial misfits.

But vocational selection and vocational guidance are not the same thing.

Vocational selection looks at the problem from the point of view of industry, and seeks to ascertain whether this or that individual is fitted for this or that occupation.

Vocational guidance, on the other hand, regards the problem from the worker's point of view, and endeavours to guide each individual into that occupation for which he or she is best fitted, mentally and bodily.

It is only within the last few years that any serious attempts have been made to place *vocational psychology* on a sound scientific basis.

More research and further experience are still necessary, but the results already attained justify the conclusion that

vocational selection, and especially vocational guidance, will be of enormous and growing importance in the industrial life, not only of this country, but of the world.

The study of the prevention of human waste in industrial life is at present an almost untrodden field.

When dealing with the problem of unemployment, we drew attention to the great importance of a right choice of occupations on the part of young citizens entering industrial life.

We then pointed out that, if all our citizens were engaged in work which promoted individual and national well-being, unemployment on any considerable scale would soon come to an end.

We then saw that, apart from the question of racial improvement on eugenic lines, we must look to Education, including religious and moral influences, to bring about the wider mental outlook necessary to ensure this change of life—this readjustment of social and industrial relationships.

For Education is not merely, or only, concerned with the imparting of knowledge in order to fit men and women for life's duties—it is also the function of Education so to enlarge the mental outlook and so to mould the desires of every normal individual as to lead that individual to wish for, and to choose, the "higher" in preference to the "lower" in all spheres of human life.

And this applies to the choice of occupations and careers of life by our young citizens.

I wish to suggest that more importance should be attached in our scheme of national education, and by school teachers, and parents, to this most important side of education, namely, guidance and direction in the choice of a career according to natural fitness and training.

For this is not a matter of mere academic interest, or a subject for politicians and statesmen alone.

It is the urgent duty, not only of parents and teachers, but of the Churches and religious advisers of all denominations, and of all who are interested in the welfare of our young citizens, to give counsel and advice (in so far as they are fitted to do so) in the choice of right and wrong occupations, especially to adolescents entering industrial life.

For if we begin with the young now, it would be possible even in one generation to build up a public opinion which would regard as anti-social, and therefore immoral, occupations and employments which are definitely opposed to public welfare.

Then, as the national conscience becomes more alert and more definite, occupations which, though perhaps not actively anti-social, are yet wasteful and non-productive, and which do not promote bodily, mental, or moral welfare, would come under national disapproval, and would tend to be avoided by the more thoughtful and public-minded citizens.

Some good will, however, result from our discussion this evening if we are led to realise that it is the function of true education not only to fit young citizens for the duties of life, but also to guide them to a worthy career in life.

MONOTONY IN WORK

Monotony has been regarded as an important factor in the production of industrial fatigue.

This is no doubt, to a certain extent, true.

If the worker is not interested in what he is making or doing owing to the uninteresting or repetitive or monotonous nature of the movements or processes involved, then the

repeated movements and the energy expended in the repetitive processes no doubt do tend to produce fatigue and exhaustion.

At the same time we must not forget that simple processes may be carried out and uncomplicated machines tended semi-consciously, while other trains of thought and imagination are also occupying the attention of the machinist.

Further, enquiry into the psychology of workers of a certain mental type shows that for such individuals the automatic, semi-conscious character of the occupation they are engaged in offers certain attractions.

They like the work, although it is monotonous, because it allows them, while engaged in it, to think their own thoughts undisturbed by their immediate surroundings.

Further, repetition, which may be monotonous to one temperament, may to another bring relief from anxiety and the constant call for mental effort.

Relief so obtained, however, is not without its own dangers.

For it is not by ignoring and forgetting, but by a fuller understanding of, and by an increased interest in the principles which underlie industrial processes that progress will be made.

The true remedy, as we have already seen, lies in the direction of making the work itself more interesting and the worker more interested in his work.

CONCLUSION

We have now reviewed very briefly a few only of the methods by the further application and extension of which it is hoped that industrial fatigue will be lessened, and those other physiological and psychological factors which

affect industry prejudicially to-day may be removed or diminished.

Among these remedies the wise use of *vocational selection* and *guidance* is one of the most important.

The importance of these remedies depends on the fact that they are concerned with the fundamental factor of "Adaptation"—i.e. the fitting the individual to his environment and the environment to the individual.

The final test of every remedial method must be (1) whether it tends to bring industry into closer relations with both individual and national welfare ; and (2) whether it enables the worker to obtain a larger measure of satisfaction and happiness from his daily toil.

As we have already seen, both are intimately associated.

The Industrial Revolution of the last century was concerned with wealth production rather than with welfare. It paid little attention to the worker's interests, or the satisfaction he derived from his labour.

The Industrial Revolution of the near future, nay, which is already going on, will be primarily concerned with the well-being of the worker and the extent to which he can satisfy legitimate desires and obtain a larger measure of happiness while engaged in his labour and as the result of his toil.

Meanwhile, and along with this result, wealth production will increase as a by-product, and industrial prosperity will be promoted.

Let us cherish a vision of the more distant time when, in Kipling's words—

" No one shall work for money, and no one shall work for fame,
But each for the joy of the working, and each in his separate star,
Shall draw the thing as he sees it for the God of things as they are ! "

CHAPTER XII

THE PREVENTION OF MENTAL DEFICIENCY¹

THE attitude of Health Authorities and the public generally to mental deficiency and other forms of defect, both innate and acquired, is undergoing considerable change. It is now beginning to be realised that prevention is a more effective method of dealing with this and other forms of disease than attempts at cure.

But to prevent these congenital and innate kinds of defect it is necessary to begin at an early stage and to take into consideration the natural or inborn capacity of the individual child, first to develop normally along healthy lines, and secondly to resist not only disease germs, but injurious influences of all kinds. Of these two factors on which the healthy life depends Nature is more important in the long run than Nurture.

Those Health Authorities who ignore the part played by inherited bodily and mental qualities, and trust only or mainly to improving the environmental conditions of life, will fail in the end to prevent hereditary disease and defect. The conversion of a C₃ into an A₁ population requires the exercise of control over the production of human life for many generations. We must also remember that, in Ruskin's words, "There is no wealth but life,—happy, healthy, and vigorous human life." I have, however, said

¹ Introductory Address at the Conference on racial decay, Leicestershire Health Insurance Committee, November 27, 1929.

enough about the attitude of Health Insurance Committees and Health Authorities to inherited and congenital defects, because most of these bodies do now recognise the all-important part played by prevention in dealing with disease.

We must now turn to the consideration of Mental Deficiency as one of the most important, perhaps from the point of view of national welfare *the* most important, kind of inborn defect. Mental deficiency may be either innate or acquired. That is to say, it may be the result of a defective heredity affecting the brain and the mind, a lack of capacity of normal development, or it may be acquired during prenatal life, or at birth, or later, as the result of faulty environmental conditions, or of injury affecting normal growth.

As an example of defective heredity, we know that the children of two mentally defective parents will be (almost without exception) themselves mentally defective. The same applies to the offspring of congenitally deaf mute parents, a condition which is also due to a defect of the nervous system. Injurious environmental conditions may be entirely external, as in the case of injury to the child's head during labour; or they may be partly external and partly internal, as in the case of the Cretin child, whose mental incapacity is the result of a deficient or abnormal thyroid secretion, which itself may be associated with a lack of iodine in the water or food. But even in this case the tendency of the thyroid to feeble development and reduced activity may be hereditary.

The importance of a careful analysis of all cases of mental deficiency, and the separation of the acquired (possibly curable) from the innate or congenital (incurable) cases is very great, and has not yet been adequately carried out.

From the point of view of national health and efficiency this aspect of the subject must be grasped before we can deal with it effectively. The recently issued report of the Mental Deficiency Committee appointed jointly by the Board of Education and the Board of Control gives the number of mentally defectives in the true sense, namely, "as being incapable of independent social adaptation," as at least 314,000, or 8 per 1,000 of the population in England and Wales. This is roughly double the number as ascertained by the Royal Commission in 1906, and rather more than double the number of notified insane in the country.

This number, however, does not include the 35,000 children whose mental defect is educational rather than social, nor does it include a marginal group of 300,000 dull, backward, or retarded children of from ten to fifteen years of age. In fact, if all the children with mental ratios below 85 were included, the number of mentally defectives among children would amount to some 10 per cent. of the school population of England and Wales. Dr. Lewis, the able investigator working for the Commission, states that "mental deficiency must be regarded as an index of a much bigger problem, and that for every one defective there are ten other persons who are, to a great extent, socially inefficient, partially because of subnormal mentality."

Recent researches in Germany point to the total number of defectives as amounting to 25 per cent. of the population. This is made up of rather more than half mental and the rest physical defects. Thus the magnitude and the importance of the problem of mental inefficiency and deficiency is very great.

The Committee finds that the evidence suggests some

increase in the number of mental defectives during the last twenty years. If so, this fact, in spite of improved conditions of life and a better system of national education, is very disquieting. The Committee also finds that there is a marked difference in the incidence of mental deficiency between urban and rural areas, 6.49 per 1,000 urban, as against 10.66 in rural districts. They also find that in the areas investigated 77 per cent. of the feeble-minded children (educable mental defectives) were in attendance at public elementary schools, and in their opinion "our existing system as it affects the educational aspect of the problem has, except in the larger towns where better schools are available, broken down."

Another important finding is the occurrence of groups of mental defectives in certain areas, especially rural, which on examination turn out to be due to familial incidence, that is to say, they represent family foci of the defect, especially in certain villages. Such families are often interrelated by marriage. This too confirms the suggestion of the importance of heredity as a factor in the production of mental deficiency.

There is also an important relation between the slum problem and mental deficiency. The importance of these findings lies in the fact that it is from this subnormal section of the population that the ranks of the habitual pauper, the unemployable, the juvenile delinquent, and the criminal army are largely recruited.

Finally, and of especial interest to Health Insurance Committees, the report states: "There is reason to think that mental deficiency, much physical inefficiency, chronic pauperism, and recidivism, are all parts of a single focal problem, in which poor mental endowment may be a chief

contributory cause. If so, then the problem of mental inefficiency of which mental deficiency is an important part must be one of the major social problems which a civilised community may be called upon to solve."

I have already stated that, almost without exception, the offspring of two parents, both innately defective, will themselves be mentally defective. In the case of a normal person of sound stock mated to a mental defective, half the children may be, probably will be, apparently normal, as far as their mental capacity is concerned, though they will carry in their germ cells the factor for mental defect. If such children should later intermarry with similarly constituted individuals, then the latent mental deficiency element may become patent in their children of the next generation. The importance of this "carrier" problem is very great.

The fact that a mentally defective child may, as it were, suddenly appear in a family of normal children, the offspring of parents who do not show in their own persons any mental defect, has been a difficulty in the minds of many parents, and has perhaps done more than anything else to delay the full recognition, by the public generally, of the importance of the hereditary factor in the production of mental deficiency.

But when we realise that there are a considerable number of individuals in the population who, while themselves apparently normal, yet carry in their germ cells the seeds of mental defects, who are, in fact, "carriers," without being "exhibitors" of such defects, and that when these, apparently normal, persons intermarry their children will in a certain number of cases exhibit the defect, then the real position is rendered clearer, and the danger more

easily realised. Meanwhile all will agree with the Committee's recommendation as to the need for further research into the problem of mental deficiency.

It will be useful at this stage to say a word on the question of Cousin Marriages. It was thought for a long time that the marriage of nearly related persons, for instance, cousins, was liable to lead to the production of children lacking in constitutional vigour. We now know that the nearness of kin in the case of marriage between cousins is not by itself the real danger. What matters, is the constitution of the germ cells which are mated together when cousins marry.

If the stock is sound and vigorous on *both* sides, then the children will be healthy and vigorous, probably markedly so. But if a strong hereditary defect, such for instance as that of feeble-mindedness, is present on either side, and especially if it should be present on both sides, then the "carrier" element will come into action and the probability of defect in some of the offspring will be considerable, and if large numbers are concerned it will be certain.

PREVENTION

We must now consider the question of the prevention of mental deficiency. There are three main directions along which it seems likely that attempts at prevention will travel in the future. Firstly by eugenics, secondly by preventive medicine, thirdly by control (of the quality) of the world population. In regard to the group of innately mentally defective persons, the alternative methods are practically limited to segregation or sterilisation, or a combination of both these methods, or far less effectively

by an improved system of what is called in the M.D. report "socialisation" (supervision and guardianship).

We may first consider the complete segregation of all innately mentally defective children up to and during the reproductive period of life. This would, of course, if effectively carried out, prevent the transmission of the defect so far as these individuals themselves were concerned. It would, however, fail to include the larger number who, while not exhibiting the defect themselves, are yet "carriers" of it in their germ cells.

To this extent, therefore, segregation so limited would not solve the problem of mental deficiency. Further, it is a very costly method, and would become a very heavy burden indeed, if it included all cases of mental defectives of the hereditary kind. At the present time, segregation in colonies or institutions is only dealing with the fringe of the problem.

Many Mental Deficiency Committees are not making full use of the powers they already possess under the Mental Deficiency Act.¹ In spite, however, of these drawbacks, if accommodation were available, and if it were made full use of by Local Authorities, the beneficial effect on the lives of the defectives so treated would be great, while the effect on racial welfare would also be considerable in the long run.

One important result would be that the removal of mentally defective children to institutions would allow more supervision and better care to be given to the normal children in the families from which they came. In fact,

¹ Miss Susan Lawrence, in reply to a question in the House of Commons on March 12, 1930, stated that only 29 out of 1,924 Local Authorities or combinations of Local Authorities have provided such accommodation, and that, assuming the figures in the Report to be accurate, there was a shortage at the present time of 30,000 beds.

I do not think it is sufficiently realised by more fortunately circumstanced people, what the presence of a mentally defective child in a working-class home means. It is, in fact, little short of a calamity ; the strain on the parents, especially the mother, is very great, and the influence of the defective child on the other children is often detrimental.

Removal, therefore, to institutional care is necessary on these and other grounds. But it is not yet carried out on any adequate scale, and even if it were, Prevention is better than Cure. It is not along these lines of segregation that, in my opinion, the ultimate solution of the problem of mental deficiency will be found.

Moreover, in view of the statement in the Committee's report that " there is no prospect at any rate in the near future of sufficient institutional accommodation being provided for all the mentally defective persons of the country who need it, and that the majority of them must, for many years to come, remain amongst the general community," we are bound to seek some other alternative, or some other supplemental method.

If the State realised all that this latter conclusion of the Committee means to the future of our country and the human race, and if it takes no action to prevent perpetuation of mental deficiency, then, as it seems to me, it is not only acting in direct opposition to the true interest of our country but it is guilty of a crime against humanity.

There is another vital point to remember ; it will not be enough to deal with the smaller group of certifiable mental defectives. As the report states, " if we are to prevent the racial disaster of mental deficiency we must deal not merely with mentally defective persons, but with the whole subnormal group (the lowest 10 per cent. in the social scale

of most communities) from which the majority of mental defectives come."

The urgent problem, therefore, before the country is how we are to do this—how we are to eliminate not the mental defective alone, but the unfit and unworthy of all kinds from our population. How we are in fact to convert our C₃ into an A₁ people.

STERILISATION

There is, however, an alternative line of action, one which if widely made use of, contains, in my opinion, great possibilities for the future. I refer to sterilisation.

At the outset it is important to remember that sterilisation, as effected by modern surgical methods, does not unsex the individual, while in the male it is not a serious operation.

What is removed is the power to produce offspring. Those secretions of the sex organs (the ovary in the female and the testis in the male) on which maleness and femaleness, and the capacity for the sexual life depend, these still enter the blood stream and still circulate through the nervous system. These are not interfered with. It is not, in fact, true to describe the procedure of sterilisation when so performed as an operation which maims the individual so far as his own health or vigour is concerned.

There is one section of the certifiable group of mental defectives in which sterilisation would be of especial value. I refer to the higher-grade cases under supervision or guardianship outside institutional control, and also those living in institutions who are allowed out on temporary leave. If parents or guardians knew that the possibility of procreation was safeguarded against in both sexes, a

greater sense of security and relief from anxiety would be thereby obtained.

MARRIAGE AND MENTAL DEFECT

To permit marriage between mentally defective individuals and normal persons in the hope that strength will overcome weakness, and that their children will not exhibit the defect, as in a certain number of cases would no doubt be the case, would result in a large increase in the number of the "carriers" of the defect, and in a further deterioration of the fibre of the nation. For this and for other important reasons all are agreed that marriage in the case of mental defectives should be prohibited by law.

OBJECTIONS TO STERILISATION

It is true that the Report already quoted does not give much hope of a marked reduction in the number of mental defectives in the near future by the employment of legalised sterilisation limited to the comparatively small group of certifiable mental defectives, which forms perhaps less than 10 per cent. of the whole subnormal group in the population.

The reason is that the "carriers" as opposed to the "exhibitors" would still remain to hand on the defect to their offspring. But it is not to sterilisation limited to this small certifiable group that we must look in the future to prevent racial degeneracy; it will be necessary considerably to reduce, even if not entirely to prevent, the production of offspring among this subnormal group as a whole, if we are to avoid national and racial decline. It is indeed the enormous numbers of this section that rules out segregation as a complete solution. Sterilisation, therefore, partly voluntary, perhaps in the future partly compulsory, becomes

the only practical alternative method of bringing this about.

It has been suggested that sterilisation would lead to an increase in sexual promiscuity. This, however, does not seem to have been the case in California, the one State in which legalised sterilisation has been practised on any considerable scale. In speaking of the U.S.A., I may mention that in Ohio the feeble-minded amounted in 1917 to 1 per cent. or 10 per 1,000 of the population. One feeble-minded man left at large had, after five generations, 75 feeble-minded descendants living.

I realise and appreciate the objection to sterilisation which is raised by many persons on religious and ethical grounds, for instance, by Roman Catholics and others. At the same time I believe that such objections can be met. The objections so made against sterilisation remind me of those with which we are familiar in the case of birth control. Sterilisation, so it is urged, means the doing away with the "fear of consequences" which may follow selfish indulgence or immoral conduct. Apart, however, from the question of the real value of "fear of consequence" as a deterrent, there is the important fact that in the case of mental defectives, moral responsibility and self-control are largely absent. Mental defectives, even in the higher grades, are not capable of adjusting their conduct like normal persons. Hence, in such cases, while sterilisation does not affect the motives or the restraints which activate or control action, it would protect the community against the results of immoral conduct as far as racial deterioration is concerned.

Another objection that has been suggested is that the prevention, by sterilisation, of procreation of offspring by

mental defects of the higher grades would prevent the possible birth of genius. Such an idea, however, involves a misconception of the relationship between genius and feeble-mindedness. The fact is that though genius may be associated with various forms of mental instability, including insanity, genius is *not* associated with mental deficiency, which is essentially a failure in development of the brain and mind of an innate, congenital kind.

In these remarks we have been dealing with sterilisation of the voluntary kind, that is when performed with the consent of the person sterilised, or in the case of mental deficient with the consent of parents or guardians. The proposal now made is that sterilisation, so performed, should be recognised by law, and that it should be safeguarded in practice by appropriate medical, expert, and legal safeguards.

To sum up the position in regard to sterilisation, it is recognised that unless it can be so extended in the future as to include "carriers" as well as "exhibitors" it will not solve the problem of the prevention of mental defect. I suggest that it is the "carriers" who will eventually have to be sterilised or otherwise prevented from producing offspring in the national and racial interests.

The "exhibitors" ought to be dealt with by segregation, whereby not only their own lives would be rendered happier and more useful, but by which also they would be prevented from handing on the defect to posterity. But here also sterilisation should be available for a certain section.

POSSIBLE NEW METHODS

In thus speaking of sterilisation we must also remember that the present surgical position will not be the last word

on the subject. We can, I think, reasonably look forward to the employment of some physiological method of preventing, temporarily or permanently, the production of germ-cells, without otherwise curtailing the bodily or mental powers of the individual.

We have only to consider what we already know about the effect of radiation (in its many forms) on fecundity, and the facts already ascertained about immunology and cyto-serology, to realise the great possibilities which such methods may contain in the future. Moreover, recent investigations into the properties of certain accessory food factors or vitamins in promoting and reducing fecundity have also an important bearing on this subject.

Meanwhile, the position from the national point of view is serious and urgent. In the Report for 1928 of the Chief Medical Officer of the Board of Education, to which I have already alluded, Sir George Newman uses these words: "There are no doubt certain cases of mental defectives for whom marriage should be denied, or who would be better confined in custody, *or even sterilised.*"

THE EDUCATION OF PUBLIC OPINION

Before, however, it will be possible to bring pressure on local authorities even to make full use of the powers they already possess to segregate the "exhibitors" of mental deficiency in their areas, it will be necessary to arouse public opinion and to bring about a fuller appreciation of the gravity of the problem of mental defect, and the need for wise governmental, departmental, and legislative action.

The arousal of a more sensitive "racial conscience" in our citizens must be achieved before we can hope to see any effective use made of sterilisation as a preventive of mental

defect in that large subnormal section of the population in which, as the Report states, the mental defectives themselves are mainly found.

It is the "carriers" and not only the "exhibitors" who are the danger. It is they who must leave fewer offspring if the national interest is to be safeguarded.

It is these (rather than the "exhibitors") who present the real difficulty as far as the future of our British race is concerned.

I have already said that segregation for "carriers" on this enormous scale is out of the question, nor is it in the interests either of the individuals segregated or the community. While segregation, or segregation with sterilisation in special cases, is the remedy as far as the "exhibitors" are concerned, I look to the growth of public opinion, reinforced by religious ideals and by an ethical code which regards it as immoral to hand on, knowingly, hereditary defect to offspring, to bring about a change of attitude to this question of sterilisation, in the case of "carriers" of hereditary defect.

I believe that in the near future, individuals and family groups of individuals, who are conscious of the fact that they are, or may prove on marriage to be, "carriers" of certain serious hereditary defects of mind or body, realising their responsibility to posterity, and anxious at the same time, as good citizens, to make the best of their lives, and to serve their day and generation, will welcome sterilisation for themselves as a way out of what may be a great difficulty.

When this voluntary stage is reached on any considerable scale, then the time will be ripe for further legislative action to make sterilisation legally applicable to "carriers" of transmissible defects of body or mind.

There is one statement in the recently issued Report of the Board of Control for 1928 which seems to me to be of doubtful validity. After pointing out that out of 300,000 mental defectives "200,000 must remain in the community while they are at the same time wholly unfitted for parenthood," the Report goes on to say that a rational use of supervision and guardianship, and an enlightened and educated public opinion, would go a long way to eliminate, or to reduce to a negligible minimum, the risk of procreation (that is, without recourse to sterilisation).

Surely this is open to doubt. Even under the improved conditions anticipated in the Report as a necessary accompaniment, and even with the further suggestion that all marriages of defectives should be prohibited by law (with which we shall all agree), surely it is difficult to believe that the perpetuation of mental defect by procreation of offspring would thus be prevented, in the case of these subnormal individuals, human nature being what it is.

It is with the problem of sterilisation, as with that of birth control. We must first, by education of our citizens on biological lines, get rid of prejudice and misconception. We must teach the public that wise action is essential in both cases. We must get our fellow-citizens to realise the danger to our nation and race which the continued breeding from this defective and subnormal section of the population involves.

No doubt, the old cry of interference with the liberty of the subject will be raised, but surely true liberty consists in opportunity for the development of all that is best in each individual, for the service of, and in the interests of the community.

Where normal capacities are absent, and are therefore

incapable of development by training, then racial welfare and racial interest demand that such defects shall not be handed on to future generations.

One final word as to the attitude of mind in which, as it seems to me, we should approach, and endeavour to solve, this problem of mental deficiency. While fully sensible of the sad lot in life of these our less fortunate brothers and sisters, and while doing all in our power to make their lives more healthy, more or less self-supporting, and happier, we must see to it that the burden of mental defect is not perpetuated and handed on to future generations.

The problem is a difficult one. It will take time. It will require not only further knowledge of the nature and inheritance of mental defect, but also wisdom, that is the wise application of such knowledge to right ends, to ends which will promote not only individual, but racial well-being.

I believe that the suggestions now made are not incompatible with the realisation of this ideal. But I also recognise that to some, perhaps to many, to-day, these suggestions will not be acceptable, while to some minds they may even be a cause of offence.

But we must envisage the future, and I feel sure that our children of the next generation will not only take efficient steps to prevent the transmission of mental and bodily defect to offspring;—they will wonder why we, of this generation, did not do the same.

CHAPTER XIII

IS THERE A SOCIAL CONSCIOUSNESS ? ¹

THE old question, " Does a Nation possess a soul ? " still awaits an answer.

This is no modern problem. Plato in the Republic asks the question whether the State possesses a soul, and he makes Socrates answer that " States are as men are, they grow out of human characteristics."

But I cannot find that Plato came to any definite conclusion as to the nature of this State soul, or of the relation of social to individual consciousness. Plato, like other Greek philosophers, attached much importance to human agency as the main factor in the development of the State.

In later times Hobbes was concerned with the same problem. He says: " For by Art is created that great Leviathan called a commonwealth or State (in Latin *civitas*), which is but an artificial man, and in which the sovereignty is an artificial soul."

In the time of Plato, as in that of Hobbes, scientific knowledge concerning life and organic growth was limited, and " making by human agency " often stood for what we now regard as a process of organic growth, wholly or partly outside human control.

But while the older philosophers regarded the State as the outcome of human manufacture, and while modern

¹ Introductory Paper read at a College Staff Discussion Meeting, March 1925.

thinkers regard the State, like the individual, as the product of evolutionary development, both factors, organic growth on the one hand and human agency on the other, must be taken into consideration in any study of social evolution.

A society grows, and as it grows it helps to mould individual character, while the character and conduct of the individual citizens react upon and help to determine the character of the society.

It is the old story of innate capacities reacting to environmental influences, and the State, like the individual, is the outcome of this reaction.

It was, no doubt, the growth of biological knowledge during his lifetime that led Herbert Spencer to elaborate his well-known comparison between the individual and the social organism ; especially in his *Essays*, in the chapter on the Social Organism, and more fully in his *Principles of Sociology*. In fact, the very title, the "Social Organism," indicates the change which had come over scientific thought in later times concerning the nature of society.

Spencer pointed out in much detail the various ways in which the social organism resembles the individual :

- (a) It grows.
- (b) While growing it becomes more complex.
- (c) While becoming more complex its parts at the same time become more definite and more integrated.
- (d) And its length of life is increased when compared with the lives of its parts.

We need not discuss the various analogies which Spencer described between the structure and function of the component parts or organs in the individual, and in the social organism. For instance, the circulatory system in the individual, and the transport system in a society, by which

food and commodities are distributed to its members, both serve a similar purpose. But it is with the co-ordinating methods in the two cases that we are now more especially concerned, and it is here that some of the difficulties lie in any complete comparison.

The growth of biology and psychology since Spencer's day, however, enables us to take a wider view of life and mind, and thus overcome some of the difficulties which in Spencer's time appeared to be insurmountable.

Recent views as to the constitution of the physical universe and the nature of matter, and the relation of matter to electrical and other forms of energy, also enable us to look at the problem of life and mind, and the relation between them, from a wider standpoint than was perhaps possible then.

Matter is now regarded as a manifestation of electrical, or even of some more fundamental form of energy. Mind also is now regarded by many thinkers as the expression of energy of some kind. The same purposive and directive characters which distinguish living from dead matter, when raised to a higher power, also distinguish the mental activity of nerve cells from the activities of other living tissues.

It may be that as modern physical research has led to the conception of the electron as a point electrical charge with an attendant train of waves, so too neuro-psychical energy may be partly corpuscular and partly undulatory in nature.

The problem of the essential oneness of all forms of cosmic energy and the interchangeable character of its various manifestations also bears on the nature of the association between Neurosis and Psychosis in another direction.

It is generally believed that when, during activity in the human brain, neural energy is raised to a sufficiently high level, it then becomes associated with psychic manifestations.

Under such conditions, however, the tendency of direction is from the neural to the psychical, just as, in the case of neural activity, the flow of the neural wave is from the afferent to the efferent side of the nervous system.

Any evidence pointing to a flow of energy in the opposite direction, that is from the efferent to the afferent side of the individual nervous system, is difficult to obtain.

It will be said that the observations and the findings of the modern school of Psychology point to a direct influence of the mind on the body.

We are, however, not now concerned with the problem of the existence of such an influence, but rather with the means by which it may conceivably be brought about.

If direct communication is to be established between individual minds in order to achieve social consciousness, then it seems at first sight necessary that mind should act directly on matter, that is, on the neural mechanism which subserves the psychic process in the individual, and this means a reversibility of direction in the current of energy. It also means that energy, either in the psychical or in some other form, must cross the gap which separates mind from mind in human beings.

Perhaps in the future this reversibility of flow will be brought about by a raising of the physical to the psychical, and by a lowering of the psychical to the physical on either side of the gap. That is, if all forms of energy are one in essence, and are interconvertible and become manifest in

different aspects according to varying conditions. It is not in this way that telepathy attempts to bridge the gap between mind and mind. In the telepathic view, as I understand it, mind must first undergo a process of disembodiment, and become dissociated from matter before it can directly communicate with, or influence, mind.

The former is, however, the method by which one individual communicates with another under the conditions which now exist on the earth. It seems reasonable to believe that it will be by further evolutionary development along these lines, either by improvement in human afferent and efferent organs, or in a facilitated interchange between the various forms of energy, neural, psychical, and physical, that further progress will be brought about, and the gap will be bridged which now separates the neuropsychic processes going on in different individual brains.

This raises a further question as to the nature of neuro-psychosis in the individual: Is there any evidence pointing to an association in time, of neural with psychical activity in the manifestation of consciousness?

If the psychical event follows, even by the merest fraction of time, the neural event in the neuro-psychical process, this would support the conception now put forward of activity in some common form of energy, in which activity of the neural counterpart precedes, or becomes converted into, energy in the psychical form. If, on the other hand, it can be shown that psychical precedes neural activity in the higher centres of the cerebral cortex, when consciousness is present, then this would suggest that the psychical counterpart stands in a causal relationship to the neural. While

if both can be shown to have no serial relationship, but to be coincident and coterminous, then we should perhaps be justified in regarding both events as constituting two aspects—two associated manifestations of one underlying reality.

But how does this conception of psychic or mental activity, as being related to other forms of energy, animate and inanimate, help us in our comparison between individual and collective consciousness? How far does it enable us to ascertain the grounds, if there be any, on which we can reasonably attribute personality to society?

It helps us, I think, by co-ordinating and interrelating physical, vital, and mental activities.

In the first place, some possibility of intercommunication, through a common medium between the individual minds, must be reached before we can postulate a collective consciousness having any effective or directive influence over the minds which compose it. Let us consider for a moment the structure and function of the central nervous system in the individual. We find that the development of the brain is governed by the same ontogenetic and phylogenetic laws as those which govern the development of other organs which make up the individual organism. In both, physiological division of labour is an essential feature.

The important point is that the brain is built up, on the physical side, out of a number of nerve cells or neurons, arranged, not in absolutely continuous but, as many neurologists think, in discontinuous but very close contact in a common medium.

The branching fibrils or dendrons of one nerve cell arborise with, but are not directly continuous with, those

of the neighbouring cell,¹ and it is in this common medium, or synaptic field, in which these fibrils lie, just separated at their terminal ends, when a wave or current of nervous energy of sufficient intensity passes across the gap from one nerve cell to the other, that psychosis becomes associated with neurosis and consciousness supervenes.

It is not, apparently, during the steady flow of the neural wave through the nerve cell or the nerve fibre, but when the wave leaves one cell and passes into another, among the myriad cells which form the higher association centres in the brain ; it is in the make and break phase of this flow that the glow of consciousness arises when the points of contact are sufficiently numerous, and the energy of the nerve current is sufficiently intense.

At this point I wish to make it clear that in thus discussing some of the conditions under which psychosis becomes associated with neurosis, we are not thereby committing ourselves to any one view as to the nature of consciousness itself. We leave on one side, as not essential to our present discussion, such questions as Monism, Dualism, Parallelism, and Interaction, as interpretations of the nature of Mind, and of the relation of psychical to bodily activity.

We start with the established fact that under certain conditions, especially where there is sufficient complexity and integration of the nervous mechanism, nervous activity is raised to a higher power and becomes associated with psychic manifestations. The interpretation of this

¹ In thus assuming discontinuity as a feature of the nerve fibrils in a neuronie arc I am not unmindful of recent researches. See a paper by Dr. O. W. Tiegs, on "Neuro-fibril Continuity," Section D, British Association, 1928.

fact and the real nature of the relation between these two events need not now detain us.

In thus comparing individual with social psychosis it becomes evident at the outset that the individual brains which together form the social nervous system or communal brain are not in the same intimate spatial relationship as the neurons or nerve units which form the individual brain, but as we have just seen, the contact between these neurons is probably not so direct as was at one time supposed. They lie, it is true, in close juxtaposition, in a common medium, and it is during the passage of the nerve current across this synaptic field that psychosis arises. Further, it is believed that these terminal fibrils of the nerve cells are capable of protrusion and retraction, like the fine dendrons of an active leucocyte, and that the focused intensity of consciousness at any time, in any given area of the brain, may be related to the distance which separates the fibrils of one cell from the fibrils of another. It has indeed been suggested that sleep may be the result of the retraction of these juxtaposed dendrons. Now all this points to the importance of the medium in which these nerve fibrils are embedded, and the amount of resistance which has to be overcome in the passage of the nerve current from one cell to the other across this medium. This suggests that the apparent difficulty arising from lack of direct contact in the case of the individual brains which make up the nervous system of society may, after all, be a question of degree. At any rate, it helps us to focus our attention on the medium which separates and interrelates the units in the two organisms, the Individual and the Social.

We proceed to enquire, then, as to the way in which, and the means by which, neuro-psychical communication may

be established between the individual minds which make up the social or collective mind.

Judging by the analogy of the individual consciousness it will be at the "make and break" phases in this medium, when the message leaves one brain or mind and enters another brain or mind, that any manifestation of social consciousness will arise.

I mentioned that our knowledge, not of the fundamental nature, but of the conditions under which electrical, nervous, and other forms of energy become manifest has increased in recent years. We now know that the electric current is associated with movement among electrons, and that this movement forms a condition of the flow of an electric current. We also know that the passage of a nerve current along a nerve fibre is associated with a recordable change in the electrotonic state of that nerve fibre.¹ As we gain more knowledge of the structure and function of electrons and of nerve elements or neurons, more light will be thrown on the structure and function of the combined organ, the social nervous system, and some of the difficulties which now relate to an apparent lack of structural continuity will disappear.

Further, in dealing with the problem of collective consciousness it is very necessary to remember that whatever may be the stage of evolutionary development now reached by the human brain, and the human personality associated with it, the social brain, with its associated social consciousness, is by comparison still in a very primitive and undeveloped stage. Hence, we are not justified in taking even the nation as an example, and concluding that owing

¹ Prof. A. V. Hill's researches have also shown that heat is produced in the nerve fibre under such conditions.

to the evident lack of co-ordination, integration, and intensity in its psychic life, no rudiments of a social consciousness exist in a nation.

Further, we must remember that, just as the individual can only develop his full personality in proportion as he becomes a social unit and leads the social life, so the group or nation can only reach full development when it plays its part as a unit in an international or world community. It is only when we remember this fact that we begin to see how very far mankind is at present from realising that "world-consciousness," that soul of humanity, which must be attained before the human race can reach the highest stages of its career.

Although neuro-psychosis in the human individual has reached a certain level of integration, and although human personality has become more or less unified, traces of its compartmental nature are still revealed during the growth of the mind from childhood to maturity, and during its decline from maturity to old age. The child, when quite young, may resemble mentally its father and its father's relations, and at a later date its mother and its maternal ancestry, or vice versa. Or it may, in adult life, recall the mental characteristics of some strong-willed or specially gifted progenitor.

The mode of inheritance of mental, like that of bodily, features is *particulate*, and the character and the personality of the individual depend on the way in which these different cognitive, conative, and affective inherited traits have become unified and integrated into one whole. In like manner, the disintegrating effect of disease, acting on the nervous system, may bring about a corresponding mental dissociation.

The alternating phases of a dual personality, of which examples occurred in certain soldiers as the result of violent emotional shocks received during the War, also illustrates the same fact that the mind, under certain conditions, can be dissociated into its component parts, though the dissociation under such conditions must be regarded as pathological. The mental phenomena which arise during hypnosis also illustrate the same thing.

Further, modern psychology lays stress on the importance of the subconscious in the psychic life of the individual. Here again the effect of conflict between the instinctive, and the controlled, or repressed phases, of mental activity in early life, may show itself at a later stage in some psychical dissociation which again recalls the compartmental plan on which the mind is built up.

The manner in which different children wake from sleep is also of considerable interest from this point of view. One child will wake "all at once" in a happy frame of mind, with its brain getting to work quickly and as a whole; another will wake "in bits and by degrees," with the mind feeling its way, as it were, to unified action, and such a waker often shows signs of irritability, discordancy, and slowness in responding to stimulation.

Careful enquiry into the family history and ancestral traits in such cases will often reveal an hereditary factor in the transmission of these intellectual and emotional characters from parent to child.

There is also much to be learned from observation of the way in which consciousness is lost during the artificial sleep of anæsthesia. Personal experience of nitrous-oxide anæsthesia, for instance, shows that the transition from full mental activity to complete unconsciousness is not a steady

continuous passage, but a sort of staircase in which blank periods of increasing length are succeeded by momentary returns, more or less complete, to consciousness, until these are blotted out and the full anæsthetic state is reached.

Recovery from such anæsthesia is also marked by a gradual transition from a state of less to greater rousability on stimulation, from a general to a more particular awareness, from a sense of inability, to one of ability to initiate movement, and to respond to external influences.

In this, then, and in other ways, we learn that individual personality results from the welding of associated neuro-physical component parts or elements into one unified whole.¹ The same would seem to be true of the less completely unified collective consciousness which represents the personality of a group, or of a society.

It may be that this group mind or social consciousness is not, as yet, sufficiently developed to deserve the attribute of personality, but this does not mean that it will not become personified as human civilisation develops.

As a matter of fact, the path followed by human evolution in its earlier stages, and even up to the present time, does not seem to have favoured the growth of collective consciousness. Renan and other thinkers have pointed out that the aspects of mentality which have become chiefly developed in the individual are those which have enabled man to maintain contact with the physical rather than with the psychological world.

It may be that the human brain has not yet developed sense organs and perceptive capacities (other perhaps than those of vision) which can enable it to receive and to perceive waves of psychical energy in the surrounding medium,

¹ See also Pavlov, *Lectures on Conditioned Reflexes*.

such as could serve as a means of direct communication between the individual units which form the collective mind.

But the environment of civilised man is rapidly becoming more social and more psychical. The struggle is no longer with nature and natural forces alone, but is becoming one of conflict, or co-operation, with his fellow-men and with their mental activities. This means that the social and the psychical aspects of human life will assume increasing importance, and a growing survival value as civilisation develops.

We must now consider in rather more detail some of the difficulties which stand in the way of accepting this, or indeed any other, conception of a collective personality.

1. It has been objected that such a conception involves the use of the same individual consciousness twice over. It is employed first in its individual and again in its collective form. But the same objection applies in the case of individual consciousness in relation to the consciousnesses of the nerve cells which compose the individual brain. Out of the combined neuro-psychical activities of the individual nerve cells there arises a unified form of neuro-psychosis which seems to embrace something more than the combined activities of these individual units. If this be true of individual personality, then the objection breaks down in the case of the collective mind, because the consciousness of the units is used similarly in both cases.

2. The absence of any apparent unified character in brain function, so unlike the unified stream of consciousness, as we know it in the individual, has suggested to some thinkers that these diversified neural correlates perhaps interact with some outside immaterial or psychical entity. On this view, the unified nature of individual

consciousness would be explained by the fact that the psychological correlate on which the neural correlate operates is itself an entity. But the same conception can be used to get over the same difficulty in the case of social consciousness. If the idea of the existence of a psychological entity, with which the neural processes interact, be valid on other grounds, we can extend this idea to the social organism, and regard the neural correlates of the individual brains as interacting with some universal psychological entity.

In thus speaking of the absence of any unified character in brain function, I am not unmindful of the fact that the older conception of localisation of brain function, in its cruder and earlier form, is undergoing change, and that according to more recent neurological opinion, although certain areas of the cerebral cortex represent centres, or gathering-grounds for neural waves specially concerned with certain sensori motor tracts, yet, notwithstanding this, the brain acts not in separate compartments but as a whole.¹

3. Perhaps a more serious difficulty is the apparent absence of any real continuity in space between the individual brains which form the social organism. If we judge merely by the effect on individual consciousness of any interference with the continuity of the neurons, then the absence of this structural continuity between individuals, through which neural messages can be transmitted from one brain to another, does no doubt, at first sight, offer a serious difficulty. But as we have seen, modern research goes to show that the arborisations of the nerve cells in a common medium are not in direct structural continuity.

¹ See James Collier, *B.M.J.*, January 11, 1930, "Localisation of Function in the Nervous System."

In fact, it may be that this break in the continuity of the nerve structures is an essential factor in the transformation of neural into psychical energy, or rather in the manifestation of energy in the psychical form. It may be that no real consciousness can arise in the absence of some medium which allows of close juxtaposition without actual contact. Thus the question becomes one of the nature of the medium which separates and at the same time connects, the neurons in the individual brain and in the different brains in the social organism. Everything, in fact, turns on the *possibility of intercommunication*. It is at this point that modern conceptions of the nature of the physical universe, and of the relation between electrical, neural, and psychical forms of energy, and probably other forms, are so important.¹ It may be that the ether of space, as in Sir Oliver Lodge's view—or the space time continuum, as in the relativity view, may provide a means by which psychical communication can be established between individual personalities.

4. Another difficulty arises when we try to define the stage of development in any society at which social consciousness can arise. Does a crowd possess this group consciousness?—or does it only come into existence when the individuals who form the crowd are tuned to a common emotion? What happens to it when the crowd disperses? But the same difficulty applies to the problem of the birth of consciousness in the individual. At what stage does it arise in phylogenetic or in ontogenetic evolution? Does the amœba, or the worm, or the insect possess it? Does the baby possess it? The true answer probably is that all living organisms possess the rudiments of it, in propor-

¹ More recent conceptions of the physical universe seem to lead away from the rigid determinism of the earlier mechanistic view.

tion to the stage of development of the nervous mechanism in each case. Psychosis seems to become manifest, but not necessarily to begin, when the neuro-psychical activity reaches a certain stage of development in the species, and in the individual. What happens when the individual units whose co-ordinated psychical activities represent consciousness are again dissociated as in sleep, or in death? We do not know; all we know is, that whatever happens in the case of individual psychosis may happen in the case of group consciousness. It may be that each persists in proportion to the stage of development at which each has arrived.

5. A still further question arises. Is collective consciousness (even if it exists) an epiphenomenon merely—or does it react on the individual minds and mould the activities of the society which manifests it? What has history to tell us on this point? Have social aggregates in the past exhibited mass movements, religious or political uprisings, which cannot be explained as the sum of the activities of the component minds, acting in response to some common stimulus which affects them all?

In the case of the individual, mental capacity in its most fully developed and integrated form is generally associated with some power to control the current of thought as well as the line of action. The biographies of men of outstanding general, as opposed to special, ability show that such men and women have frequently been able at will to divert their train of reasoning and focus it on some other problem. There is some evidence that the social mind can react upon its component minds in somewhat the same fashion. History records many examples of mass movements and concerted activities on a large or national scale, affecting tribes or nations under the stress of some widely acting,

powerful stimulus. Revolutions, at different periods, in different countries, although doubtless the outcome of predisposing social, economic, and other environmental influences, have often been precipitated by some psychological factor which seems to surge up at a definite period into the conscious life of the nation. Migrations of peoples on a large scale, as recorded in the Bible, and the Crusades, which were a prominent feature of European history in the Middle Ages, afford further examples of mass movements on such a national or international scale.

In our own day the rapid and complete manner in which the Japanese nation has discarded agelong habits and modes of life, and has assimilated Western thought and Western customs, cannot be wholly the result of a change in the innate mental constitution or racial character of the Japanese people. The time has not been long enough for such a slowly moving influence to operate. It has rather been the outcome of a change in mental attitude, taking its origin in the upper strata of Japanese society, and permeating a considerable section of the Japanese population. A change of spirit, not due wholly to educational influences.

There is another point affecting psychosis in the individual which has some bearing on this question of a reaction by a social consciousness on societies and peoples in the mass. We are profoundly ignorant of the real nature of mind; but we may perhaps speculate as to whether the psychical form of activity, the stuff out of which mind proceeds in the individual, is uniform in composition like the primordial substance or form of energy out of which, as modern research suggests, the different forms of matter have been evolved.

If we assume, as we must do, that intellectual capacity—such, for instance, as distinguishes the human mind from that of the lower animals, and the minds of great from those of ordinary men—if we assume that this difference depends on the completeness and the directness with which the microcosm of the individual mind represents and reflects in space and time the macrocosm of the world without, then we are led to enquire how this fuller and truer representation in the world of mind is brought about. Is the greater fullness and accuracy of the process in one mind, as compared with another, due to any intrinsic difference in the volume and intensity of the neuro-psychical wave, as it traverses the different nerve paths and crosses the different synaptic fields in the brain? Or is the difference due to a greater complexity and diversity of nervous channels through which the wave flows? or is it due to both factors, to a qualitative as well as a quantitative difference—a difference in kind of energy, as well as a difference in the mode of flow and the path traversed by the neuro-psychic wave.

The facts of biological evolution suggest that an increasing complexity of neural mechanism always accompanies a higher development of psychical life. Thus it looks as though increasing complexity and increasing co-ordination of the medium in which the psychical experience arises are necessary to a fuller development of conscious life in the individual, and probably also in the society.

But when traced backwards to a still earlier stage, various forms of matter, as we recognise them, seem to arise out of more primary forms, and when we press the enquiry still farther back, this primary matter stuff, or protyle, becomes still further changed into energy, in its various

modes of manifestation. So too with mind stuff. The imponderable form of energy, whatever it be, which is associated with consciousness may be one in essence, operating in different mediums and through various channels. Farther back still these two forms of energy, the physical and the psychical, may merge into one form, the ultimate reality which lies behind all existence.

But the trouble has always been that as we trace these various forms in which energy manifests itself back to earlier sources, mind, like matter, in its earlier phases, seems to become less personal. But this may be the result of our very imperfect conception of what personality really means. Our idea of personality is derived from our limited experience, as we recognise it in ourselves and as we extend our conception of it to outside existences. But this may represent a very imperfect and limited idea of what personality really implies. However this may be, the further development of intellectual and moral progress waits on the evolution of higher capacities in the human brain and in the psychical life which is associated with such capacities. But this means the improvement of human nature, and brings us to the problem of eugenics, a subject which we cannot now discuss.

Some light on the problem of social consciousness may be gained from the study of psychical manifestations among primitive societies. It is a suggestive fact that the more striking examples of community and simultaneity of emotional experience, leading to common action, have been, for the most part, recorded in uncivilised peoples and among savage tribes. McDougal's instance of the wave of excitement which rapidly passed through a crowd of Borneo natives, without apparently any time or opportunity for

transference from one to another individual by the ordinary channels of gesture or language, and which ended in the common action of hurried flight, is a case in point.

The suggestibility of the ordinary crowd, even in civilised societies, is well known. Some individuals are possessed of unusual powers of dealing with mathematical or other problems in a manner which suggests an intuitive process, rather than the step by step method by which the ordinary person arrives at the result. But these exceptional gifts, as in the case of the calculating boy or the blindfolded chess-player, do not necessarily go with an exceptionally developed intellectuality in the all-round sense.

It is apparently the same with the primitive society. The successive stages by which the emotional experience is reached, or the steps which lead to the special line of action, are telescoped and shortened into a subconscious, intuitive process. This appears to possess a group character, a community of origin, and a simultaneity of expression, beyond that which characterises the thought and conduct of associated individuals under ordinary conditions.

Here we are confronted with a paradox. On the one hand the grouping of individuals in a mass or crowd seems to lower the individual mentality to the level of the average mentality of the crowd. It tends to disintegrate self-consciousness, and to destroy the sense of individual responsibility ; it dissolves personality. On the other hand it is only by and through the social life, by life, that is, spent in and for the community, that the human spirit gains the higher levels, and reaches its full powers of self-expression.

But this, after all, is the old difficulty, which we have already encountered in another form when discussing the apparently opposing claims of individual and communal

interests. This difficulty represents, in essence, one of the most fundamental problems of existence. It is the old question of the relation of the part to the whole, and though we cannot hope to reach the final answer, it would seem to be true that it is the kind of society, the stage of its mental evolution, the degree of co-ordination and integration of its psychosis, in short, its character and its personality, which determines the kind of influence it exerts on the individual minds which compose it. It is this which produces a degrading and disintegrating effect on the one hand, or an ennobling and unifying influence on the other.

CONCLUSION

But it must not be thought that this question of the existence of a collective consciousness is one of mere academic interest, having no bearing on human life.

We have already seen that on our answer to this question largely depends our attitude to the wider question as to which represents the paramount interest, the individual or the society. Is the welfare of the individual the supreme end, to the accomplishment of which the State is only a means? Or is the welfare of the community the main object, to which the interest of the individual must give place when the two are opposed? Or, perhaps more truly, must not both interests be kept in view? The practical problem of social life is how to harmonise these two interests, and the degree to which they *are* harmonised in any community provides a real test of the stage of civilisation to which that community has attained.

If any enquirer, who doubts the reality of progress in human affairs, should ask for a true criterion of progress, I

think it might be found in the extent to which this harmonising of individual and social interests has been attained. This, in my view, means the extent to which a collective or social consciousness is coming or has come into existence in any given society.

Let us apply for a moment this supposed competition between individual and social interests, and the possibility of harmonising them, to those units in the individual organism, the brain cells, by the co-ordinated activities of which the emergence of individual consciousness and personality are made possible.

The interests of these cells are secured by losing something to the whole, and by gaining something from the whole. The highly specialised brain cell has lost a power which the unspecialised germ cell retains of reproducing the whole. Indeed, the nerve cell has lost the power of reproducing even itself by cell division, a capacity which many of the other body cells still retain. But it has gained, at the same time, by becoming a part of a more highly developed neuro-psychical whole. Progress does not consist in restoring so-called ancient rights and powers, as, for instance, the power to reproduce the whole to the individual cell, but in a growing specialisation of the cells or units along with participation in the larger life and activities of the whole.

In this matter of individual versus State interests, and in that of the dawn of a social consciousness, it looks as though progress in the psychical sense depends essentially on a fuller participation of the individual in the collective consciousness of the society or nation, and the extent to which this larger life reacts upon individual personality by affording opportunities for further development and fuller expression. But along with this gain must go some relin-

quishment of the claim and the wish on the part of the individual to be a whole in itself. He who will lose his life shall find it in the larger whole.

The right relation of the part to the whole, of the individual to the community, and of the community to the individual, lies at the very root of the many difficult problems which underlie our troubled civic and political life to-day. While perhaps it is not necessary to wait for complete knowledge before attempting some solution of these difficult problems, it is certain that a fuller knowledge of their real nature would make this solution easier and more permanent.

A few words may be added about the manner in which mankind in earlier days, and at the present stage of his career, has interpreted this implied, though not always expressed, relationship of the individual to the physical and psychical environment. That is, the relationship of part to whole. The one outstanding feature has been that throughout human development, from early animistic through polytheistic and monotheistic stages, the tendency has been, at any rate in the earlier periods, to clothe inanimate nature with human attributes. It is a significant fact that as human capacity develops, a tendency also becomes manifest towards the integration by the human mind of surrounding consciousnesses and spirits into one universal consciousness, one all-pervading spirit. Monotheism tends to replace polytheism as a conception of the Deity.

Further, as far as we can see, one of the results of the evolution of life and mind, or, may we rather say, one of the ends of existence, has been the development of individual personalities on the one hand, and a world or human-race consciousness on the other. In this process of psychical

integration, the growth of a group consciousness has been an important factor. It is true that the physical framework, the neural organisation which subserves this social psychosis, seems at present to be insufficient and rudimentary, but in view of what has happened and is happening in the physical world, in the increasing facilities of communication between individual minds, this apparent inadequacy of the physical or neural basis does not seem to offer an insuperable difficulty.

However this may be, there can, I think, be no doubt that the view individual men and women take as to the nature and probability—may we not add, as to the desirability of a personal immortality—will influence the opinion they hold as to the existence of a social consciousness, and the relation of the individual to the universal mind.

There are, indeed, grounds for thinking that our attitude in regard to this question of partiality in unity in the psychical sphere depends more upon the hereditary and innate mental make-up of the individual than has been ordinarily supposed. Education and other environmental influences, including influences derived from the communal and the universal mind, so-called revelations, have no doubt all played an important part in moulding our mental attitude to the realities of existence ; but much depends on the inborn tendency and disposition of the neuro-psychical organisation which reacts to the moulding process.

To one man the idea of the cessation of individual existence after death comes as a shock and fills him with anxiety and dread ; to another, survival, if it takes the form of continued existence in the present individual and personal form, affords no great solace ; while to others, the idea of

the absorption of the individual in the universal mind offers a wider vision and provides a larger hope.

In all ages the spirit world has occupied the mind of man. The relation of the individual to the universal Mind, in other words, of man to God and God to man, has been the great problem of human existence.

It has occupied the greatest minds in the past, and will continue to be the great quest of the human spirit in the ages to come. As human nature and human capacity develop, so will this problem grow in depth and meaning. The one supreme test of our human civilisation in the future will be the manner in which men and women, individually and collectively, regard this fundamental question, and the manner in which it reacts upon individual and communal life.

Finally, just as it is difficult to decide at what stage in organic life, from amœba to man, or at what period in the pre-natal or post-natal life of the human embryo, neurosis begins to be associated with psychosis, so also we cannot yet be sure what degree of integration and development the social organism must attain before group consciousness can arise or can become manifest.

Many indications, however, suggest that the future evolution of the human mind will travel along these lines, and that out of a group consciousness there will develop in the fullness of time a Soul of Humanity.



*Printed for H. K. Lewis & Co. Ltd. by
Hazell, Watson & Viney, Ltd., London and Aylesbury.*

