The failure of vivisection and the future of medical research / being the prize essay in a competition instituted by the Leigh Browne endowment / by Arabella Kenealy.

THE FAILURE OF VIVISECTION

AND THE

FUTURE OF MEDICAL RESEARCH

Being the Prize Essay in a Competition

INSTITUTED BY THE

LEIGH BROWNE ENDOWMENT

BY

ARABELLA KENEALY, L.R.C.P. & L.M. (DUBLIN)

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"Whatsoever that be which thinks, which understands, which acts, that is divine and celestial, and must necessarily be Eternal."—CICERO.

"Nature continually presents us with ready-made experiments of the most delicate and suggestive kind, impossible for mechanical artifice to realise, on account of the conditions under which artifice must necessarily work."—PROF. CHARCOT.

THE

FAILURE OF VIVISECTION

To this Essay was awarded the Prize of £50 offered by the LEIGH BROWNE ENDOWMENT *for the best Essay on the following subject, namely—*

The Failure of Vivisection as a Means of Promoting the Healing Art in Man, with Suggested Lines for Future Medical Research Work without employing Experimentation on Animals.

THE FAILURE OF VIVISECTION

AND THE

FUTURE OF MEDICAL RESEARCH

THE Failure of Vivisection as a means of promoting the Healing Art in man is proved by two facts :

1. That since the first Royal Commission, by sanctioning, conferred upon this survival from barbaric times a fictitious and unmerited value, it has formed the main basis of Medical Science ;

2. And that while all the other Sciences have made notable strides, keeping so well ahead of material progress as to have equipped themselves with knowledge and with resources greatly in advance of human needs, Medical Science has been left far behind, outpaced and powerless before the alarming inroads of a Disease and Degeneracy which have been ever increasing in ratio, ever intensifying in degree. And this despite the circumstance that other Sciences have by their achievements placed new and valuable resources at its disposal.

Increased knowledge of Sanitation, of Personal Hygiene, of Dietetics, and of Nursing have added greatly to our methods of dealing with our sick. But nobody can pretend that these arts have been in any way furthered by the mutilation of living animals.

The modern achievements in Surgery are further evidences of the Failure of Medicine—it being the function of the Art of Healing to arrest disease in its early stages. They are signs, too, no doubt, of a constitutional degeneracy which

tolerates abnormal mutilations and deprivation of organs. (That Surgery owes nothing to Vivisection is shown by the fact that the President of the Royal College of Surgeons stated before the recent Royal Commission that he had attained his eminent position and had, moreover, earned his reputation for operations on the kidney without having made one experiment on animals.)

The Failure of Modern Medical Science, then, is self-evident in face of the prevalence among us (despite our immensely improved social and hygienic conditions) of Insanity, of Tuberculosis, and of an almost universal Degeneracy, as shown by our spectacled, adenoid-afflicted, mentally and otherwise deficient children; by our anæmic, neurotic, and precocious girls and boys; and by our valetudinarian adults, of whom, according to Dr. W. Ogle in the Registrar-General's Report for 1889, one out of every twenty-one men and one out of every twelve women who have reached the age of thirty-five may anticipate as a certainty the terrible scourge of Cancer.

And it has been notably within the last half-century, during which the Vivisectional method of Medical Research has been paramount, hindering and misleading Medical Science, that this deplorable inadequacy of the healing art has become so signal.

For, in addition to the fallacious and misleading results which must inevitably come from the application to man of conclusions based on phenomena in lower creatures, mutilated, in pain, narcotised and anæsthetised, or suffering from diseases artificially induced, Animal Experimentation has taken the place of other and truly valuable methods of research.

So profoundly, indeed, does this fetish-faith in the resources of mutilated animals obsess and obscure the medical horizon, that when Animal Experimentation has failed to elucidate one of the many problems baffling us, the situation is regarded as hopeless. The expedient of attacking it from broader and from more enlightened standpoints seems not to present itself.

Our Medical Scientists of the Twentieth Century take up the false and mortifying position of protesting, "Deprive us of our guinea-pigs and rabbits, and the whole structure and future of the great Art of Human Healing must fall to the ground!"

Yet so little has Medical Science contributed in recent years to the Art of Healing that we find all our wisest and most successful physicians relying more and more upon mere common-sense principles derived from everyday and clinical experiences.

So, although they may pen you a routine prescription, they put but little faith in drugging. They will, however, give you most explicit instructions regarding diet, personal hygiene, and habits of rest and sleep, fresh air and exercise, perhaps of medicated baths and of mineral waters to wash out waste materials from the system. But these cannot be claimed as in any way the products of Vivisection.

Every day are being more and more realised (outside Medical Science) the complex nature of man's constitution, the mysterious and incalculable forces with which it is instinct, the immense influence which the mind and environment exert upon physical health.

Yet within the precincts of orthodox Medical Science these larger, more complex, and more comprehensive truths are virtually ignored, the attention of our Medical Scientists being for the most part concentrated upon the purely artificial phenomena of diseases artificially induced in mice and guinea-pigs.

Owing to some constitutional inherency, hereditary or acquired, to mental or physical overstrain, to mechanical injury, or to the shock of a great grief, a man's central nervous balance may be so disturbed that his physical conscience (the function which maintains the tissues in a state of health) lapses from its standard, and permits a lower form of tissue to develop—a form which, it may be, is a mere reversion to an earlier period of his evolution. These degenerated cells, a little group of disaffected aliens, multiply locally, perhaps migrate and form other centres of disaffection, causing the phenomenon we know as "Cancer."

The normal healthy cells in their neighbourhood rebel against, attempt to segregate and to cast off their degenerate neighbours, thus giving rise to pain, inflammation, ulceration, and constitutional exhaustion.

It becomes a battle between the general system and the local enemy, to end usually, alas ! in the defeat and death of the general system—a defeat and death which are nevertheless an attestation of health, the body succumbing in its strenuous war upon, instead of tolerating further existence side by side with, its degenerate invaders.

Now Medical Science, in the place of going to the fountain-head and studying the racial, social, family, and personal causes at the back of this cell-degeneration, snips off portions of the cancer, takes 100,000 mice, and attempts to grow 100,000 little tumours in them, with the hope of explaining the phenomenon, and, it may be, of inventing a mouse-serum which, injected into the blood of men, will prevent them from suffering the natural and inevitable ill-effects of prolonged mental or nervous overstrain, of mechanical injury, of shock, or of grief.

But in experimenting on the cancer, isolated from the man, they have lost all touch with the *causa causans*. It is probably mere idiosyncrasy which determines whether this degenerative cause shall produce cancer, or diabetes, or some other nervous affection. The whole crux of the matter lies in this : There are certain lines—broad in the healthy, narrow in the unhealthy—between which man may travel without suffering structural degeneration. But if he overstep these lines, his tissues degenerate. In other words, like other human powers, the capacity of tissues for resisting deleterious agencies has limits.

That is intelligible. Nature requires not only to insist upon conditions which shall be most conducive to the present health of the individual, but to insist also upon conditions which shall conduce to his remote constitutional integrity, to his future development, and, further, to the evolution in him of the race.

Nature's aim is not only the preservation of the individual,

but also the preservation and the evolution of the type. And having in her mind a definite idea of the perfectly evolved man, she has been compelled (unless she would make him superhuman) to restrict the limits within which his health can be maintained and his evolution can proceed.

The thing we require to know of Medical Science is not the nature and effects of 100,000 little tumours artificially produced in 100,000 little mice by transplanting a man's cancer into them, but the cause or causes in the man, in his progenitors, or in his life-conditions which led to such grave tissue-degeneration as constitutes cancer.

You can no more acquire knowledge of the human constitution and of the laws subtending it by experimenting with the micro-organisms and tumours which infect man, when he departs from those laws, than you could learn the sanitary system of a city by experimenting with the fungi and vermin which might invade its houses as a result of some defects in that sanitary system.

And you can still less find remedies. For whereas you might poison the vermin and destroy the fungi of the city, you cannot, short of the knife, destroy the tumours or the bacteria in man without otherwise injuring him.

Professor Metchnikoff, one of our greatest Medical Scientists, calculates that the daily increase of bacteria in the human intestine numbers 128,000,000,000,000. Also, "I have examined grapes microscopically," he states, "to find billions of the most deadly microbes swarming over the skins. . . . Eating grapes is suicidal, and to give them to a child is a crime."

Professor W. D. Miller, an eminent authority on Dental Bacteriology, estimates that one milliard one hundred and thirty millions of micro-organisms can be present in one day in a single uncleansed mouth.

Having regard to these colossal numbers, to this overwhelming proliferation, the sane man placidly realises that these micro-organisms must be, like himself, included in the plan of Nature, and must doubtless play an important part.

Not so the Medical Scientist. Detecting under his microscope this enormous daily proliferation of bacteria, he does not use his common sense and realise that, despite these billions of "deadly organisms" crawling over grapes, grapes have nevertheless from time immemorial formed a nutritive and a gratefully refreshing food in sickness and in health. He does not tell himself that, despite the bacteria in his intestine, man's evolution has nevertheless proceeded for some millions of years quite satisfactorily.

On the contrary, he cries in a panic, "Here now are flagrant errors on the part of Nature! Let every man who hereinafter gives to his child a grape be punished as a criminal. Let every person, sooner or later, be relieved by a surgical operation of this large intestine, 'an organ which has become useless,' and which is, moreover, a breeding-ground of deadly organisms."

Professor Metchnikoff proposes, too, to "immunise" men against old age by injecting into their blood a serum derived from some lower creature which should have been previously injected with extracts of human liver and of other organs.

Extreme in his views, he is the advance-guard of modern Medical Science.

"Here is that incompetent Dame Nature," it complains, "recklessly sowing grape-skins with deadly organisms—sowing man's body with them. Here she is carelessly leaving in his interior appendices and large intestines and other dangerous and superfluous impedimenta. Come, now, let us proceed to rectify these glaring errors! Had it not been that Lady Mary Wortley Montagu chanced to bring back from her foreign travels the disgusting practice of inoculating healthy persons with small-pox (subsequently modified by Jenner to vaccination), we should doubtless ere this have been swept out of existence. Had it not been for the fortunate chance that Pasteur one day detected a microbe in a test-tube, who would be living to-day?"

And yet! And yet! This same Science of Nature has, by the marvellous working of the great plan of evolution,

steadfastly and patiently evolved from, it may be an ion and an electron (the smallest calculable atoms of matter and of force), the complex physical, intellectual, and moral organisation which we know to-day as man.

By plague, pestilence, and famine, she has taught, has disciplined, and has led us. For every lesson she has given reward ; for every pain a blessing. Every hard step and abstinence and onward effort has been crowned by some or another added power or privilege. For the pain and the blood and the suffering of the individual she has rewarded the type—that type which is so dear to her, whose ultimate perfection is her strenuous aim.

By making decomposition obnoxious to the senses and injurious to health, she first taught us to restore to the earth (in more highly vitalised condition) material derived from it. In her Schoolhouse of Disease we are instructed in the laws of Hygiene, of Self-Discipline, of Self-Respect. By Malaria we learn to drain and to cultivate the soil ; by infection, to free our air, our rivers, and our food from taint ; by penalties of suffering, we learn self-restraint and moral effort. And, each task and exaction stimulating and evolving faculty, we are making ourselves no longer creature, but master of our material environment ; we now no longer need to adapt our development to it, but we begin to adapt it to our development.

Nevertheless, with these facts of evolution before them, the chief aim of Medical Scientists is in the direction of opposing and subverting natural methods, as I shall presently show in my remarks on Serum-Therapy and Immunity.

And yet, no more than an ant in a crevice of a mighty locomotive, can we influence the pace of Nature or the direction she is taking—although, like the ant, we may get under the wheels. And not all the scientists of all the nations could heal a pin-scratch on a baby's arm were Nature not to set in operation her beautiful law of repair.

TYPICAL FAILURES IN PHYSIOLOGY

THE life of Physiology is a span of three years. In these three years the errors derived from experiments on animals are supplanted by further errors derived from further experiments on animals. The "discoveries" which our Physiologists triennially boast are mere changes in the forms of error.

So, too, all our Physiology is stultified by the circumstances that the greater part of it is derived, in the first place, from dogs and cats and rabbits, between which creatures and man perhaps ten million years of evolutionary development have occurred ; in the second place, because all the observations have been made upon creatures in the abnormal states of mutilation, of narcotisation, of anæsthetisation, or of supreme suffering.

The greatest truths of Physiology were discovered independently of animal experimentation :

1. The recognition of the cell as the basis of all life—the fundamental truth, indeed, of the whole Science—was discovered by Schleiden from his investigations in the vegetable world.

2. The recognition that the brain is the seat of consciousness was made B.C. by Alkmaon without experiment on living animals.

3. The recognition that there exists in the brain some sort of localisation of function was discovered by a French physician named Broca, who observed that, in cases of disease affecting a certain brain area, *aphasia*, or loss of the power of speech, resulted.

So, too, as Darwin admitted before the First Royal Commission, his great truth of the Origin of Species was worked out by watching the life-habits of creatures under normal conditions and without vivisectional experiments.

TYPICAL FAILURES IN MEDICAL SCIENCE

LOOKING back upon Medical history, we perceive with regret that it has been mainly from without, and not from within Medical Science that reform and progress in the Art of Healing have come. For, strange to say, although, of course, progressive and noble-hearted members of the medical world have allied themselves with such, all the way along progress and reforms have originated, not in the Medical but in the Moral Idea.

1. The impulse toward Asepsis, expressed in the proverb "Cleanliness is next to godliness," was first of all a religious and a moral one.

2. So, too, the Temperance movement. Medical Science has been late indeed in discovering the physiological evils occasioned by alcohol, which were long since demonstrated by the moral evils occasioned by it.

3. The Vegetarian movement, leading to our present rational moderation in flesh-eating, and no doubt in time to a strictly non-animal dietary, originated in the humane dislike to killing creatures.

4. The Agitation against Child-Labour, so disastrous to racial health and development, has not emanated from Medical Science, but took source in the public senses of justice and of pity.

5. Our modern improved and intelligent Methods of Dealing with the Insane originated in the humane sense, which was shocked to see the mentally afflicted confined in cages, strapped to their beds, chained to rings in walls, and otherwise forcibly restrained.

6. Medical Science, despite the disastrous consequences of Immorality to human health, has never set before the laity the plain truth that this, no doubt, poisoning life at its source, has been the primary origin of all disease. The movements for social and personal purity have been wholly inspired by the Moral Idea.

Indeed, Medical Science is even now seeking methods of artificial immunity whereby to defeat the great moral lesson

which Nature teaches in this relation by inflicting penalties for violation of her laws.

So, too, I profoundly believe the Movement for the Protection of Animals against Vivisection, originating in the moral and humane ideas, is the advance wave of a great and progressive impulse which will develop a new, an enlightened, and a truly noble Medical Science which shall be worthy of our age.

Instead of dealing briefly with the many, I propose to indicate at length a few of the typical fallacies and dangers into which the Art of Healing has been betrayed by the crude and misleading Methods of Animal Experimentation. I have chosen such as particularly emphasize the obstructive and unintelligent attitudes of our present-day Medical Scientists.

And, first, let me disclaim any intention of classing with Medical Scientists that fine and intelligent body of doctors who, having neither time nor opportunity for medical research, yet practise a sane and intelligent medical art, which has been handed down from their fathers, and is supplemented by their own practical experiences and wit. These men suffer seriously, as do their patients, from the fact that the leaders of medical thought, absorbed in laboratories over mutilated and artificially diseased lower creatures, playing games of physiological and pharmacological ping-pong with the blood-discs of rabbits and cats, are wholly out of touch with human needs, and merely befog and mislead the practitioners of a great Art, in the place of equipping them with new resources.

RESUSCITATION FROM DROWNING

Professor Schäfer claims to have shown, by his experiments on dogs, that the admirable Sylvester method, so long and so notably successful, even in cases apparently hopeless, is a mistaken method, and that the prone position is superior to the supine for resuscitating drowned persons.

Now, the main point to be considered is the position in

which the human chest most readily expands. Every fact of anatomy and physiology shows that for man this is in the erect and in the supine positions. According to Halliburton's "Physiology," "The movements of the lung . . . depend on the changes of shape of the closed cavity [the chest] in which they are contained."

Now, the chest is a dilatable and compressible box which expands and enlarges with the drawing in of each breath. It is almost absolutely rigid, undilatable, and incompressible at the back, where the ribs are strong and are firmly attached to the spine, "the hinder ends [of the ribs]," states Kirkes, "being prevented from performing any upward movement by their attachment to the spine." But the chest is freely dilatable and expansile in front and at the sides, but more especially in front, where the ribs are joined to the breast-bone by lengths of soft elastic cartilage. The abdomen, too, which plays an important part in respiration, is lax and most compressible. If, then, you have a box which is rigid and heavy and firm on its under side, and light and expansile and compressible on its upper side, when you wish to expand it to its utmost you will, of course, place it with its expansile, compressible surface uppermost ; while if you wish to compress it you will place it with its heavy, rigid side weighing down upon its yielding, expansile one.

Professor Schäfer, however, wishing to expand the human box and lung, places the drowned, insensible man prone, with all the weight of his rigid trunk and back muscles bearing down upon the elastic, compressible front of the chest and upon the yielding, compressible abdomen. Moreover, it is just this upper front of the chest, which in the human being mainly fills with the "tidal air" of breathing, upon which in the prone position his weight will rest, compressing not only the most required and most expansile part of the chest, but also bearing heavily upon and hampering the heart and large bloodvessels.

(In the Sylvester method, the prone position is adopted for a first, brief interval before attempting to restore respiration, in order to empty the chest and the stomach of water—

an admirable proof that the prone position is the one most suited to the *emptying* and not to the *filling* of the lungs.)

Again, in the prone position, the shoulders and arms drop forward and contract the chest, while in the supine they fall backward and upward and expand the chest. (The main business of drilling, indeed, is to set back the shoulders in order to expand the chest and lungs.)

Further, in the prone position, the face of a drowned person will be liable to injury from pressure upon the ground or beach, and in a woman the bosom will also be bruised.

Then, too, the face in the supine position can be closely watched for signs of reanimation.

That the prone is the better position for resuscitating a drowned dog I accept without hesitation upon the word of an eminent physiologist. But a dog is a dog; a man is a man.

The horizontal, prone position of the trunk is normal to the dog. He assumes it when he pants for breath. It is doubtless, being his normal, his best attitude for breathing, just as in man his best attitude is the erect. In that position air more freely enters and more freely circulates in the lungs.

In the dog, too, the forelegs are attached to the chest quite differently from the attachment of the arms to the human chest. They cannot be extended and uplifted in such a manner as to broaden the chest and to expand the lungs, as they can be made to do in man.

Had Professor Schäfer derived his knowledge from human beings instead of from dogs, he would have asked himself, What position is chosen by a man who is suffering from difficult breathing? Would he see such a person in a sick-ward voluntarily lying prone?

On the contrary, he would see him propped forward in order to raise the shoulders and so to assist the expansion of the lungs and chest.

An insensible man cannot, of course, sit up, and, moreover, the horizontal position is necessary in order to lessen the labour of the circulation when this is restored.

All of Professor Schäfer's elaborate demonstrations can, in the course of thirty seconds, be controverted by any intelligent layman who will take the trouble to place himself prone, a dead-weight on the floor, and compare the embarrassment he will find in breathing with the ease which will immediately follow upon changing to the supine position.

The truth is that it is absurd to argue from a creature whose normal attitude, walking or lying, is with the body horizontal and prone, to a man, whose normal attitude, walking, is the erect, and lying the supine.

Professor Starling told the recent Royal Commission on Vivisection that Professor Schäfer proved to him and to others the advantages of the prone position by demonstration on a living man—without, of course, having previously drowned him. If, therefore, the thing were demonstrable on a living man, who needed merely to lie down for a few minutes on a couch while pressure was made on his trunk, why subject a number of miserable dogs to supreme suffering? (The error arose, of course, from the bias given by Animal Experimentation, and from the fact that in this man the lung was not collapsed and airless, as it is in a drowned body.)

At all events, I personally hope that, should I at any time be in danger of death from drowning, all eminent physiologists will be safely locked up in their laboratories, and that my resuscitation may be undertaken by a practical doctor whose experience has been derived from his own kind, and not from dogs.

ASEPSIS AND ANTISEPSIS

WITHOUT in the least wishing to depreciate the valuable work of Pasteur and Lister, it must in justice be insisted that the true founder of the doctrine of Asepsis, vaunted so freely as a product of Animal Experimentation, was Semmelweiss, a German physician.

Semmelweiss, in 1847, as Mr. Paget, in his book "Experi-

ments on Animals," points out, " by a long series of clinical observations, and, so far as we know, without any experiments on animals, discovered that the ghastly mortality from puerperal fever in the great general Hospital of Vienna was due to direct infection." " Not only," he stated, " can the particles from dead bodies generate puerperal fever, but any decomposed material from the living body can also generate it, and so can air contaminated by such materials."

Accordingly he isolated all infected cases, and made the use of cleanliness and of disinfectants compulsory, with the result that the mortality dropped in ten months from 12·24 per cent. to 3·04, and in the following year to 1·27.

Here, now, is the truth : Semmelweiss, from clinical observations, developed not only the theory of septic infectivity, but also the practice of Asepsis.

Pasteur later, by means of the microscope, saw that the " particles " which Semmelweiss had described as the offending matter were associated with certain vegetable organisms ; but, although credit be given to him and to the microscope, the truth is that this was a mere detail in the great comprehensive truth which Semmelweiss had formulated.

Mr. Paget continues, that Semmelweiss " could show them how their patients died, why they died, and where the fault lay, but he could not show them a microbe in a test-tube, in an inoculated rabbit, and in the patient's tissues." Pasteur was able to do this ; and while Semmelweiss, the true discoverer, was for his discovery deprived of his Professorship and persecuted by his colleagues until he became insane from grief, Pasteur, because " he could show them a microbe in a test-tube," reaped all the honours of his predecessor's discovery.

Going on to describe how Lister further developed the antiseptic theory from Pasteur's discovery that Semmelweiss's " particles " were associated with micro-organisms, Mr. Paget repeats the time-honoured statement that bacteriology was based on Animal Experimentation.

Bacteriology was based on Semmelweiss's discovery of the infective nature of " particles " from the dead or living body,

and from Pasteur's later observation, by means of the microscope, that there were present in these particles certain micro-organisms which have since been regarded as the *causes* of infection, although their precise function has not been definitely proved.

As to testing by the inoculation of animals—what need was there of this ? Here were the patients in the hospital being daily inoculated by students fresh from the dissecting-rooms, by the uncleansed hands of doctors and of nurses, and by one another !

The secretions of these patients would show bacteria when examined under the microscope. And the microbes could, if required, be grown in test-tubes. What need of rats and rabbits ?

(The inadequacy of rats and rabbits to solve the problem is shown by the fact that an authority so eminent as Dr. Granville Bantock has collected weighty evidence to prove that these micro-organisms are incidents in, but are not the causes of, infection.)

That which really did result from experiments on animals was in this, as in other cases, a travesty of the truth. The extravagant practices of Listerism, with its fetishes of carbolic spraying, and of free and excessive applications of carbolic acid and other antiseptics, whereby Nature's phenomenon of micro-organisms was to be fought at every turn, are now discontinued. But they were not discontinued until they had claimed in discomfort, in suffering, and in death numbers of hapless victims.

Let us now see what has happened to this Antiseptic method.

Practical experience over many years having shown its dangers and disadvantages, a whole revulsion of thought is setting in against it. In the perpetual contest which Medical Science wages against Nature, Nature has once again, as ever, been shown to be right.

In a paper read before the last British Medical Association at Toronto, Dr. G. W. Ross stated : " In surgery even the efficacy of antiseptics is being more and more questioned.

There is a large increasing school that practises asepsis. . . . And furthermore," he continued, " Sir Almroth Wright has recently shown that the application of antiseptics to a healthy wound may *predispose to bacterial invasion*, because of the fact that *the natural bacteriotropic substances of the body-fluids are completely neutralised*, even by weak solutions of antiseptics."

No doubt, when useful, the true value of these so-called antiseptics lies in some stimulating and alterative effects they produce upon the local blood and nerve currents, and not at all in their vaunted bactericidal properties.

In a paper—" Science in Medicine "—which appeared in *Science Progress*, October, 1907, Dr. A. C. Inman says : " As time goes on . . . aseptic surgery *is gradually ousting antiseptic surgery from the field*. . . . It is doubtful whether the practice of using antiseptics in the dressing of septic wounds is advisable, since the action of a large number of them, at any rate, *is in direct antagonism to the action of the protective substances in the blood, which must be regarded as the prime factors in the art of healing*."

An interesting light is thrown upon the devitalising effects which attend the bactericidal properties of antiseptics by the fact that in injury to extremities, to the fingers in particular, the use of carbolic acid as lotion or as dressing has been found to cause gangrene.

DIPHTHERIA AND ANTITOXIN

By means of the Antitoxin treatment of Diphtheria the upholders of Vivisection claim to have reduced the mortality from 22·5 to 8·3 per cent. Nevertheless, the general mortality from Diphtheria in the United Kingdom is now greater than it has ever before been.

Statistics are especially misleading in the case of a disease so variable in its degrees of intensity as is Diphtheria.

In Quain's " Dictionary of Medicine " for 1886 (before the introduction of antitoxin) it is stated that in some epidemics scarcely any patients died, while in an epidemic in Paris in 1847, 91 per cent. of those affected died.

As regards more recent figures to set against statistics of the successful treatment of Diphtheria by antitoxin, we have the Medical Supplement of our Metropolitan Asylums Board for 1906, which reports a mortality of 10·4 per cent. of cases treated *with* antitoxin, while of cases treated *without* antitoxin a mortality only of 1·5 per cent.

The Medical Health Officer for Toronto also has given, in his Report for 1904, statistics of 5,100 cases of Diphtheria treated in hospital during the preceding ten years. Of these, 16 per cent. of those treated with antitoxin died, while of those treated without antitoxin only 12·2 per cent. died.

The advocates of antitoxin claim that in a case of Diphtheria an injection of antitoxin causes a speedy diminution of throat symptoms. This happens naturally, of course, the tendency of all diseases being toward spontaneous recovery. It happens also as a result of local remedies—sulphurous acid, for example. But when it happens naturally, because the poison has spent itself, or as the result of tonics or of local applications which directly increase the constitutional or local resisting power, it is well.

But as a result of antitoxin, a substance which produces some or another violent reaction of the system to it, it is not well; for it disturbs the plan of Nature. It withdraws the poison from the throat, which Nature had selected as the best eliminant organ, and, in so withdrawing, throws back the poison into the blood and tissues.

In the Report for 1904 of the Lister Institute (where antitoxin is prepared) occurs the following: "The increased number of cases of paralysis following the use of antitoxin has by certain individuals been attributed to the use of antitoxin."

The Report goes on: "As *experimentally* antitoxin protects against the paralysing substance, the increase in the number of such cases must be attributed to paralysis occurring in cases which, had antitoxin not been used, would have proved fatal in the early stages of the disease."

But by this specious method of reasoning any injurious

treatment could be regarded as having in reality benefited a patient, the aggravation of bad symptoms being interpreted as proof that but for the remedy he would have died!

We take it, therefore, that the use of antitoxin has notably increased the number of cases of paralysis in Diphtheria. Well, paralysis is perhaps the gravest danger of Diphtheria. So that if antitoxin relieves the throat and throws the poison back into the system to paralyse, it may be, the heart, we can scarcely regard it as a satisfactory, or, indeed, as a justifiable remedy.

But this is not all that antitoxin does.

According to the same Report, Anti-Diphtheric Serum causes a great number of cases of fever and rashes, and pain and swelling of joints. The Report attributes these to "something inherent in the serum of the horses or other animals." It states that they may develop from four days to six weeks after the injection.

In "The Extra Pharmacopœia," by Martindale and Westcott, I find under the head of *Serum Anti-Diphthericum*:

"Of complications following injection—if abscesses and septic infection occur, the serum may have been contaminated, yet hæmorrhage occurs occasionally. Albuminuria is less frequent under antitoxin than formerly." Again: "Sudden death may follow injection."

So that, considering all things—"the increased number of cases of paralysis," abscesses, septicæmia, albuminuria, sudden death, fever, rashes, and joint-affections, to say nothing of convulsions, which some authorities have recorded as a result of antitoxin—antitoxin must be confessed a very dangerous addition to our Pharmacopœia, and one which is anything but a credit to the doctrine of Serum-therapy.

As to the "case mortality," the statistics are made, *not* from the number of patients who are known to have had Diphtheria, but from the number of patients who, having sore throats and being suspected to be suffering from Diphtheria, have received a routine injection of antitoxin. And as Diphtheria is most difficult in the early stages to

diagnose from other and simple throat affections, an immense number of persons, of course, with simple or follicular tonsillitis swell the " successful recoveries " from antitoxin treatment.

As to the value of bacteriological confirmation, a person may have so-called Diphtheria bacilli in his throat, and may yet never develop Diphtheria ; or he may not have Diphtheria bacilli in his throat, and yet may develop Diphtheria.

In an outbreak of Diphtheria in the Willard State Hospital, Salmon found undoubted Diphtheria bacilli in 189 out of 1,423 perfectly healthy persons ; while Graham Smith states that the true Diphtheria bacillus (Klebs-Loeffler) was found only in 72 per cent. of 27,000 cases of certified Diphtheria. And in twelve metropolitan districts the Diphtheria bacillus was found in only 32·7 per cent. of the " swabs " sent by medical men for examination.

This means that of every 100 persons whom their doctors believed to be suffering from Diphtheria, nearly 68 had not Diphtheria at all ! So that, even when a bacteriological examination confirms the diagnosis upon which an antitoxin injection has been given, Diphtheria is a disease from which it is impossible to make statistics.

Now as to the theory of antitoxin. It was assumed that the diphtheric poison was a specific substance against which, when it entered the blood, the blood manufactured a specific antidote—a specific antitoxin, that is, to neutralise a specific toxin.

The theory was that, by injecting a horse repeatedly with the toxin, its blood became a sort of factory in which large quantities of antitoxin were produced.

Now, the whole value of the theory rested upon the specific antidotal nature of this antitoxin. Let us keep horses to manufacture in their blood this antidote, as chemists manufacture drugs in their laboratories.

Then it began to be claimed that diphtheric antitoxin would cure other things besides Diphtheria. Dr. Montgomerie Paton claims as a result of experiments made upon human patients over a period of eight years that diphtheric

antitoxin serum is " curative " in the majority of affections, from appendicitis, indeed, to broken limbs.

It can no longer, then, be regarded as a specific antidote to Diphtheria.

Further, it appears that this substance, called " anti-diphtheric toxin," is found in the blood of from 20 to 30 per cent. of healthy horses.* (Clinical Diphtheria is unknown in horses.)

Now, as it is absurd to suppose that a horse manufactures in its blood a specific antidote to a poison which has never been, and is unlikely ever to be, in its blood, the whole anti-dotal hypothesis falls to the ground.

Moreover, it begins now to be realised that the resisting power against disease is not an affair of antidotes in the blood, but resides in, and is a normal property of, the *tissues* of the body.

At an International Congress on Hygiene, Roux stated that antitoxicity must be regarded as the action of the living cell. Pfeiffer has expressed the same belief.

At a meeting of naturalists in Vienna, Wasserman said : " A very great number of individuals who never had Diph-theria show in their systems some pronounced qualifications for the destruction of the diphtheric poison."

Armand Gautier,† a notable authority, reduces the elimination of the toxins to two factors—namely, *oxidation, and excretion by the kidneys.*

In short, we get back to the creed of our grandmothers—namely, that the power of resistance to infection is a vital property of healthy tissues—in other words, " Health."

But if this be so—if there are no specific substances to be obtained from the blood of horses by previously injecting specific poisons into it, and if we can believe that health is something which can be decanted from the blood of horses, why do we continue to inject these first with diphtheric poisons ? Being a health principle, it will be better obtained, surely, from the blood of healthy horses. Why not, there-fore, tap any healthy horse in the street for it ?

* " Studies on Immunity," by Professor Ehrlich.
† " Les Toxines, Microbiennes et Animales."

SMALL-POX AND VACCINATION

With the statistics of Small-pox and Vaccination I do not propose to deal. I would merely point out that Leprosy, Plague, and Typhus Fever, which were once common in England, have been stamped out more effectually than Small-pox has been, by means of Sanitation.

But let us assume for a moment that Vaccination has stamped out Small-pox, and another consideration arises. As Nature's plan is wise and is beneficent, in our absolute ignorance of her aims and methods, how can we say but that this same Small-pox is a developmental step, inherent or acquired, without which certain human stock is unable to continue its evolutionary progress ?

Being part of the plan of Nature, we are dealing dangerously when we—if indeed we are able to—divert the normal course of human phenomena.

In " Small-pox and Inoculation in China," by Professor C. H. Parker, of the Victoria University, Manchester (*British Medical Journal*, January 12, 1907), the following occurs :

" In the southern and western parts of China, so far as I remember, pock-marked persons are the exception, not to say very rare. And I believe, from inquiries recently made, that Small-pox is, as a matter of fact, comparatively uncommon south of the Yangtse, *where alone, on the other hand, leprosy is found.*"

Here, now, is a fact requiring investigation ! It is well known that, with evolution, diseases change their type. Small-pox is bad enough, but Leprosy is infinitely worse. Suppose that Small-pox took the place of Plague, of Typhus, and of Leprosy in England ? Was not that a beneficent substitution ?

There are, too, other considerations with regard to the abnormal practices of inoculation and vaccination.

It is claimed for them that they transfer to a human being an immunity against infection which has been artificially induced in a lower animal—that is, that they so alter for ever afterwards, or for a number of years, the normal

character of healthy human blood, that it will not react against elements of infection or disease which may enter it. (A burn will so alter the character of normal skin that for ever afterwards, instead of healthy normal skin, scar-tissue is produced at the site of the injury.)

The question arises, Is this tolerance of the presence of the elements of disease a real and intrinsic, or is it merely an apparent benefit, for which in the long-run the individual and the race must pay heavily ?

For we cannot so monstrously delude ourselves as to believe that, if we take a clean-blooded, healthy human infant, the child of clean-blooded, cultured parents, and inoculate it from one of a hundred artificially produced sores on the abdomen of a calf, we increase for a number of years the vital tone and resisting power of its blood and tissues. All we can claim (if Vaccination does indeed confer immunity from Small-pox) is that it does so by compelling the tissues to tolerate stupidly, instead of vehemently repelling, such Small-pox poison as may one day invade them.

In Yellow-Fever districts a great number of persons, more particularly children, are what is called " immunes "—that is, they show no symptoms of disease ; their systems make no rebellious attempt to throw out the poison—although the " plasmodium " is in their blood and they are capable of infecting others.

Another suggestive example is that of the so-called " typhoid-carriers "—" immunes," that is, to the typhoid poison. These are persons who appear to be in health, despite the facts that they manufacture typhoid poisons and that their tissues contain typhoid bacilli ; that is to say, they are degenerate to so striking a degree, have so far deteriorated from the healthy normal, that their systems generate and tolerate without attempting to eliminate typhoid poisons.

Yet they are able to disseminate typhoid fever wheresoever they go. A case has been described by Soper of New York, in which a female cook, a " typhoid-carrier," herself apparently in perfect health, had in the course of five years occa-

sioned typhoid epidemics in seven different households. To such states will our Immunists bring us!

In the normal infectivity of diseases, increasing with the complexity of development, may be seen, I think, Nature's expedient for linking the race in a Universal Brotherhood. "Races," she says, "shall progress as a great Unity. The many shall suffer for the few, the few for the many. Injury to the meanest shall react upon the highest. Am I my brother's keeper? If not, Lazarus at the gates, full of sores, shall breed an evil which shall slay the Monarch!"

THE DOCTRINE OF IMMUNITY

THE whole doctrine of Immunity is fraught with dangerous issues. Immunity—or Impunity—against deleterious factors is the parent of Degeneracy.

One may make himself "immune" to degrees of cold which deteriorate his tissues (there being a certain range of temperature conducive to the best tissue health). He may make himself "immune" to excesses of alcohol, to opium, hashisch, arsenic, sewer gas. But the moment the healthy resistance of his tissues to these injurious factors ceases, these factors begin to circulate freely in his blood and freely to attack his vital organs.

One knows persons who are immune to fatigue, and, being immune to fatigue (having lost, that is, the healthy sensitiveness which would warn them when their tissues have exhausted their store of available force and require rest for renewal), they continue their activities, and so draw upon their constitutional reserve forces until physical wreckage results.

The maintenance of health and the progress of development, indeed, depend absolutely upon a normal delicate sensitiveness and reactivity to the conditions of the environment, whether deleterious or beneficial. That such sensitiveness to exterior influences is a symptom of health is

proved by the case of children, who react far more readily than do adults to all agencies, and who are, of course, in more highly vitalised states of health than are their elders.

With advancing age, Immunity to infection and impunity against deteriorating agencies become established. The functional diseases of youth—protests of still healthy organs against some or another trespass against them—pass into structural changes—changes leading to the degeneration of tissue which constitutes old age.

And there is an even graver consideration with regard to artificial Immunity. If we are indeed able to convey from a lower creature to a human being its special immunities, how can we reasonably suppose that we can do this without at the same time transmitting its *special susceptibilities ?*

We may, then, in vaccinating a child against such a temporary affection as Small-pox, transmit to it a grave constitutional disease to which the calf from which the lymph was obtained possessed a special liability. In the *British Medical Journal* of March 30, 1907, Dr. W. Collingridge is reported as quoting before the Sanitary Committee of the Public Health Department (London) the statistics of Mr. J. King, who found that, of 500 carcasses of cows examined by him, 244 (nearly 50 per cent.) showed tuberculous lesions.

Is it not, then, more than probable that, in vaccinating children in the susceptible infant years against the rare chance of Small-pox, we are conveying to them the great liabiltiy of calves to tuberculosis, and so propagating tuberculosis wholesale ?

Finally, since the physiological and the psychological are closely allied, who shall say but that in these morbid and unnatural comminglings of human blood with calf- and horse-serums we do not also seal the treaty of a terrible moral devolution ?

Nature has isolated and safeguarded the blood of every creature, man or lower animal, from that of every other creature by means of a vital shield, the skin. When it is considered that by a breach in this shield, by the prick even

of a mosquito, or by other forms of inoculation, intentional or accidental, in one moment there may enter through this breach a virus, a poison, a bacterium—call it what you will—something which has the power to effectually wreck the health, to blight the development, even to kill in the course of a few hours, the vital importance of this shield of the skin with which Nature has protected us is evident.

That effects are not immediate proves nothing. Rabies has lain dormant in the system, and has developed ten years after the bite of a rabid dog. Other inoculated poisons also lie latent for long periods, but are all the while producing constitutional deterioration.

As an example of the pseudo-scientific triflings of modern Scientists, I commend Professor Ehrlich's "Studies on Immunity."

Professor Ehrlich, an authority of whom Medical Scientists speak with bated breath, is the author of the famous "Side-chain theory." It is a system of hypothetical assumptions, based upon the action of such abnormal factors as the effect on the blood of a sheep when it is mixed with the blood of "a goat which had been during eight months subcutaneously injected with . . . sheep-serum rich in blood-corpuscles!"

Professor Ehrlich, to explain such phenomena, has invented an elaborate chemistry of the blood. It includes "Haptophore groups," "Toxophore groups," "Receptors" of the First, of the Second, and of the Third Orders, "Amboceptors," "Anti-amboceptors," "Toxins," "Toxons," "Toxoids," "Complements," "Anti-complements," "Complementoids," and a host of other purely hypothetical factors.

Dog-serum, he observes—normal dog-serum without any previous admixture with guinea-pigs' blood—will dissolve guinea-pigs' blood "with great energy"!

He accounts for this by assuming that "a multiplicity of Interbodies and of corresponding Complements effects this action."

He plainly believes that this power in the blood of dogs of dissolving the blood of guinea-pigs is a premeditated part of the plan of creation, and that Nature has provided the blood of dogs with a " multiplicity " of complex substances to this end. Yet who can suppose that Nature, in her maddest moments, can have prepared for these experiments of twentieth-century Scientists, can have made provision for the absolutely abnormal exploit of injecting the blood of a dog into a guinea-pig ?

" A serum derived from rabbits," continues Professor Ehrlich, " after these had been treated with goat-serum, protected the rabbit blood-corpuscles against solution by goat-serum. At the same time, however, it protected the blood of *guinea-pigs and rats against the same influence, and even prevented the hæmolytic action of dog-serum on rabbit-blood.* From this fact we must conclude that immunisation with *one* serum produces a whole series of different anti-lysins."

" Clearly this," he goes on, " is to be explained by assuming " (here he is again assuming) " that a serum contains a great number of different complexes possessing haptophore groups, of which many, whether they are toxic or not, are able to excite the production of corresponding anti-bodies."

To the confusion of his theory, however, he finds that " Goat-serum at one time possesses a slight solvent action on sheeps' blood ; at other times this is entirely absent. Dog-serum in one case dissolves the red cells of cats very strongly ; in another case it does not do so at all. The action of rabbit-serum on guinea-pigs' blood shows a special variability. A very interesting example is afforded by lamprey-serum, which, as is well known, possesses an extraordinary toxic action for laboratory animals in general."

" And yet," he goes on, " the serum of a not inconsiderable number of lampreys possesses no toxic action at all, so that it could be injected into rabbits intravenously in amounts of 2 c.c. without any damage whatever."

Now, let not the modest layman believe that these are mysteries too subtle and profound for his comprehension.

There is neither subtlety nor profundity about them. They are, in plain terms, mere nonsense. The action of the blood of a lamprey when injected into the blood of a sheep, which had been previously injected with the blood of a goose, is an absurdly artificial phenomenon which can have no relation to Natural Science. Modern Medical Science, based on such phenomena, will be incomplete until it has tested the effect upon every creature of the blood of every other creature which has previously been injected with the blood of every other creature.

As Goethe has said, "*It nettles man to find that truth should be so simple.*" And Du Prel: "*Nature is more simple than our conception thereof; we begin with very complicated theories and end with the most simple.*"

Newton one day, sitting in an orchard, saw an apple fall to the ground. In a moment his great mind leapt beyond the trivial happening to the great Law subtending it—the Law of Gravity, so vast that it suspends the mighty solar system of the Universe, so simple that it brings the apple to the ground. Had Newton been an experimental physiologist, he would have spent the remainder of his days in experimenting upon apples in order to discover in them the micro-organism which caused one to fall to the ground.

One day an equally great and simple mind will discover the degree to which the phenomena of human life are the resultant of some Vast Force exterior to it. Indeed, the developments of Evolution may be mere applications of the Law of Gravity—Force radiating centrifugally from some all-potent Centre into Space, then seeking back, centripetally, along paths of affinity by way of ever more complex conditions.

The aim of modern physiologists is to show that in Physiology there is nothing beyond Chemistry and Physics. And yet it is impossible to explain physiological phenomena without admitting another factor—Vital Force.

And no doubt this Vital Force it is which makes blood so Protean and mysterious a fluid, deluding our modern physiologists, as in other ages it baffled and deluded

necromancers and alchemists a-search for the philosopher's stone.

Chemists and Physicists, denying Vital Force, profess that the mysteries of animal metabolism are wholly explained by the chemical interchange of molecules.

Now, in the chemical dissociation of inorganic molecules, there is given off, in the form of electricity, the force which occasioned, and was imprisoned by, their combination.

So, too, in the chemical dissociation of vegetable and animal molecules which takes place in digestion, in addition to the freed molecules which the body builds into itself, there must also be freed that mysterious Vital Force which occasioned the complex progressive grouping of vegetable and animal molecules which we call Life and Growth.

(It is possibly this Force which, transformed and stored as potential light and heat, and recoverable in the dissociation of the oxygen molecule, is the cause of the phenomena we call oxidation.)

Doubtless the ultimate dissociation of molecules, which is the object of digestion, is directed less even toward the appropriation of the chemical molecule than it is to the appropriation of the evolutionary force imprisoned between the molecules.

Imperfect metabolism, by failing to set free all this available Force for the uses of the animal organisation, fails to supply it with its most vital need. This Force, it may be, which expresses itself in vital and psychical equivalents when released by the dissociation of the molecules composing mineral and vegetable medicaments.

It is this Force, perhaps, which creates the phenomena attributed to so-called "catalysts" and "ferments." It may be stored in the nucleus of the cell, for which Science has hitherto found no function.

Perhaps Cancer originates in cells which have lost their capacity to store this Vital Force, and so have become spots of degeneracy.

The leucocytes no doubt possess it in large amount, and, moving in the blood currents, carry it to tissues in especial

need of it. This would explain the important part they play in disease. I suggest that Mesmerism, Hypnotism, Telepathy and allied manifestations, have their source in this mysterious principle, which, pervading creation, the Great Mind of the Universe, is the force about which the phenomena of evolution group themselves.

Sooner or later our Scientists must recognise It, and in doing so will find the field of Medical knowledge flooded with new light.

SUGGESTIONS FOR FUTURE MEDICAL RESEARCH WITHOUT VIVISECTION

First it must be realised that that which is needed is not a further aggravation of our confusion and ignorance by amassing further perplexing and conflicting facts, but a sane and scientific explanation of the perplexing and conflicting facts which are before us. Determine the law governing these, and the facts and perplexities will group themselves about it as do the pieces of a puzzle round their key.

Every natural phenomenon is the casket of a truth—all, it may be, portions of one Great Simple Truth. We need to find the truths within the myriad caskets round us, not to manufacture spurious caskets which, if they contain anything at all, contain error.

To begin, we must make a clear and satisfactory definition of what constitutes Health. For unless we determine our goal, how shall we be able to decide upon the direction we must take in order to arrive at it ?

For the present, muscular capacity is the main (and wholly mistaken) gauge by which the doctor and the layman alike decides his condition. In point of fact, muscular energy is but small test of health. Muscular energy may be, indeed, a species of nerve diarrhœa, which exhausts other vital and more important capacities and keeps the general system at a low ebb.

" I am well," says a man ; " I can eat and drink anything without suffering from it."

And yet this very symptom may be the sign-manual of an abnormal state. He may be able to eat and to drink and to digest substances and quantities which are all the while causing remote injury to him—injury which will one day show itself in structural disease.

"Sick babies," it has been said, "are healthy babies"—not because it is healthy to be sick, but because, given more than the digestive powers can cope with, the intelligent stomach protects the later digestive functions by promptly rejecting the surplus.

So the man without functional symptoms, who regards himself in consequence as a type of health, may be in truth in a bad way. His lack of symptoms may arise from a morbid insensitiveness on the part of his organs, which permits without protest excesses of diet, of alcohol, or of other evil agencies.

Clearly the absence of symptoms may be a far worse evil than is the occurrence of illness. For the sick man, taught by his symptoms, treats his condition and recruits his strength, and, if also a wise man, avoids for the future the ills which led to his disablement.

Again, nobody who has watched the effects upon his fellows of that we style Disease can help realising that Disease may be a mere symptom of Development. The forces are being redistributed, and some or another lesser factor suffers.

The hoyden-girl grows languid and anæmic when her system is first learning to store her forces for the race. Sex-development and the evolution of a new world of capacities and emotions are drawing off resources from the muscular plane of crude, undifferentiated energy, and placing them upon more highly differentiated planes.

The strong man struck down by paralysis for the first time feels in him the thews and sinews of a nascent imagination. (It is a matter of observation that negroes who evolve beyond their fellows in intellectual or moral powers are particularly prone to tuberculosis or to blindness.)

We need, therefore, a definition of the line across which Development passes into Disease.

The indication of the Art of Healing would be, of course, to check such too speedy development and to bring back the patient into the domain of Health. For Evolution should be a gradual and imperceptible, not a morbid and violent process. (The fact that acquired faculties are not transmitted to offspring has also a direct bearing upon this question of too rapid development, showing as it does that such development is achieved at the expense of offspring.)

Disease being a process of Nature whereby the individual is taught the errors and evils of the environment he creates about himself, and his limits of achievement and endurance, it follows that all methods which aim at stifling the warnings of Disease and at suppressing symptoms are harmful and unscientific.

If we can get at the back of the symptom and abolish the cause, well and good. When the ptomaines of an ill-digested and unwholesome meal are causing sickness and diarrhœa, good practice is to purge out the offending matter. But to suppress the sickness and diarrhœa, which are conservative, before having got rid of the offending matter of which these are endeavouring to free the system, is unscientific and injurious.

The majority of symptoms which we call illness, however, are neither so simple of origin nor of cure. They may be so obscure that we are unable to diagnose their source. They may be signs of structural defects we are powerless to remedy. They may be the escape, through safety-valves of functional activity, of forces or elements which, dammed back by treatment, might expend themselves dangerously upon vital centres.

All we can do, then, is to place the patient, by rest and by hygienic rule, under the best conditions for his system to work out its own cure, to divert symptoms into channels less harmful, or even to aggravate them, when we recognise that to do so will be to further open escape-valves which are relieving the system.

Within the scope of this paper all that can be attempted is to show that the true Art of Healing lies in the direction of closely watching, correctly interpreting, and assisting, instead of opposing, the natural process by which we perceive a patient's system is striving to recruit itself. That which may be styled the physical conscience (the centre of subconscious intelligence, whose function it is to preserve the health) is in intimate touch with all the constitutional facts of the individual—his defects and resources—which are hidden from us.

Accordingly, recognising Disease as a conservative process—a temporary low ebb of the forces at one spot in order that the tidal health may be sustained at higher levels at some spot whereat repair is taking place, or a temporary general disablement in order that impoverished forces may be restored—and recognising symptoms as intelligent efforts toward that recuperative process, we shall be careful always to treat the patient, and not the disease.

The successful physician is not he who makes exact calculations of the number of his patient's blood-corpuscles, or describes the course of his disease by parabolic curves, but the man of sympathy and intuitive power, who, by a process akin to divination (assisted, of course, by physical investigation), puts his mental finger, not on the organ or function which is deranged, but upon the cause or source of derangement of that organ or function.

The form in which disease shows itself is a mere detail. The cause is the fact to be discovered and attacked.

Indeed, the matter resolves itself into the self-evident truth that, since in the whole range of Medicine by the nature of things there cannot exist a "cure" for disease, but that only out of the patient's own resources can the return to health be secured, the main feature of Medical Science must lie in the direction of increasing the health resources of the individual, and eventually of eliminating from our social and personal conditions the factors which lead to aberrations from health.

Having defined the broad general features of Health, we

must determine the Positive and the Relative Importance of each Organ and Function of the body in maintaining that condition.

The only satisfactory and scientific method of arriving at this knowledge would be by making exact and exhaustive observations upon human subjects, beginning with those who most nearly approximate our Health definition, and passing on to those who show deviations from the normal, from the slightest functional to the gravest and last stages of fatal disease, and by later carefully comparing the various stages and phases in the light of conditions found after death.

The subjects should be classified, not only according to the organs affected, but also according to the anatomical and histological sites of disease. By such careful and exhaustive observations, by examinations and chemical analyses of secretions and excretions, revealing facts and variations of metabolism, not only the physiological, but also the pathological, importance of every organ and group of organs could in time be estimated. Also, with the physiological, the psychological influences of organs might be determined by means of the mental and psychical effects of aberrations from their normal.

By the same means the Values of Foods and of other articles of general diet could be judged in their relation and application to derangement of special organs.

To assist these observations, valuable indications might be found in Comparative Biology, by studying the life-habits and the characteristics of those lower creatures in which organs common to them and to man are found specially developed.

For example, in the guinea-pig, the supra-renal bodies, of the function of which we are wholly ignorant, are particularly large and well-developed. Not by mutilating their bodies, but by carefully noting their living characteristics, their daily metabolism, and the diseases to which they are subject, and by comparing these with data obtained from other animals in which these bodies exist in ascending and

descending scales of development, indications of the true and intrinsic functions of these organs might be obtained.

From elephant to electrical eel, with its strange properties, Nature has filled the world, her kindergarten school, with object-lessons, which not only show to man, in the concrete, ideals of faculty and achievement, savagery and gentleness, sloth and swiftness, treachery and fidelity, rapacity and unselfishness, but supply him also with rudimentary lessons in Physiology.

Valuable light might be thrown upon Development and Disease from the scientific observation of children in Schools and Institutions.

The phenomena of Normal, of Precocious, and of Arrested Development require investigation and classification. Complexion, Configuration, and Temperamental Characteristics afford interesting material for study.

The Health and Development, physical and mental, of children in Schools and Institutions require scientific comparison with that of children brought up in the natural atmosphere and environment of the family into which they were born. Information is needed as to whether this natural environment of the family is not, indeed, the one most conducive to health and to the evolution of faculty.

An interesting possibility is that the Communised Life of the School, as opposed to the Individualised Life of the Family, may so deteriorate the type as to produce later in life, when marriage takes place, effects similar to that of breeding in and in, the best results in offspring being from persons of highly specialised and opposite types.

The Effect upon the Offspring of the Marriage of persons of Different Diatheses is worth investigation—*e.g.*, whether in the union of a tuberculous with a gouty person the diathesis of each will exert such a corrective influence that the offspring may revert to the normal. Some such law would explain the natural inclination of persons to those of dissimilar type.

A most valuable field of inquiry lies in the Effects upon Offspring of the Prenatal Conditions of the Parents—and

more especially of the Mother. Data are needed to decide whether the Employment of the Mother in the Labour market does not so exhaust her powers as to leave only the dregs of her resources for the development of her child. The degree to which rest, hygienic conditions, and the Conservation of the Maternal Energies would correct degenerative tendencies should be determined.

Definite observations are needed to discover whether our present system is not gravely mistaken in its method of exhausting, by intellectual and athletic strains, boys and girls, precisely during those years when the development of sex (in which is bound up the parental efficiency of the race) is already seriously taxing their powers.

The degree to which, by deferring all educative strain, Nature would apply the resources thus conserved to the Eradication of Disease Spots, and even to the correction of structural defects (for example, of defects of vision), is an important point.

The Influence of Sex (in which is bound up the evolutionary impulse of the race) upon physical health and mental and moral development offers a valuable field of study. It should be determined whether personal development should be subordinated to sex-capacity, or sex-capacity (and the racial future) to personal development.

THE TESTING OF DRUGS

As regards the Action of Drugs, it would be impossible to improve upon the intelligent and scientific methods of the Homœopaths, described before the recent Royal Commission by Dr. G. H. Burford. The tests are made upon volunteer human subjects.

"The experimenters are always healthy human beings—healthy in the first place in order that the vitiating results of sickness may be eliminated, human in the second place in that the major part of a medical man's work deals with human beings ; and conscious human beings in the third place in that the great variety of subjective symptoms and

mental conditions, which are unattainable by experimentation on animals, may be added to the objective findings."

The experiments begin with small and gradually increased doses (without any relation at all to the quantities in use by Homœopathy). During administration the subjects are closely observed by experts, who make exhaustive examinations as to temperature, pulse, blood-pressure, blood character, secretions, excretions, etc.

Many of the most-used and accredited drugs now employed by our own Allopathy were first introduced into medicine by Homœopathy.

"Homœopathy," Dr. Burford stated, "finds that experiments on healthy human beings yield results more ample, more direct, more fertile, and more reliable, than the details obtained by experiments on animals."

In point of fact, by this only, allied with clinical methods, can reliable information be acquired.

In mutilated, anæsthetised, narcotised, and unconscious animals, results are necessarily vitiated or nullified.

In the cases of animals, too, the valuable subjective effects of drugs are hidden.

Finally, of course, all results obtained on healthy man must be tested upon sick man. For the action of drugs differs in health and in sickness.

In practice, the intelligent and observant doctor reduces year by year the number of remedies upon which he relies, experience showing him the valuelessness, or, worse still, the dangers, of many of the drugs with which, as a result of Animal Experimentation, pharmacologists flood the markets.

Therefore it results absurdly that the true *laboratory* values of drugs are not obtained until long after practising doctors have discarded the drugs as of any remedial value.

The growing practice of Hypodermic Injection of drugs is, I think, to be strongly condemned, save in cases of extreme urgency. The method is abnormal, the far-reaching results of substances introduced directly into the blood are not understood, and the mental effect upon the patient is a morbid one.

Nobody who has seen a patient fall soundly asleep after a hypodermic injection of pure water (which he believed to be his accustomed morphia dose) could rationally rely upon results obtained by hypodermic medication. These must and do vary enormously with the potency of faith of the patient and with the "suggestive" power of the physician, doubtless also with the presence or absence of that healing magnetism which some persons undoubtedly possess.

HYPNOTISM AND ALLIED AGENCIES

For the present, orthodox Medical Science ignores Hypnotism, "Suggestion," and other allied phenomena.

Yet nobody who has intelligently considered these interesting, suggestive, and promising phenomena can doubt but that in this field and in the subconscious plane of mind which are their source lies the future of Medical Science and of the Healing Art.

How superfluous to burden our minds with the physiology of cats and guinea-pigs at an era when human physiology is lifting itself on to the plane of psychology!

How superfluous to spend our lives in investigating the action of a mineral or a vegetable upon the pancreas of a dog when, by the development and cultivation of new powers now evolving, the physician may be able, by means of his higher intelligence, and by the medium of his subconscious intelligence, so to bring himself into relation with the psychology of his patient that the patient's physiology (which is its lower expression) will be subject to the physician's will.

Closely allied with this subject is that of the Nervous Influence, benign or injurious, which persons exert upon one another, and the degree to which those whose nervous forces are exhausted by starvation, by ill-health, or by overactivity draw upon the nervous forces of others. In this field lies a whole new Science. Constitutional exhaustion of another by a "consumptive" living in the same house by means of this absorption of vital force plays, I am convinced,

a far more important part in the communication of phthisis than does the tubercle bacillus. In my own practice I have obtained "cures" apparently miraculous by merely removing sufferers from association with some relative who was so draining their powers.

A striking example was that of an exhausted woman, of nevertheless tireless activity, who, upon four separate occasions when expectant motherhood was draining her strength, reduced to death's door, by drawing upon its vitality, a child who was closely in association with her. On each occasion the child's life was saved only by sending it to a distance from its mother; whereupon the mother, deprived of her source of vital energy, herself fell ill.

In such phenomena appears again Nature's method of preserving a great level average of health and development, and of preventing the individual from outstripping the race.

Here, again, excellent reason is shown for improving the life-conditions of our poorer brothers, lest their starved and devitalised bodies prove a perpetual drain upon the nerve-forces of better-nurtured systems.

To sum up: The thing required to-day in Medical Science is a new and higher standpoint. From a higher elevation a broader and more comprehensive view is possible, and the true dimensions and relations of things are revealed.

The orthodox unprogressive majority, represented by present-day Medical Scientists, must yield before the thin end of the wedge of a progressive minority. History shows that by the time a creed, political, religious, or scientific, has become orthodox it is already out of date.

We must move forward with the mighty tide of Evolution. We must adjust ourselves to new conditions. Otherwise, the mighty tide of Evolution will engulf us. Then Nature will begin again. She has begun again many times. And always it has been from disregarding or fighting her laws that races have gone under.

A steadily advancing, ever-evolving race, intelligently developing its forces in line with and in co-operation with Nature, has yet to be born.

THE LEIGH BROWNE ENDOWMENT

FOR THE PROMOTION OF

PAINLESS RESEARCH IN THE BIOLOGICAL SCIENCES.

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Hon. Sec.: ERNEST BELL.