to our own steadfastness in its pursuit, the public will gradually learn to estimate our honest toil.

By discussion the rule of custom or authority is swayed and broken, and the primary conditions of intellectual ongoing are set free. Discussion, indeed, furnishes the great incentive to vigorous and elevated thought, and is a motive power of incalculable impulse to the advance of learning in any form; but most particularly so in that form, in the cultivation of which we spend our days, and I may fairly say our nights.

Discussion necessarily implies *in limine* that its subject is a matter of either questionable fact or opinion, not settled in the minds of the enquirers, although either may have been accepted beforehand, on the ground of pre-existing authority; but something new may have occurred to render it susceptible of further elucidation by discussion, and possibly to emancipate it from the category of hereditary *dictum* or *dicta*.

The results of truth seeking trustworthy discussion have been well described as "pure dry light, free from the humour of habit and purged from consecrated usage," and I feel assured that our meetings tend to the same lucid form and ultimate result thus expressed.

Reflecting on the educational condition of the upcoming generation, in reference to our actual and future professional status, my long experience as a teacher at Guy's Hospital, and my extended official position, as an examiner at our College of Surgeons, enable me to speak on this matter with some reasonable amount of authority, and to affirm that the evidence of marked advancement is incontrovertible, and that it is impossible to doubt or overlook the conclusion that the prospect is most cheering for our profession. Various causes have contributed to this improvement; perhaps it is primarily referable to a better brain training in early life, and to a fuller aptitude for the recognition and retention of knowledge, this mental fruition being helped and encouraged by a more natural and true common sense scholastic tuition.

Relying and resting on the outcome of these fundamental advantages, I believe that much of the rapidity of professional acquirements may be justly attributable to and derived from the comparatively recent method now so widely insisted on, of teaching through the medium of the eye, and which is intended to be expressed by the term "practical study."

It must be within the personal experience of each of us, that no impressions are so quickly made, so tenaciously fixed, or so permanently stamped upon the memory as through the eye. This method of study complemented, as it has been of late years, by powerful optical agents, has contributed a great help, which has been eagerly sought and used by the emulous and industrious in the pursuit of knowledge, and at the same time it has become virtually an attractive allurements to the unemployed and the idle.

Powerful minds are now devoted energetically to the exploration of exact knowledge devoid of doubt.

Formerly the conclusions derived from statistics were much extolled, and relied upon, but they never could reach beyond the verge of probability, and that would not content the professional mind of the present day, which will be satisfied with nothing short of a usable certainty.

During the last thirty years, there has been a marked tendency, in the mind of the painstaking reflective physician or surgeon, in his search after truth, to rely only upon provable facts, myriads of which have been garnered and stored in isolated works, and especially in the archives of our various societies; few persons venturing to form hypotheses or theories upon them, until they have been acknowledged, under discussion, by their brethren and accepted, as reliable and proven data, upon which they might confidently reason.

Who is to gather together this massive and varied material and cement it into a harmonious whole?

Who will take, from this time, the foremost needful step in the van of scientific organisers in order to examine, arrange, and digest these stored materials in such a manner as to construct the foundation of a trustworthy reliable authority in the form of a future oracular work of strict and scientific reference?

The necessity for such an interpreter is felt by all of us in these days of bold inquiry, when science is pushing her researches into the mysteries of nature, bringing the animate and the inanimate creations closer to one another, and promising to flood with glowing light the hitherto black line of demarcation and separation of the known from the unknown.

In conclusion, I may be allowed to express my conviction that the Newton of medicine has not yet arrived; but in the meantime I am satisfied that such meetings as these disclose what all the best men of our profession have in view—viz., the promotion of kindly intercourse, and thereby the free interchange of knowledge, the motive force to further and further inquiry, to the quenching of the pretentious and deceptive habits still, I regret, oftentimes exhibited by some of our profession to the public; and, finally, to avow our energetic commendation of the safe foothold, step by step process, by which we trust to reach our ultimate goal—Truth.

AN ADDRESS

DELIVERED AT THE OPENING OF

THE SECTION OF PHYSIOLOGY.

*At the Annual Meeting of the British Medical Association,
in London, August 6th, 1873.*

By GEORGE MURRAY HUMPHRY, M.D., F.R.S.,

Professor of Anatomy at the University of Cambridge; President of the Section.

THE British Medical Association is still in process of development, and has not, we are glad to think, yet attained to maturity. A few years ago the important advance of instituting sections was made. On the present occasion, when the Association derives the great impulse resulting from a meeting in the metropolis, there are six sections representing six of the important branches of medicine; and it is a matter of no small congratulation that the section of Physiology has been revived. This section was held, and was attended with much success, under the able presidency of Professor Rolleston at Oxford; but since that meeting it has not, I believe, been attempted. It is, I feel, a great honour to be invited to preside in this section at the important meeting now held; and, setting aside all personal feelings and consciousness of inefficiency to discharge the duties of the office to my own and your satisfaction, I did not hesitate to accept the honour, because I perceived that in the selection a compliment was paid to my University, no less than to myself. I was therefore bound to do my best; and I must rely for the rest upon your indulgence and the able assistance of the gentlemen who are associated with me as Vice-Presidents and Secretaries.

I have said that the revival of the Physiological Section is a subject of no small congratulation. Indeed, I feel it to be a matter of the very highest importance; for, without depreciating the other sections, it may be said of this more truly than of any other, that it is, or ought to be, the main connecting link between the Association and science, I may say, indeed, between the Association and the Science of Medicine. Physiology must not simply be at the root, but must itself form the root of medical science. Unless it flourishes and is well tended, the science of medicine cannot thrive and be maintained on a level with other sciences. It cannot but have a tendency to degenerate into empiricism. Far be it from one whose life has, in the main, been spent in pursuing the practical work of the profession, to say anything which should seem to detract from the value of that work, or from the advances which are made in it. These are undoubted. They are sufficiently estimated; and they bring their own reward in their train; so that the influence of a great Association like the present is scarcely required to maintain and give an impulse to practical medicine. We live in an eminently, almost too practical, age; and some of our faults and mistakes are due to the general and growing submission to this influence. In medicine that is peculiarly the case. The practical has, more and more, a tendency to preponderate over the philosophical, which is evinced by a comparison of the writings of physicians and surgeons, of the former more particularly, at the present time with those of the past.

The increasing stringency of the examinations, and the greater range and precision of the several subjects comprised in the examinations, tend to produce this effect. The text-books are more heavily loaded with facts, and the students' minds are more densely crammed with the same, almost to a suffocating extent. A result of this compression may be, and no doubt is, seen in the greater amount of knowledge acquired; and knowledge is a good thing. But to produce its best results, knowledge should minister, and be subordinated, to thought. Not simply to store the mind, but to train the mind to use its store should be the object of education. The subjects of medical education are peculiarly adapted for this purpose; but I do not think that sufficient heed is taken of them in this respect, and it is to Physiology, more than the other subjects, that we must look to restore the balance between thought and knowledge. It teaches us to look beyond the fact into the causes, purposes, relations, and workings of the fact—into "the being's use and end." It gives life to dead anatomy—it leaves us not content with the dreary knowledge that a process exists, and is of given shape and size; but it urges us into the consideration of why it is so, and how it comes to be so. It transforms the miser of facts into the philosophical utiliser of them. I cannot but observe, and observe with regret, that the

more accurate cultivation of anatomy, now-a-days, has led not a little to its divorce from physiology. That kind of pure anatomy which, to my mind, savours much of pure dulness, is too exclusively the object of pursuit in teaching and in examination; and the great interest, enlivenment, and mental benefit which anatomy would derive from the association of other things and of ideas with it, are too much lost sight of. I must remark, however, that this fault does not appertain to the teaching of anatomy or of medicine only, but to teaching in general. I fear that much of the effect of teaching now-a-days is to make the student dislike learning; and I trace that effect not a little to the fact-cramming manner in which it is often done.

I am induced to allude to this subject particularly, because I apprehend that, between the pure anatomist, on the one hand, and the pure physiologist, on the other, the intermediate ground of what may be called "grosser physiology"—the mechanical, teleological, and morphological physiology—that is to say, the physiology of the larger and more solid parts of the frame, of the osseous and muscular systems more particularly, is in danger of being neglected. If this is so it will, I think, be much to be regretted; because a great part, at least, of the educational value of anatomical study will be sacrificed.

It is, however, with the "finer physiology," the physiology which discusses delicate structure and processes, the relations of parts to one another and their developments, that we are here most concerned, and with it, more particularly, as a branch, I may say the fundamental branch, of medical science.

It has been said, and the dictum has, I think, had much influence, that physiology forms a section or subsection of the British Association, that the ground is, therefore, occupied by that Association, and ought not to be invaded by the British Medical Association. But it need scarcely be observed that physiology is a very wide field, upon which the workers are daily increasing, which is becoming daily wider, and the new treasures of which are daily being disclosed. Moreover, its relations to medicine are such that a Medical Association ought not to presume to parade the noble word "science" upon its banner, which does not send its labourers into this field, which does not encourage them there, and, at the very least, receive gracefully the fruit of their toil. A knowledge of the healthy working of the machine must be the only key which can unlock the mysteries of those deviations from it which constitute morbid processes, and must alone be able to furnish any reasonable theory as to the mode by which they may be prevented and arrested, and by which the damage they have done may be repaired. Physiology, indeed, must be the foundation stone of Pathology, of Sanitary Medicine, and of rational Therapeutics; and in each of these instances the building has yet, in great measure, to be raised. Indeed, the groundwork is scarcely visible, and we have only dim glimmerings of the form which the structures are to assume; but we feel assured that they must rise, and that, as they do grow upon this only sure foundation, an enormous amount of good is likely to accrue to the human race, and the science of medicine will be rescued from the opprobrium of empiricism. It is in this way mainly, if not solely, that civilisation must hope to stem the tide of malady, or rather the increasing number and variety of maladies, which she unfailingly brings in her train, as a consequence of the increasing variety of occupations, the increasing artificiality of life with the consequent increasing sensitiveness to external impressions, and, above all, by the increasing density of population.

The allusion to this point reminds me that some maladies, as the black death of the fourteenth century, the sweating sickness of the sixteenth century, and the plague of the seventeenth century, have disappeared under increasing cleanliness, better diet, and improved sanitary regulations. But others, as syphilis, cholera, and diphtheria, with a multitude of minor and more chronic ailments, have come in. The fact is, that the catastrophes of disease which now and then sweep, like hurricanes and storms, over a land, serve, to some extent, to clear and purify the population; and the sanitary measures must not be limited to the prevention of these disasters and the evils which directly accrue from them. They must be extended also to those general improvements of the condition of the people which sound physiology will suggest.

The importance of Physiology, in a sanitary point of view, is beginning to be recognised and discussed by the public. It is felt, as a matter of common sense, that a knowledge of the living processes must assist in the discovery and the carrying out of the means which are most likely to maintain those processes in health and in vigour; and no greater service to mankind could this Association do than by giving an impulse to that feeling. In their apprehensions of epidemics men are beginning to bend before the shrine of science and to recognise the fact that it is in a patient, persevering, hopeful application of the faculties of investigation which have been given them, rather than in any direct interpositions, that they are to look to Providence for security. Where man can help himself, other assistance must not be sought; indeed, would be detri-

mental. Is not this as sure a law and as sure a stimulus to activity as any other which is stamped upon creation? Already the careful consideration of the life history of epidemic diseases, of their causes, origin, development, growth, and decay, and the very limited knowledge of their nature thus derived, have suggested certain definite preventive measures sufficient to give great encouragement to their further physiological investigation; and this, be it observed, can only be based upon more advanced knowledge of the conditions of healthy process.

True, it may be said that hitherto practical medicine has not derived much from physiology; that our knowledge of disease is still confined, almost entirely, to the information derived from observation of it and of its symptoms; and that treatment is based chiefly upon the results obtained by experience; that of the actual *modus operandi* of medicines we are very ignorant; that we give mercury, iodide of potassium, quinine, opium, etc., under certain circumstances, simply because we have found them to be beneficial in similar conditions; and that medicine, accordingly, is more of a tentative and experimental than of a rational and an inductive science. Doubtless there is much in this; and the same thing may be said of many other sciences. The reason in this case is obvious, forasmuch as Physiology has never yet reached a sufficiently advanced stage to render much help to medicine. The problems of disease and of therapeutics are singularly difficult of solution, perhaps more than any others in the physical world. They are so because they have relation to the aberrations of the most complex and most refined and highest of created objects. For instance, how many questions hard to be answered does an ague suggest, with its chill, its heat and its sweat, with its periodicity, its miasmatic origin, its accompanying depression, and its cure by quinine or arsenic, and by the relation of all these to one another. We watch the spasms in tetanus, which are dragging the life out of our patient, and fatally barring the road against supplies of nourishment if not of medicine; and we wonder upon what they depend, whether it is upon some change in the muscles, in the blood, or in the nervous system, and what change it is in either or all of these. We try a drug which we have read was followed by good result in some other case of the kind, and we are disappointed. All the drugs have had their turn, and in turn have failed. We cast about for help to enlighten our darkness; and we look longingly to Physiology. We cannot but feel a hope, if not a confidence, that though the problem may be a difficult one, and though we have hitherto looked in vain, yet that the solution of these and many like questions will come and will bring with it the alleviation of some of the destructive and racking and hitherto indomitable maladies to which our frames are subject. We yield to that hope the more willingly because we recognise that though hitherto almost barren in this direction, yet that physiology, as it is now studied, has more promise of fertility. So long as the attention was confined, almost exclusively, to the investigation of dead structure, we could not hope for much enlightenment on the subject of morbid process. That investigation was necessary; and it was necessary that it should be conducted with the labour and care which have been bestowed upon it. It is, however, not the end, but a means to assist in the elucidation of living process. The mine of dead physiology has probably been pretty nearly worked out in the last fifty years; and the shafts are now being sunk more determinedly and systematically than has hitherto been done in the district of living physiology, with all the assistance which an accurate knowledge of the ground can give. It is unquestionably to repeated, thoughtfully planned, and carefully conducted experiments upon living animals that we must look for the solution of the great problems of pathology and therapeutics. The valuable discovery of the use of anæsthetics has rendered these experiments far more successful, as well as feasible; and it may be anticipated that, through their administration to animals for this purpose, anæsthetics will conduce even more largely, though less directly, to the mitigation of human suffering and the prolongation of human life, than in the mode in which we are accustomed to witness their employment on the human body. The workings of the animal machine can now be watched carefully and uninterruptedly, and the influence of various agents upon them can be deliberately investigated. At the same time, the improvement of apparatus enables the phenomena to be more accurately tested and recorded; and the employment of the bath enables a prolonged microscopical examination of the changes in a living part to be maintained.

The researches in this field which seem to hold out the best promise to medicine, are—*First*, those which are designed to elucidate the relation of the nervous to the vascular and the secretory system. *Secondly*, those which have relation to the transmission of healthy and morbid products from tissue to tissue, and from without the body to within it, and of their increase in the body. *Thirdly*, those which have for their end to determine the influence of various drugs, poisonous and other agents, upon the system.

With regard to the first of these, the growing knowledge we are acquiring, through the labours of Bridge, Schiff, Louget, Pflüger, Rutherford, and others, respecting the influence upon the heart and blood-vessels of the nervous system, as represented by two of its chief parts—the sympathetic, on the one hand, and the vagus and medulla oblongata, on the other—has opened up new fields of thought. They are enabling us to obtain rational views of the influences, already well known, which radiate from the stomach and alimentary canal upon the circulatory system. It seems incredible that this important stand-point, coupled as it is, and will be still more, with a knowledge of the circumstances which regulate blood-pressure and the production and distribution of heat, should not lead to better views of pathology and treatment. Happily, the sphygmograph and the clinical thermometer have introduced themselves here as additional bonds between the physician and the physiologist, coming in, as new inventions have happily the art of doing, or rather, as in the nature of things, they must do, precisely at the right time; and I trust that my friend Mr. Garrod, whose clinical knowledge, accuracy of observation, and fertility of invention peculiarly fit him for this work, will not cease to continue his interesting and instructive experiments. Practical medicine can scarcely desire a greater improvement than, it may be hoped, will accrue from a more rational system of applying cold internally and externally, and of regulating temperature, locally and generally, in the treatment of disease. We are peculiarly impressed with the importance of some trustworthy guiding knowledge on this point, when we remember the vacillations of practice which have taken place, and which do so still take place, with regard to it, when we reflect how terribly open we are to the imputation of blowing hot and cold with the same or consecutive breaths, and when we think upon the enormous amount of evil which has resulted from this. How many thousand lives have been sacrificed to misconception in this one point. Who can question, for instance, that the plagues of former days owed not a little of their virulence to the heated atmosphere in which the patients were sedulously kept? Then, as is too often the case still, profound ignorance cloaked itself with an effrontery of dogma which passed with the wearer, as well as with others, for evidence of an insight into the deep mysteries of science. Then, as too often now, the purely practical man, as he is called, was not uncommonly a slave to the grossest and most absurd theories, upon which he unconsciously relied as the ground of his malpraxis. If, then, theory is so potent for evil and for good, of what paramount importance is it to take all means that lie in our power to establish the foundations of theory upon as correct a basis as possible. Let the physiologist and the physician work on together, and let them work out, among other things, the subject of temperature in health and disease, so that the employment of cold, in the treatment of fever, for instance, may rest upon some assured principle, and not crop up for a time, do a certain amount of good or harm, and then fade away because it has no root in a clear conception of its effects and of the nature of the processes it is intended to regulate.

The second class of researches to which I have referred, those, namely, which have relation to the transmission of healthy and morbid products from tissue to tissue, and which have been made by Addison, Waller, Cohnheim, Stricker, Sanderson, Caton, and others, may be expected, perhaps, to throw light, not so much upon treatment as upon that which is still more important, viz., the prevention of disease. We have learned that the bodies of animals, probably of all animals, including our own, are freely permeable by parasitic forms, which insinuate themselves into and through the tissues, and leave no gap or trace of their course. We find that a similar, though more refined, corpuscular wandering, or transit of corpuscles, to and fro, takes place with regard to animal tissues; and the observation of the migration of corpuscles which have been stained by cinnabar and other coloured materials shows that their membranes offer little or no barriers to this sort of osmosis. A wide field for observation and speculation is here opened, upon which, however, we are only just entering, and we need that it should be much more thoroughly explored, and that much more information must be gained respecting the laws by which this process is regulated, before we can apply our knowledge respecting it, with much advantage, to the elucidation of the many great problems of pathology that may probably be solved by it. We can understand now, what was before thought to be impossible, that pus corpuscles, and others like them, can find their way into the blood current and produce the effects we so much dread under the name of pyæmia; but we need assurance that this really takes place; and, if so, under what circumstances it occurs, what conditions favour and what oppose it, and why purulent matter is sometimes diffused and at others pent up in abscesses. We trust that more information on these and other like points will teach us how we may best avoid those evils which are among the most serious hindrances to the success of operative surgery. My own impression is, that they are connected with some particular habits and states of system

thereby engendered. If I am not mistaken, they are less frequent among the agriculturists than among oppidans, and are, in part, due to the more liberal supply of animal food in which the latter, the artisans more especially, have, of late years, been in the habit of indulging.

Associated with this subject is that of the introduction of noxious agencies from without, and the various questions bearing upon it, such as the decomposition of fluids, the introduction, dissemination, and propagation of germs, and, I may add, their spontaneous generation. The importance of a fuller investigation of those subjects to the adopting of effectual means to prevent the spread of disease is sufficiently obvious. Some points appear to be clear.

First, it is pretty clear that air is the great, if not the only, vehicle of these insidious agencies, whatever they are; and that the exclusion of air or the purification of air from them prevents the occurrence of their effects. To this exclusion of air in the one case, and its admission in the other, must be attributed the difference in the changes which follow a simple and a compound fracture, as also of a subcutaneous and a more free external incision. There can be little doubt that if air could be entirely excluded, the various serous and synovial cavities might be opened with comparative immunity, and operations could be performed, from the probable or certain danger of which we now wisely shrink. It is upon the purification of air from these agents, or germs as they are called, that the antiseptic treatment, so ably propounded by Professor Lister at a former meeting of this Association, rests its claim. Certainly, whether they are germs or not in the ordinary sense of the word, they are so inasmuch as they are the starters or initiators of a new series of changes in the fluids or solids of the body.

Secondly, it is clear that these influences operate with greatest rapidity and facility where vitality is lowered. In other words, the nutritive and other processes are most easily impressed and diverted in a new direction in persons and parts where they are least vigorously conducted. Where the tendency to a right direction is staggered or weakened, the tendency to a wrong direction is most easily given. A fainting or a depressed body is well known to be a ready victim to poisonous and malarious agencies.

Closer observation of animal and vegetable life tells, more and more, of the prevalence of parasitic growth and of those lowered conditions which induce its excess. If a garden is blighted we know that it is so because the vigour of the trees is lowered by imperfect ventilation, frost, or some depressing cause. We recognise in it a mode of killing off some of the imperfect and over-crowded plants; and to apply these physiological principles to the case of man, we see that the maintenance of the vigour of the population by judicious sanitary measures is the only means of preventing an epidemic, and, at the same time, of preventing those evils which epidemics have the effect of correcting. We learn that, if it were in our power to stop epidemics by any mode, as by the institution of rigid quarantine, without attending to this point, we might, by so doing, effect more harm than good; forasmuch as we should incur the liability of engendering other, more insidious and perhaps more destructive, maladies than those we attempt to ward off. Physiologically, the security of a country from invasion by epidemic and other maladies depends not upon the rigour of its quarantine laws, but upon the efficiency of its sanitary enactments; just as, in a military point of view, security from foreign invasion and intestine commotion depends less upon bristling fortresses and strong ramparts than upon those laws which promote the energy and independence, and give scope to the physical, mental, and moral development of the people.

This is one among the lessons which physiology here teaches; and well would it be for the nations of the earth if they would lay it to heart, and would set about improving their own condition, rather than rest content, as they are too prone to do, with expending their efforts on what seems to be the more obvious and the easier task of endeavouring to bar out the enemy. This may be urged the more, because physiology points to some, and may soon be able to indicate more, of the methods by which the end may be attained. Physiology will gradually more unfold those laws which regulate and continue in mutual subordination the multitudinous factors that make a human body, and will show under what conditions they are most likely to degenerate into morbid conditions or morbid forms, and to degenerate into, or be modified by, parasitic growths or something akin to them. I say degenerate into parasitic growths; for as a cancer, on the one hand, has many of the attributes of the parasite, so it has, on the other, many connecting links with healthy tissue. It occupies, as it were, a middle or transitional place, and seems to suggest that in a better knowledge of the refined processes which are the source of it and some other morbid products, and in the more intimate knowledge of their real nature to be thus attained, we may look for some assistance towards the pre-

vention, and possibly the cure, of these, the most terrible scourges of a civilised people.

We know that effused blood and other fluids of low vitality are peculiarly prone to decomposition and disintegration from the admission of air. If the presence of blood in wounds could be prevented, the other tissues would, as a rule, resist the decomposing influence of air; and the lower the vitality of the blood, the less is its resisting power. If experimental physiology will disclose some means of increasing the resistance of the blood to decomposition, or, still better, will give us some good means of damming up the vessels, or clotting the blood in them, so as to prevent its effusions into wounds after they are closed, primary union would be the rule, and the mortality after the lesions caused by operations and in other ways would be greatly reduced. I say into wounds after they are closed; for the blood which flows while the wound is open may be cleared away, or may be so tanned, as it were, by carbolic acid and other agents, as to render it proof against the decomposing influence of air. The frequent failure of the primary union of wounds is discreditable alike to physiology and to surgery.

Thirdly, we find that, though some of these noxious agents, such as the fine poisons of measles, scarlatina, etc., are capable of traversing the delicate pulmonary and other membranes and to produce their effect on the system, while others, which are probably of a somewhat coarser nature, are arrested by these sieves, and, to some extent, by the artificial sieves of cotton-wool or muslin, which have been suggested by Professor Tyndall in his well known lecture on dust; some, and this seems to be the case with diphtheria, erysipelas, ringworm, and more obviously with itch, fasten upon the surface and spread their baneful influence in the epithelium and subjacent membrane. Of these, some, as the last mentioned, are clearly parasitic; and others may be so. In deciding this point, it is necessary to discriminate whether the parasite is a cause or a consequence of the altered condition. For instance, in the case of hay-fever, it is not by any means certain whether the vibrios in the mucus of the Schneiderian membrane, described by Binz and Helmholtz, and which suggested the dropping of a solution of quinine into the nostrils as a remedy, are a cause of the malady, or whether they are only an aggravating consequence of the altered condition of the epithelium, which presents a favourable nidus for them. Just as it appears from the recent observations of Hoppe-Seyler, that fermentation may not be, as supposed by Pasteur, dependent upon organisms, though the progress of fermentation and the production of new organisms may proceed *pari passu*.

The third direction of physiological research, to which I have alluded as holding out good promise for medicine, that, namely, which has for its object to determine the influence of various drugs, poisons, and other agents, upon the system, is the one we may look to most directly for assistance to the practical physician. The ground has been broken and the seed sown by Drs. Fraser, Brunton, and Paton, by Von Bezold, Boehm, J. Blake of San Francisco, and others; and we hope to gather the fruit of a more precise knowledge of the effects of medicines, and also of their *modus operandi* upon the parts of the body upon which they severally act; whether it is by influencing the chemical, the osmotic, or the other qualities of the fluids and tissues. So that we may learn what it is that a medicine really does, and have some scientific basis for our employment of it in the treatment of disease. Here I may refer to the interesting observations of Drs. Crum Brown and Fraser on the relation between chemical constitution and physiological action; from which it appears that a slight change in the composition of a medicine may lead not only to a change of effect, but to a change in the tissue affected; and also to the observations of Dr. Murray on the relation of osmosis to digestion and dyspepsia, and to the physical and physiological action of medicines, as indicating the path in which such investigations may be pursued. Is it not strange, and a strong shock to our reliance upon the evidence of practical men on such matters, that they should so long have gone on in the belief, and in action founded on the belief, that mercury produced a direct and marked effect upon the liver; and that they should have done so in spite of the abundant evidence to the contrary daily before their eyes, in the treatment of syphilis and other affections? That it should have been reserved to the experiments recently conducted in Edinburgh, by Drs. Rutherford and Gamgee, to throw a doubt upon, if not to disprove this, is a proof, at any rate, that the experience of practitioners needs to be supplemented by the carefully conducted experiments of trained physiologists. Indeed, the doubt thrown upon the action of mercury on the liver; the announcement by M. Lorain, that digitalis augments the force of the heart's action, and diminishes and regulates its beats; and further, the observation that alcohol lowers the temperature in pyrexia, are sufficiently startling to make us hesitate respecting the accepted views of the effects of remedies. Added to the revulsions of opinion on apparently established points

which many of us have witnessed, they make us long for some additional sources of information to show us better light in this dark and difficult road. In the midst of these shakings of our old ideas, it is some comfort to learn, from the carefully conducted observations made by MM. Rabateau and Constant, that the action of alkalis is really to reduce the rate of oxidation of tissues, the temperature, the pulsations of the heart, and the excretion of urea, and not, as was recently taught by Mialke and other therapeutists, to increase all these.

The physiologically antagonistic influences of atropia and physostigma, and the fact that a poisonous dose of the one may be given with impunity, if the other is administered along with it, seem to open a prospect that really curative, that is antidotal agents, may be discovered, not simply for drugs, but for the effects induced by drugs, and also for the changes which constitute disease; and the observation that morphia, chloroform, and some other substances, produce different and sometimes opposite effects, according to the doses in which they are given, renders it not improbable that poisonous agents may, in some instances, be antidotal to themselves, and that the word "homœopathy" may be rescued from its position as the expression of a fallacy, and may yet take its place in the etymology of scientific medicine.

In connection with this subject, I cannot do better than refer you to the valuable and truly philosophical lectures of Dr. Brunton *On the Experimental Investigation of the Action of Medicines*, the publication of which in the JOURNAL of the Association has done more than any one other thing to raise the scientific character of the JOURNAL. The appearance of such lectures in one of our weekly JOURNALS may be said almost to mark a new era in our profession; and I earnestly commend the perusal or re-perusal of them to every member of the Association, not only because they will supply him with a surprising amount of original information, but, still more, because they are calculated to inspire him with a truer feeling of what the science of medicine is or ought to be, and of the mode in which it should be studied.

Let us hope, too, that researches, conducted in the spirit of those by Parkes, Allbutt, Flint, and others, will induce more rational views respecting diet in health and disease, so that we may not henceforth find the "starving" system and the "keeping-up" system supplanting one another, as though at the caprice of fashion, to the great injury of all and to the discredit of our profession; and that we may gain more positive information as to the nutritive qualities of some of the staple articles of food, such as alcohol, albumen, and gelatine, as well as of the conditions in which each is most likely to be serviceable.

I must not, however, trespass longer upon your time; I have purposely avoided details, partly because they are scarcely suitable to the occasion, and still more, because we have the pleasure of anticipating an address in Physiology from one who is so much more competent to the task. My object in troubling you with these remarks is chiefly to express my own sense of the paramount importance of physiology, especially of physiology practically studied upon the living animal body, to the science of medicine, and of the great opportunity which is open to the Association, through the medium of this section, to clench more tightly the link that joins physiology to medicine. This I believe to be of especial importance at the present time, not simply because physiologists are entering upon regions of research which afford vast opportunity for the improvement of medical science, but because the great area and engrossing character of those regions may have too much the effect of rendering physiology a special and separate study, and of carrying its followers somewhat too much out of the range of medical thought. Upon this section, therefore, devolves the task of giving or maintaining a practical bearing to the researches of physiology, of showing that every discovery of physiology may, indeed must, admit of such a bearing; that however abstruse the investigation into animal life may be, it must ultimately have a relation to the pathology of man and the treatment of his diseases. It is for us, as practical men, to sympathise with the physiologist in his most refined investigations, on the one hand, and on the other, to induce the physiologist to sympathise with us, and to feel that the highest aim of his pursuits should be to extend the knowledge of the natural processes into that of the variations from them which constitute disease, and into that of the means by which those variations may be prevented or arrested. In short, to connect science and practice, to make them interpret and supplement and assist one another, which is the great desideratum in all departments of knowledge, is the especial function of the Physiological Section of the British Medical Association. That our meeting will not be altogether barren in this respect is sufficiently shown by the list of papers embracing so many, and such interesting subjects, which appears upon our programme.