again attacked. But it has been found that if the leg be taken off in the first instance above the knee a fair proportion of cases recover. About one half, according to the most recently collected figures, have been successful, and in a condition so hopeless and usually so painful, such a result is better than the certain issue of non-interference. Let me enforce the point, and at the same time refer to an interesting pathological fact which, in some instances at least, provides its explanation by quoting a case. A man, aged 56, had spreading gangrene of the toes, with severe and constant suffering. The circulation of the whole foot was very imperfect. No pulsation of the posterior tibial was to be felt, but that of the popliteal was distinct. The leg was amputated immediately below the knee, and recovery was marred by slight sloughing of the flap edges and a good deal of pain in the stump. In the end the case did well. The artery, which had been severed high in the popliteal space, presented an interesting condition. Due to chronic arteritis, and not atheroma, there was thickening of the coats to the extent of complete occlusion of the posterior tibial behind the malleolus. A thrombus nearly filled the artery in the calf, and above the bifurcation of the popliteal there was a great narrowing of the vessel. This narrowing close to the bifurcation has been noted in similar cases. It is an old observation that tendency to degeneration in consequence of strain is greatest close to an arterial bifurcation; and the frequent occurrence of serious narrowing at the point referred to explains in a proportion of cases the ill success of amputations through the leg for gangrene. The happily limited sloughing and protracted recovery of my patient teach—as the consequences of breach of rule ought to do—the advantages of obedience; and I leave the case as testimony, so far as it goes, in favour of the establishment of a surgical canon, to this effect: In spreading gangrene of the foot, amputate through the thigh.

An old and familiar surgical canon formulated by our predecessors as the result of experience, enjoined on the surgeon the duty of operating, "when in doubt," in all cases of hernia. We greatly need the guidance of some equally definite rule in cases of internal obstruction. Upon the question of operation surgeons are, if not divided into two parties, at least biassed in contrary directions. Some would operate in all cases of complete obstruction so soon as they have the opportunity; others would try other measures, see what Nature will do, and operate as a last resource. And strong arguments are to be found on either side. The surgeon who would always operate, and had always an early opportunity of doing so, would unquestionably achieve the best results possible, although he would operate on a certain proportion of cases that could spontaneously recover. But unfortunately no one is brought in contact with even the majority of his cases in an early stage. And hence arises the force of the contrary arguments. The circumstances which militate against the success of operation for internal obstruction in the fully established or later stages of the complaint are twofold. In the first place, in nearly all cases, secondary changes speedily ensue, which hinder the search for the obstructing cause, and which may nullify attempts at its removal. And in the second place the patient often passes, it may be at an early period, into a condition mainly due to poisoned blood in which he trembles on the brink of collapse, and in which operation is badly borne. Add to these the fact that a not inconsiderable number of cases, even when there is stercoraceous vomiting, do recover, whose chance of recovery would disappear under the shock of an operation; and we have what I think is a fair statement of the reasoning against operating in all cases. Where are we to look for guidance? Mainly, the question must be settled by experience; it is a case to which the maxim "Solvitur ambulando" applies; and I think experience will aid by bringing to us the ability better to discriminate between the different causes producing obstruction, and to appreciate the prognosis to be attached to each, In a syllabus of intestinal surgery recently published,[1] a list of eleven different causes of intestinal obstruction is tabulated. When we have learned more accurately to distinguish between these at the bedside, we shall be much nearer to the acknowledgment of a surgical canon or rule to guide our interference.

[1] Dr. Byron Robson in May No. of *Annals of Surgery*.

I shall trespass on your attention with one more surgical canon, but it is one whose propriety is so obvious—nay, whose observance is so imperative—that it ought to need no enforcing. The magnitude of many modern operations carrying surgical interference to the verge of what the human body can sustain, makes it more and more incumbent on the surgeon to avoid, or as far as possible to minimise, shock. And yet I doubt if this important duty receives generally the systematic attention it deserves. We do not know the exact pathology of the condition; probably several different conditions are included under the name. But we are very familiar with its symptoms. We know that the patient becomes cold, that the heart's action is depressed, and that all the nervous functions are lowered. We know also that it is induced or aggravated by prolonged operation, by chilling of the surface, by hæmorrhage, whether this take place rapidly or by continuous oozing in small quantity for a long time. I should like to add also that the giving of chloroform on successive days lowers the patient's resisting power. All this supplies hints enough for its prevention and treatment. Something can be done in anticipation of the operation in the way of propping both the physical and moral courage of the patient. Much can be done after the operation in rallying from the condition; and I have believed that a very small, stimulating, hypodermic dose of morphine has proved then of greater use than the same measure employed as a prophylactic. Transfusion with normal saline has so wonderful a power of rallying from shock, though so far as my experience goes its good effect has been disappointingly transitory, that its use will now not be neglected. But most is in our power in the way of prevention by guarding our patients against all those causes which produce shock or aggravate it; and therefore the surgical canon which in this matter claims not formal acknowledgment but systematic observance is: Avoid or as far as possible minimise shock.

But time, and the fear lest I should exhaust your courteous patience, warn me to conclude. In the survey I have given I have had before me the wish to illustrate the growth of surgical principles, and the necessary linking between these and practice. In fearing that much that I have brought before you must have seemed elementary and commonplace, I am conscious that the fault has lain not in the choice but in the handling of my subject. No inquiry into the manner in which knowledge is acquired, or is turned to practical account, ought to be without interest or helpfulness. And, for the most part, we are so engrossed with practical details, knowing how much in surgery depends on these, that we have little time and thought to spare for scientific principles. We may, therefore, profitably remind ourselves that our art is better just in proportion as our science is broader; that for true progress the two must go forward abreast; and that, though great things have been accomplished in our time, much more remains to be done.

AN ADDRESS

DELIVERED AT THE OPENING OF

THE SECTION OF ANATOMY AND PHYSIOLOGY.

At the Annual Meeting of the British Medical Association held in Newcastle, August, 1893.

BY THOMAS OLIVER, M.A., M.D., F.R.C.P.,

Professor of Physiology, University of Durham, and Physician to the Royal Infirmary, Newcastle-upon-Tyne.

PHYSIC AND PHYSIOLOGY.

IT is more from my association with the teaching of physiology in this College than from any special fitness for the office that I have been invited to preside over the deliberations of this Section. I do not regard a meeting of the British Medical Association as the best place for the discussion of subjects of a purely anatomical and physiological nature, and yet, as there are many at this meeting whose duty it is to superintend the education of those who are entering the medical profession, there are side issues con-

nected with these subjects that may be discussed, not only with convenience, but, let us hope, to the advantage of medicine as a whole.

In these days of political and social unrest it is scarcely to be wondered that a spirit of reform should pervade the medical life of the nation, but should have penetrated the legislative Council that presides over our immediate destiny. At present there is a tendency in the schools to cast aside all that is purely dogmatic, and to recognise no authority except reason. Opinions, to be acceptable, must rest upon solid facts. The whole tendency of modern education is rather towards the practical than the systematic. The spirit of the age is, indeed, one marked by a thirst for innovation—a great desire to know a little of many things—not much of one thing, and certainly nothing well of even a few things.

In the substitution of biology for botany in the curriculum, the General Medical Council have acted wisely. The medical student ought to have knowledge of the general principles of vegetable and animal life; but it seems to me, speaking as a teacher and examiner, that the General Medical Council have made a mistake—one, certainly, that ought to be remedied without delay—by requiring from the student of medicine attendance upon only one year's lectures on systematic physiology. In England it is impossible to give in the winter session—in the three days a week suggested by the Council—anything like a course of lectures that will cover the subject or fit the student for creditably passing his examination. What we call systematic physiology is, in the calendar of the Scottish Universities, more aptly described as the Institutes of Medicine. Physiology is the foundation of all rational medicine: it is the forerunner of pathology, the handmaid of therapeutics, and the essence of modern surgery. Considering the very important functions of the General Medical Council and its present constitution, there ought to be on that body not simply representation of the schools, but of the subjects taught in the schools.

It has been remarked, and probably not without reason, that modern physiologists have taught beyond the requirements of the medical student. The application of electricity, not only in the investigation of the properties of muscle and nerve, but as an aid to the localisation of function in the brain—the utilisation of the graphic method, and the employment of the highest magnifying power possible in the investigation of intracellular processes, and the life of micro-organisms—in brief, the application of the experimental method has revealed a world of phenomena hitherto beyond the grasp of the physiologist, and has enabled him to transfer their exposition from the realm of imagination to that of reason. Only by observation, analysis, and correlation in facts—in a word, by the process of induction—has the science of physiology advanced. No intuitive knowledge can explain to us, for example, the path by which accelerator impulses pass to the heart, the activities of the vasomotor centres, or the channels through which these operate. It was in the first flush of recent discovery that teachers of physiology, stimulated by the acquisition of new facts, and fascinated by their suggestiveness, strove in the class rooms to make medical students sharers of the intellectual glory that was theirs. Thus captivated, they apparently neglected to impart the simpler and more necessary knowledge. The reaction, however, is complete, and I make bold to say that never in the education of the medical student has there been so sincere a desire on the part of teachers to place before him facts more applicable to the science and practice of medicine, or statements more truly explanatory of phenomena than there is to-day. Armed with a thorough knowledge of these, the medical student has not only the opportunity of being more highly equipped mentally—he is better forearmed for the treatment of disease than in any preceding age.

Uniting in my own particular case the practice of the physician with the teaching of physiology, it is perhaps expected of me that I should say something of their relationship. Have these two sciences advanced at the same pace as the other sciences? Have they contributed to greater physical comfort and happiness, and have we been aided in our work by the support of the public? Few things stand out more prominently than the immense development of medicine and physiology within the last few years, and the important part played by the experimental method in the investigation and treatment of disease. Is there, for example, a single department of medicine or surgery the pathological study of which may not be carried out in the laboratory as well as in the sick chamber? If the public require of us when life is imperilled that we shall bring to bear upon the patient all the resources of the healing art, we insist upon being allowed to gain that knowledge in a manner and by methods alike reasonable and righteous. It is idle to waste time recapitulating what the experimental method has accomplished. Though yet only on the threshold of discovery in this department of investigation we already recognise the true cause of tubercle and the part played by its bacillus. Rabies in Pasteur's hands has been robbed of its terrors and successfully combated. Experiments in the laboratory have placed in our hands, or suggested, remedies whereby we may more advantageously fight disease. Certain forms of brain disease, which have hitherto been considered beyond the reach of the medical and surgical art, have, in the hands of Horsley, Macewen, Godlee, and others, yielded to the knife—the operator guided to the spot by the knowledge of located function. Thanks to experimental physiology, we grapple with disease in the brain, the chest, and abdomen with a dexterity and certainty of success, in a manner quite unknown thirty or forty years ago.

If additional proof of the great advances made within this century were required we have only to allude to the discovery of chloroform and the production of anæsthesia, to the antiseptic treatment of wounds by Lister, and to the impetus given to bacteriological studies and preventive medicine. The object of the medical profession is not simply to treat disease when developed with the best weapons at our command; our duty is to prevent it. But if bacteriological investigations are proscribed, and the profession precluded from fighting the microbes, the microbes may after all prove victorious.

The subject of experimental inquiry must rest upon a rational basis; it should be considered apart from emotion or feeling. In no spirit of arrogance do we say that it is the duty of the British public to be guided in this matter by men who have studied the subject, and are convinced of the enormous benefits that result therefrom. It is gratifying to see that the Government, refusing to be influenced by well-meaning but misguided enthusiasts, and directed by men who have the larger interests of humanity at heart, have at last consented to an experimental investigation into tuberculosis. This subject of experimental investigation is one upon which we, as medical men, must have the courage of our opinions, and I cannot but think that if these are boldly stated, and the results of experimental work placed honestly before our countrymen, public opinion will pronounce in favour of a method the aim of which is their own health and happiness. Sentimentalism must give way to rationalism.

In advocating a method which I regard as perfectly consistent, it is perhaps scarcely expected that I should vindicate the experimental method. But, as we still labour under the influence of an attack which calumniated members of the profession, we cannot let the opportunity pass without saying a word or two. Gentlemen, the conflict between religion and science will never be brought to a peaceful termination or happy reconciliation, so far as the Church and medicine are concerned, by personal insult or aspersion. In this matter we refuse to recognise the dictates of ecclesiastics as authoritative. It is a subject to which they have not given the study necessary to render their opinions conclusive. Who is to estimate or judge our action in this, a purely social matter? Society, and not simply a section thereof. What is right or wrong, what constitutes a moral or immoral act, are questions that belong to the science of ethics. It scarcely comes within the scope of our inquiry as to whether the moral sense has been in the ages slowly evolved, or whether it is spiritual—anterior, therefore, to all human experience—capable of existing apart from it, and to whose dictate we must bow with reverential submission. Apart from the actions of men, morality has no practical existence for us. It is difficult to appraise the ethical value of a human deed, but surely the welfare of society is no mean standard by which to estimate the morality of actions. We admit that the legalisation of an act confers no moral quality upon it, and we equally maintain that legislative restriction does not condemn it as immoral.

In the matter before us, we, as a profession, must take sides. Of the two rival theories of morals, it is the utilitarian rather than the intuitive that appeals to us. Our duty as medical men is to do all we can to increase the span of human life, to diminish its attendant evils, to diffuse a greater amount of health, and thus intensify the happiness of the human race. We must bring to bear upon men in illness that knowledge and experience which will enable them again to become healthy members of society. Branded as utilitarians, we must not shrink from experimental work, the objects of which are to increase the sum of our own knowledge, and thereby more effectually deal with disease. Is it, after all, such a small matter that we should desire the welfare of mankind? Is it not in consonance with the Divine will? If so, then any conduct that leads to that end is in conformity with it. We claim the right to act as conscience dictates. We ask no motive to be imputed; we simply plead that the beneficial results of vivisection amply justify the practice of it. The motive that underlies the act is the attainment of knowledge not selfishly accumulated, but wielded on behalf of humanity and the lower animals also. If the morality of an action depends, as some maintain, upon the intention, here, where the intention is admittedly good, the act clearly stands on no mean moral level. The practice is undertaken, not because we like it, but from altruistic motives. It is said that we have no right to do evil that good may come, or inflict suffering upon animals that the human race may be relieved of pain. Animals, we are told, have rights; they have the right to claim protection at our hands. Animals were made subject to man, and are subservient to him. One of the prominent features in a country far advanced in civilisation is the kindness exhibited towards animals. This kindly feeling, raised as it is to the dignity of a moral sense, is the outcome of evolution or human experience. How few there are who regard the destruction of animal life for food as an immoral act. The strongest opponent of vivisection has no scruples in regard to eating a good beefsteak. He claims that it is necessary for his sustenance.

This conflict should cease. The practice of medicine and the teaching of physiology show vivisection to be necessary. The demands made upon us by society require that we should be in possession of the highest knowledge. It seems strange that men and women who entrust the medical profession with their own lives and those of their children should not receive with satisfaction the assurance that, with the Home Secretary and his colleagues in this particular work as the guardians of the lives of animals, the interests of the animal race will be protected. Reassured by us that pain will not be needlessly inflicted, that the animals in almost every instance are completely anæsthetised, and, therefore, beyond the reach of pain; that they are killed, with very exceptions, ere the return of consciousness, society should be content to leave the matter in the hands of the profession and Government.

To relieve suffering and avert death are tasks allotted to us as a profession, and are the objects that ought to be the end of all physiological inquiry. The meaning of pain, as well as many of the physical conditions upon which it depends, still remain a mystery. Speaking generally, it is admitted that the sum of pain experienced by the lower animals is outbalanced by the amount of pleasure they enjoy. The revolting death which is the lot of many animals through others of a superior order pouncing upon them is, so far as the suffering animal itself is concerned, robbed of much of its repulsiveness by the sudden shock that is received. Thus, whilst apparently in agony, the capabilities for feeling have been destroyed. Death's touch has so far narcotised these that pain cannot be felt. What a mystery there is surrounding suffering!

The whole of the animal world is at incessant strife with itself, and yet through all this warfare, whilst the weak are being crushed by the strong, there is the operation of law, whereby Nature is pushing on to higher ends. By the destruction and utilisation of the lower animals, life is ever rising to nobler forms culminating in man. By a rational use of the knowledge of the phenomena of animal life, he is continually perfecting himself, and is thus trying to realise the highest aim of being. Pain is not therefore an accident—the purpose of pain is progress. We rise through experience of pain and the knowledge of its operation to the means of conquering it. It is thus that social life is lifted higher. And yet, with a full appreciation of the limitation of human thought and action, we admit that should the efforts of our craft be blessed, and the sum of pain and suffering be reduced, no inglorious repose—no life of luxurious ease—no hedonistic allurements would be the prize to mankind, for to it would be presented a widened life of Nature—a far-off goal ever receding as humanity advanced—in a word, there would be then, as now, an ideal still to be pursued.

One of the greatest achievements of medicine has been the introduction of chloroform and its employment to abolish pain. The story of its discovery and early use find a place in medical literature. Most beneficial as its results have been, its employment has at times been followed by disaster. Public opinion has thus been aroused, and a feeling of uncertainty prevails in regard to the use of an agent whose action we cannot always control. Great as have been the benefits conferred by the introduction of chloroform and ether, it will be a real and lasting service to society when the elements of uncertainty have been eliminated, and when an anæsthetic, perfectly safe, admissible under all circumstances, and complete in its narcotising influence, can be placed at our service. This is one of those absorbing questions only to be solved in the laboratory, and if the experimental method can give the answer to this problem, the result alone would amply vindicate the means we adopt to attain it. The Hyderabad Commission and the Glasgow Committee, not to mention individuals, have already done good work. My clinical experience and opinion until lately were—and I believe a similar opinion is held by most hospital physicians and surgeons—that the sudden death in chloroform anæsthesia is due to cardiac failure; but experimental inquiry has shown me, as it did Lauder Brunton, that the sudden death is not due to cardiac failure, but comes from the respiratory centre. A few drops of chloroform will, in some instances, almost immediately kill an animal, and so absolute is the death that neither artificial respiration nor insufflation can restore the animal's life. Under these circumstances, when the chest is opened, the circulation and respiration may be completely quiescent, or the heart may still be seen beating with a fair amount of vigour, and will continue to do so for a variable length of time. Is the composition of the blood likely to throw any light upon cases of sudden death in chloroform anæsthesia? In arterial blood the percentage of nitrogen, for example, is extremely small. It is not more than from 1 to 2 volumes per 100 cubic centimetres of blood, the oxygen 20, and the carbonic acid 20 to 30.

In chloroform anæsthesia the mode of death varies. Inhalation of the anæsthetic may scarcely have begun when the animal suddenly dies. In such a case time has not been given for any quantity of vapour to have been absorbed into the blood. There is no question of the direct action of chloroform upon the heart, much less upon the respiratory or cardiac centres, and yet the sudden death clearly shows that these centres must have been influenced through the sensory nerve endings of the fifth cranial nerve in the nasal mucous membrane. Death is thus a reflex phenomenon. Once this early period of danger is passed, it is astonishing how variable is the toleration of animals in regard to chloroform. Some take it unusually well and for a long time, whilst in others the breathing soon becomes shorter and quicker, or it suddenly ceases. In these cases, when the chest is opened, the heart may still be seen beating, though relaxed, and its chambers, particularly those of the right side, overfilled. My own experience is—setting aside the few cases where heart and respiration have apparently been arrested together or at such a difference of time as to be scarcely appreciable—that death has been due to the sudden suspension of respiration, and it is from this source rather than from cardiac failure that death proceeds. Whilst, therefore, the condition of the pulse should not be overlooked, it is the breathing that should be particularly watched by the administrator of chloroform. It seems to me that the administration of anæsthetics might with the greatest advantage form the subject of a clinical lecture and demonstration by our hospital surgeons more frequently than it does.

In my experiments with chloroform, ether, bichloride of

methylene, and nitrous oxide gas, sudden death in most cases came from respiratory arrest, whilst in one or two cases the phenomena simply resembled those of asphyxia. The tendency of all anæsthetics is naturally to diminish the amount of oxygen carried in by the lungs. For the time being the vapour of the anæsthetic is circulating in the blood, and it is to its presence and its effect upon the brain rather than its influence upon the circulation that anæsthesia is due. Chloroform acts upon blood as well as upon cerebral cells. In the blood it is probably held in solution, or, as Schmiedeberg maintains, it may enter into chemical combination with the blood corpuscles. How does it cause anæsthesia?

As the inhalation of an anæsthetic interferes with the due entrance of oxygen into the blood, it has been thought that it is simply by suffocation or asphyxia that loss of consciousness is induced. Whilst in nearly all my experiments there is a much larger percentage of carbonic acid and nitrogen than in ordinary arterial blood, there are circumstances indicating that asphyxia can scarcely be the explanation. Anæsthesia does not seem to be due to interference with the cerebral circulation alone, nor, as Carter thought, to deficient oxidation and increased brain pressure. I believe with Brunton that it is due to the direct action of the anæsthetic upon nerve tissue. Whether there is, as Heinrich Ranke maintained, a transient fixation of the albuminous molecules in the cells of the cerebral cortex—a condition to which Claude Bernard applied to the term of "semi-coagulation"—we cannot say. The condition is of short duration, and is regarded as akin to the physical changes that occur in muscle in physiological tetanus. Chloroform has the power of coagulating the albuminous substances in muscle, but we require additional proof of the chemical combinations that Ranke has alluded to. I offer no new theory in regard to the action of chloroform. There may be chemical combination between the modified cerebral protoplasm and the anæsthetic. In ordinary anæsthesia the amount of chloroform vapour in the blood must be small. From the blood, as it circulates through the brain, the cells absorb chloroform to the deprivation of their normal amount of oxygen. Anæsthesia would thus be the result of the direct effect of chloroform upon these cells, entering for the time being into loose combination with their constituents, and checking the normal processes of oxidation. The rapidity with which consciousness is regained confirms the opinion that there can be no marked alteration of chemical constitution of cells, and yet there are circumstances which show that alteration in the physicial structure of organs has followed the inhalation of chloroform. I refer to sudden death three or four days after inhalation of chloroform for some trivial complaint in people who are known to have been robust, and in whom *post mortem* either nothing is found to explain death or there is fatty degeneration of the heart. These cases fortunately do no often arise, but they indicate that people who are the subjects of compensated valvular disease of the heart run far less risk during or after chloroform anæsthesia than those whose myocardium is undergoing fatty granular degeneration.

Anæsthetics paralyse the nervous system. Like alcohol, they act first upon the highest levels—those that are the seat of volition—and ultimately influence the lowest centres, those that are automatic, and are situated in the medulla. When pushed far enough, the respiratory movements cease from paralysis of the respiratory centre, or there occurs stoppage of the heart's action. Setting aside the rapidly fatal effects of the inhalation of undiluted chloroform—always attended with serious risk to life—it is when the medullary centres are paralysed that death takes place. The controversy as to the cause of death in chloroform circles round the question whether death proceeds from the cardiac or respiratory centre. In my own cases, whilst arterial pressure was falling, the veins could be seen gradually and, subsequently, suddenly swelling; the breathing became shorter and feebler, or would at once cease, whilst the heart continued to beat. The weakening of the heart's beat seemed to be due to the narcotising of the respiratory centre, and its accompanying weakened respiratory movements. This, in my opinion, is the danger to be dreaded, and, if possible, averted.

In an analysis of the gases of the blood in anæsthesia by Mr. Garrett and myself—allowing for discrepancies—we notice a large amount of carbonic acid, a deficiency of oxygen, and an excess of nitrogen present in the blood during chloroform narcosis. Paul Bert has shown that these tend to become exaggerated as anæsthesia deepens. In ether, which is regarded as a safe anæsthetic, there is a larger number of volumes of oxygen, whilst, in nitrous oxide, we notice a very great disappearance of oxygen, and its replacement by nitrous oxide and nitrogen. Another thing that struck us, too, was that the colour of the blood is no criterion of the amount of oxygen it contains.

Believing that death comes from the respiratory centre, we tried the combined inhalation of oxygen and chloroform, also oxygen and ether. Rabbits, for example, do not bear anæsthetics well, but, when given in this combined form, by passing oxygen through the anæsthetic, and allowing the commingled vapours to pass into the lungs, the risk of sudden death seemed to be diminished. The dangers characteristic of pure chloroform anæsthesia appeared to be averted—the blood pressure remained high and respiration was well maintained. The most satisfactory results were obtained by ether and oxygen. The inhalation of these gases was attended apparently by no discomfort; breathing was performed easily, and, whilst anæsthesia was more slowly induced than with the anæsthetic alone, the sleep was profound. The blood removed for examination escaped under the highest pressure of all the anæsthetics, and for several minutes after the chest was opened respiratory movements were active, whilst the heart continued to beat for from a half to three-quarters of an hour after death. Death came slowly under the combined inhalations. The breathing became shorter and shorter, and then gradually ceased. The blood removed was of a brilliant scarlet colour; it had sufficient oxygen to supply the respiratory centre, and thus apparently warded off a source of death. The pupils remained about the size of a large pin's head, and did not assume the extreme dilatation met with in asphyxia.

Experimental investigation that can be utilised for the services of humanity deserve attention, and should receive our support. The contrast between modern physiology and that taught thirty or forty years ago is so great that the two sciences scarcely resemble each other. In the truest sense of the word has the process been one of development—not simply by accumulation of facts, but by analysis and transmutation, and, therefore, in the highest sense evolutional, has physiology risen to her lofty position. It has thus shared in the general progress of the sciences, and has contributed to their advance. Already how far-reaching are the consequences of Galvani's world-famous experiment!

The history of human knowledge is one of progress—one thought, one spirit, one mind is ever present through the ages. External events may have disturbed the life of nations, arresting for the time being the wave of civilisation; intellectual aspiration may have been stifled and public opinion often have paid too high a premium to mistaken zeal, but neither the abjuration of Galileo, the terrors of an Inquisition, nor public nor private coercion, can check the development of human thought or alter the operation of a law whereby each succeeding age is the inheritor of an increasing sum of knowledge. We are heirs of all the ages. It is our privilege and vocation not only to make such contributions to the sum of human knowledge as may be utilised for the benefit of the present generation, but to transmit an increased legacy to our successors.

Conferment of Degrees at Aberdeen University.—The Graduation in Medicine at Aberdeen University took place in the Upper Hall, Marischal College, on July 27th. Sir William Geddes, Principal of the University, who presided, delivered a brief address of congratulation and advice to the graduates. Nine candidates received the degree of M.D.; thirty-one had conferred on them the degrees of M.B., C.M. The John Murray Medal and Scholarship (awarded to the most distinguished student of the year) was given to Ashley W. Macintosh, M.A., M.B., C.M., to whom also was awarded the George Thomson Fellowship.