William Dunlop Donnan (1869–1941)

President of the Ulster Medical Society 1917–18

Presidential Opening Address
Ulster Medical Society
8th November 1917

LADIES AND GENTLEMEN, Allow me to thank you most sincerely for the high honour you have paid me in asking me to be your President for the session 1917-1918, an honour which I in no way deserve and which I would have fain thrust from me, but which I have accepted as a compliment to the medical practitioners of Co. Down, whom I have the privilege to represent. It gives me especial pleasure to try and follow in the footsteps of my old friend, Mr. Robert Campbell, who has so worthily upheld the high traditions of the office in the past year, and whom we all respect both for his high professional attainments and for that rugged honesty and directness of purpose which are so characteristic of the Campbell family.

The Ulster Medical Society was founded in 1862 by the amalgamation of the Belfast Medical Society and the Clinico-Pathological Society, and when I scan the list of Past Presidents – such names as Cuming and Ross, Walton Browne and Whitla, M'Keown and Fagan, fill me with a sense of my own littleness and call up memories of my student days when these were names to conjure with and only to be mentioned with bated breath.

I think we all acknowledge that the Ulster Medical Society is the Society for the North of Ireland, and occupies a warmer corner in our hearts than the various branches and divisions which the Saxon has since created.

I would again direct your attention to the temporary loss of revenue from which we are suffering owing to the absence of so many of our members on active service, and urge you all individually to endeavour to entice any stray sheep into our fold. Such acts will give joy to our worthy Hon. Treasurer, Dr. Victor Fielden, who has the interests of our Society so much at heart. I verily believe that an overdraft at the Bank worries him as much as if it had occurred in his own private account. With the help of such officers as himself, my able lieutenants, Dr. Leathem and Dr. Walter Smyth, and our energetic Hon. Secretary, Capt. S. T. Irwin, I feel that my task will be a light one, once I have weathered the quicksands of to-night.

The custom, handed down from the shadowy past, that the President should give an opening address, is a cruel one, making the life of that individual miserable, from the passing of sentence in May till this dread night in November when he stands on the scaffold with the noose dangling over his head.

The medical profession in the North of Ireland has sustained a severe loss by the death, on 5th November, of Dr. Wm. Graham, from cardiac failure following a fracture of the leg.

Dr. Graham, who obtained the M.D. Degree in the R.U.I. in 1882, had held the post of Medical Superintendent of the Belfast Asylum since 1896. In April last he was given the control of the Belfast War Hospital on the Grosvenor Road with the rank of Lieutenant-Colonel. He was a man of charming presence, a lucid writer, a keen sportsman and an admitted authority on mental diseases. Our keenest sympathy goes out to his widow and relatives.

This dreadful European War has since its inception taken its toll from the members of our medical school. The following names of the fallen bear eloquent testimony to their bravery and devotion to duty:–

J. F. St. John Annesley.
R. H. Ashmore.
F. L. Cleland.
W. G. Cummings.
B. C. Letts.
T. D. Liddle.
W. T. M'Curry.
E. W. S. Martin.
Hamilton Matthewson.
T. M. Phillips.
Isobel Tate.
A. S. Taylor.
A. M. Thomson.
R. H. Wilson.
F. J. Wisely.

I fear it is too much to hope that my successor may be able to rejoice in the conclusion of a permanent peace.

The sacrifice of hundreds of thousands of young and useful lives fills one with horror, yet one feels that those who come through the fiery ordeal and have faced the dread Reaper with unflinching heroism, will have acquired a strength of character and readiness to face emergencies which will stand to them in civil life for the rest of their lives, and that this will leave its mark on future generations of our race whose virility will have received a fresh stimulus from the stress of these times.

We feel a legitimate pride in the noble efforts of our medical brethren in the Army and Navy who

have done so much to restore the wounded and maimed to health again. These include the best and most active brains in the kingdom, and one has only to turn to the pages of the medical journals to see the vast amount of scientific work which has been and is being done.

Just as the necessities and risks of war service have developed the aeroplane and the aviator enormously, so our surgeons, in dealing with the number and variety of wounds which pass through their hands, have improved their technique and gained dexterity in their art.

They have received valuable aid from the pathologists, bacteriologists and chemists, as is clearly shown in the improvements of the processes for the disinfection and sterilisation of wounds. The work of Wright, Carrel, Dakin and Lorrain Smith are well known to us.

Wright's lymph lavage by the irrigation of hypertonic saline solution, together with the use of sodium citrate to prevent lymph coagulation causes a flow of antitryptic and antibacterial serum into the wound from its walls, and prevents the formation of pus which is highly tryptic owing to the disintegration of the leucocytes. Later, the substitution of an isotonic solution causes an active flow of phagocyte leucocytes which attack the pyogenic cocci. Carrel, Dakin and Lorrain Smith have elaborated the use of chlorine as an active antiseptic.

Personally I have found Dakin's paratoluene sodium sulphochloramide in solution and gauze most useful in the case of infected wounds and abscesses. A later elaboration is Dakin's Dichloramine-T, which is soluble in eucalyptol and can be diluted with liquid paraffin. Owing to its oily character the dressings do not adhere to the wound. It was introduced for the disinfection of the naso-pharynx of carriers of the meningococcus. Other solutions are malachite green and perchloride of mercury in 80% alcohol applied as a spray. The latest favourites are acriflavine and proflavine.

The ambrine treatment for burns has been devised by Barthe de Sandfort. A mixture of resin and hard paraffin, sterilised by heat is sprayed or painted on the surface in a melted condition, which allows great heat to be applied, forming on cooling a non-adherent cast to the part which also exerts pressure.

Dr. Rutherford Morrison sings the praises of his B. I. P. P. which is a mixture of bismuth subnitrate and iodoform in liquid paraffin. He declares that wounds filled with this paste can be left untouched for a considerable time, healing taking place steadily.

The employment of antisepsis vaccine and the benefit gained by the use of a prophylactic dose of antitetanic serum in every wound may be briefly mentioned. In the latter case it has been noted that anaphylaxis rarely occurs, should the onset of tetanus require a further use of the serum. The fractional method of reinjection has been recommended as an extra precaution.

It is a matter of congratulation that Sir Almroth Wright is a Belfast man, and that Lorrain Smith of Edinburgh was for many years our much-beloved Professor of Pathology – a most gifted man, whose personal magnetism and inspiring example laid the foundation stone for our local brilliant band of pathologists. With all due deference to our lady pathologists, who are doing their work most excellently, I do think the exigencies of the Army might allow the city of Belfast to retain at least one of our junior male pathologists.

Incidentally, may I refer to the excellent results obtained in the use of urea on infected surfaces, mucous or otherwise. This was suggested by Professor St. Clair Symmers and carried into practice by Surgeon Kirk. During his voyage on the ill-fated "Britannic" he made converts of the whole forty medical men on board.

I had the pleasure of being Resident Pupil with Mr. Kirk. After graduating we met again in the Rotunda. I then proceeded on a voyage to the East, and on my return to succeed Dr. Jas. Colville as House Surgeon in the old Royal Hospital I found Mr. Kirk installed as Resident Physician or Resident Purge, in the words of John Morrow. Here he discovered an outlet for his surgical tastes in Dr. Byers' little operating room in Top Lobby, and here, full of his Rotunda zeal, he introduced for the first time the practice of boiling instruments, etc., before operation.

Later on I had the pleasure of introducing the same practice into the surgical operating theatre, ably backed by Mr. John Fagan and Dr. Henry O'Neill, and amiably scoffed at by Dr. Walton Browne, who still had a predilection for putting the handle of his knife between his teeth.

I well remember personally conducting operations when the first steam steriliser was bought and placed in the small ward in the Lower Mulholland Wing. What a contrast to the elaborate every day rituals of our new Royal Victoria Hospital.

Mr. Kirk deserves all praise for his untiring energy in the U.V.F. Hospital, and the inventive genius which he has displayed in his wonderfully light and ingenious artificial hand fills me with admiration.

Our local War Hospitals continue their

excellent work.

We are particularly proud of the Orthopaedic and Limbless Branch of the U.V.F., so ably formed and conducted by Col. A. B. Mitchell and Captains Irwin and Lowry, and the Neurasthenic Branch at Craigavon, still in its infancy, whose birth and early childhood have been tenderly nurtured by our kindliest of physicians, Dr. H. L. M'Kisack.

Those senior members of our Society who have sacrificed their practices for so long, in order to serve their country are particularly to be commended. In this connection I would mention the names of Col. Sinclair, C.B.; Col Fullerton, C.M.G.; Major J. S. Morrow, Major Thos. Houston, Capt. Wyclif M'Cready, Captain W. W. D. Thomson and Captain W. J. Wilson. I offer my hearty congratulations to Major Houston who has quite recently been appointed an Esquire of the Order of the Hospital of St. John of Jerusalem in England, on the sanction of His Majesty the King.

May our friends soon be back in their old places, sound in wind and limb, their imaginations quickened by the share they have taken in the great struggle, their mental outlook broadened and their hands more cunning than ever in the art of saving and prolonging life.

We general practitioners owe a deep debt of gratitude to the Committee so ably presided over by Mr. R. J. Johnstone, for the successful result of their labours in obtaining for us an increased capitation grant for certificates under the Insurance Act. Our quarterly cheques albeit much belated are substantially increased. According to the memorandum issued by the National Insurance Commission, the method of calculation is a most intricate one and must give their clerical staff a lot of trouble – hence the delay in payment.

When one surveys one's work as a general practitioner for nearly twenty-one years it is astonishing how little one finds to put down on paper. Many little lives have been ushered into this cold world, the cruel process tempered by the magic fumes of chloroform or perchance softened by the twilight sleep of morphia and hyoscyine. When Dame Nature is too slow in her progress, or the patience of the physician is waning, we may have had recourse to the gentle clasp of the forceps; although it is wonderful how often an injection of pituitrin will stimulate the lagging forces of nature, especially in a multipara with a fairly dilated cervix. In many of these cases the result is little short of magical, but I have also seen marked speeding up occur in a primipara with only partially dilated cervical canal. *En passant* may I remind you how valuable this preparation is also in intestinal obstruction. I had an old lady last summer who had resisted the wiles of calomel and castor and croton oils, to whom the vista of either death or the surgeon had opened out, when I bethought me of pituitrin and was rewarded by a series of copious evacuations and complete recovery.

Then again, many lives have been ushered out of this world, some perhaps whose calcareous arteries and creaking hearts indicated that they only required the presence of a hypostatic pneumonia to push them over the verge; many victims of those dread enemies of the human race – tuberculosis and cancer – and others, perhaps young and useful lives, where the toxins of some acute disease had resisted our efforts in the way of antidotes and the natural production of antibodies.

One has acquired a certain facility in recognising disease and in doling out the ever necessary prescription. In spite of physical or rational medicine, empiricism still holds its sway; and although Clifford Allbutt denounces the blind and formal drug-mongering of the elder tradition, still it is a sad fact that our patients must have a bottle or powders to take or tabloids or pills to swallow. Occasionally we can impress them and stimulate our scientific longings by a dose of vaccine – the idea of millions of microbes tickles them immensely.

If one is not sure it is better to look wise like Pythagoras and invest oneself in a mantle of seeming wisdom. It is most extraordinary how people like to have their ailments labelled, and would rather be ticketed with a serious disease than be told their case was obscure but would probably clear up all right. A lady with an irregular and anomalous pyrexia was quite relieved when a Widal blood test demonstrated that she had typhoid fever. The daily round of trivial ailments – gastritis, indigestion, bronchitis and diarrhoea – women with the host of ailments which anaemia brings in its train, children with all the little ills which their fond mothers direct your attention to, weary one with their monotony and the small amount of good one can do them; so that one hails with relief a fight against odds, as seen in a lobar pneumonia, or a ruptured gastric ulcer, or an acute uraemia with convulsions, whilst a leucocythaemia or hydatidiform mole is a gem of purest ray serene.

I have been much interested in that disease of children formerly known as cyclic vomiting and now believed to be a manifestation of acidosis or acid intoxication, and since I have made a practice of testing for acetone and diacetic acid in every case with a history of repeated gastric attacks, it is noteworthy how often their presence has been

detected. Acidosis is also found in diabetes, starvation, salicylic acid poisoning, delayed chloroform poisoning, and pernicious vomiting of pregnancy. Time does not permit me to dwell on the causation of acidosis, beyond reminding you that owing to some defect of metabolism, the fats, which should be burnt up in the system, producing carbon dioxide and water, are broken down into oxybutyric and diacetic acids, and finally acetone. This is supposed to occur when the tissues cannot obtain sugar from the blood. The presence of these acids threatens to seriously interfere with the normal alkalinity of the blood plasma, and nature defends itself against this invasion by calling up the ammonia which normally would be converted into urea in the liver – hence in acidosis the ammonium salts in the urine are increased.

Some writers claim to have found acetonuria in a large proportion of children's cases systematically examined. Nevertheless, I think its connection with cyclic vomiting is firmly established. To my mind the milder cases predominate, and were it not for its periodic recurrence many of the cases might be looked upon as due to a simple chill or digestive indiscretion.

While some have shown prostration and rapid emaciation from the incessant vomiting, I have not seen that condition of air hunger and semi-coma which is described as possible in severe cases. The child's face is flushed and a moderate degree of temperature – up to 100° is usual. Thirst is, of course, marked. It is a curious fact that these children are nearly all highly strung and neurotic, a characteristic which they share with one or both parents. When an attack is threatening, as shown by headache, malaise and coated tongue, a brisk purge like calomel is indicated.

On the theory of acid neutralisation large doses of sodium bicarbonate up to 30 grains are recommended, but the chances of the stomach retaining it are small. In severe cases it might be given by rectum in 5-10% strength combined with glucose 10% as an easily assimilated carbohydrate, or in 2% solution with normal saline intravenously, or by subcutaneous infusion. It is also stated that a small amount of magnesium carbonate and calcium lactate should be combined with the soda solution by mouth. There is no doubt that in the intervals the alkaline treatment in fairly full doses – say 20-30 grains three times a day – affords the best results.

In one of my cases (the daughter of a local clergyman), the mother frequently pushed the bicarbonate till the child's body and face were quite oedematous. Avoidance of excess of sugar and sweets, and a diet poor in fat, with freedom from mental excitement, regular evacuation of the bowels and plenty of fresh air are all good, but I do not believe that any elaborate system of dieting, so dear to the fond mother, will do much to avert the attacks.

Let us turn from these mundane matters to a consideration of the relations between chemical and medical science. In the 15th and 16th centuries Basil Valentine and Paracelsus pointed out the importance of chemistry in medicine and founded the school of Iatro chemistry. The knowledge of how to prepare many inorganic salts, accumulated by the labours of the alchemists was applied by them to the manufacture and use of inorganic drugs. Thus arose the use of compounds of antimony, mercury, bismuth, &c. In the 17th century John Mayow showed that respiration was necessary for supplying the blood with an active constituent of the atmosphere, which he called the "nitro-aerial spirit." He also demonstrated that this spirit or gas was necessary for ordinary combustion and that it was a constituent of saltpetre. When, at the end of the 18th century, oxygen was discovered by Priestley and Scheele, it was soon recognised that this was identical with the nitro-aerial spirit, and Lavoisier's researches put the theory of combustion and respiration on a secure chemical basis. This we may regard as the beginning of scientific chemical physiology.

The proof by Wöhler, that urea could be synthesized in the laboratory from inorganic constituents, showed that organic compounds, that is, substances produced by living organisms, did not owe their origin to any mysterious and unknown vital power of living-matter. The recognition of this fundamental fact constituted an advance of tremendous importance. Every succeeding discovery since then has served to confirm the view that the living organism, or as we may now say, the living cell, is essentially a chemical machine.

The enormous advances made in the 19th century and in the last seventeen years in the study of organic chemistry, *i.e.*, the study of the carbon compounds, have been of profound importance for physiology and pathology. These investigations have demonstrated the nature and constitution of all the chief classes of carbon compounds involved in the living processes and tissues of plants and animals. It will be sufficient to mention here the work of Chevreul on the fats and that of Fischer on the sugars, proteids and tannins. Furthermore, the work of synthetic organic chemistry has led to the production of the synthetic organic drugs, and thus to a study of

the complex relations between the chemical constitution of organic drugs and their physiological and therapeutic actions. In this connection one need only refer to the work of Ehrlich and the development of the use of such substances as the organic arsenic compounds.

But the living cell is not a mere passive structure, it is active, dynamic, the seat of a never-ceasing ebb and flow of physical and chemical actions. The formulae of the organic chemist are *static* symbols. For the advance of medical science there is required not merely a chemistry of substance but a chemistry of *action*.

In living tissues we see the most delicate interplay of chemical forces and affinities. The actions of living cells exhibit a subtle and exact equilibrium of counterpoised forces.

So marvellous indeed is the spectacle disclosed that we might well despair of our ability to interpret the mystery of this active anabolic-katabolic mechanism, and we might seek refuge again in the assumption of an unknown vital force.

Fortunately, however, the advance of modern chemistry gives us good reason for hope. That branch of modern chemistry erroneously called physical chemistry has come to the rescue. Physical chemistry may be properly called the chemistry of action, the chemistry of the play and interplay, of the poise and counterpoise of chemical forces. It teaches us how to quantitatively measure the velocities, directions and equilibria of all chemical actions.

An important step in the elucidation of organic processes was taken when Buchner showed that the alcoholic fermentation caused by the yeast cells, that is the conversion of sugar into alcohol and carbon dioxide, was not a mysterious vital action but a chemical one, induced or accelerated by an enzyme, called zymase, which could be extracted from the yeast cell. Such enzyme actions belong to the great group of catalytic actions. All enzymes are catalysts. Probably most or perhaps all the chemical actions of the living cell are catalytic. A catalyst is a substance which enormously accelerates the velocity of a possible chemical action, by temporarily interlocking its molecular field of force with that of the reactants and so awakening their latent or self-locked affinities.

Observe how important this new conception is. In the laboratory we may force chemical substances to react in certain ways by violently stirring up their activities by means of heat or special solvents. But select the right catalyst or helper, and any one of the possible modes of reaction occurs with ease at the ordinary temperature of the living cell, and that indeed is how the cell effects its wonderful decompositions and syntheses.

The toxins produced by bacteria are in general either catalysts or substances which interfere with the catalysts normally present. But the living cell is not merely a bag of enzymes. Life acts in an aqueous solution. Physical chemistry in its study of the nature of solutions, of osmotic pressure, of ionisation, of the permeability of membranous septa, of the ionic equilibria associated with the action of selectively permeable membranes, has already enabled the physiologist and physician to penetrate deeply into the arcana of cell action. When we come to consider the properties of colloids and colloidal solutions, the insight becomes deeper.

Is it not of extraordinary significance that the phenomenon of living matter occurs in a jelly! A colloidal solution or jelly is constituted by an assemblage of electrically charged particles possessing an enormous development of internal surface wherein capillary and electro-capillary actions play an essential role. Already a study of these colloidal media has led to undreamt of advances in the explanation of the actions of nerve and muscle.

There is good reason to hope that the phenomena of cell division will soon admit of at least partial explanation, through a deeper study of the physics and physical chemistry of colloidal media. Their enormous internal surface energy, their state of unstable and essentially mobile equilibrium afford the living organism a store of energy which is instantly available, and which can be thrown into or out of action by relatively slight changes in the chemical composition, for example, the acidity or alkalinity of the aqueous solution present. It is the regulation of these equilibria of change and exchange which preserves normal cell activity, and it is their disturbance which leads to the pathological changes of disease and decay. Action, whether for good or bad, we thus conceive as resulting from the displacement and disturbance of a connected complex of homogeneous and micro-heterogeneous physical and chemical equilibria.

The foregoing considerations serve to present a brief survey of the first stage in the application of physical chemistry to the analysis of cell activity. It represents the solid basis on which we have to build, but there is still an immense amount of quantitative investigation necessary, and there is still a vast region to explore. As yet we can only speculate on the nature of this unknown territory. Just as the living cell is not a mere bag of enzymes so it is more than a mere unorganised jelly. There is present organisation,

structure and arrangement. This is a point of cardinal importance. Molecules, ions and colloidal particles can produce certain effects when jumbled together in the chemist's flask. But what further marvels may they not effect when arranged? A living cell appears to possess some sort of internal polarisation. May it not be that the molecules and ions are polarised or oriented by virtue of the electrical charges of the colloidal particles? Along such molecular chains of force there may well occur transformations which are unknown in the un-polarised mixtures of the chemist. Or are we at last on the threshold of the mystery of life, in the very presence of that mysterious power of direction and arrangement which some philosophers have regarded as the real essence of living matter? To merely direct, need not incur the expenditure of work or energy. An unseen hand may direct and arrange without in any way disturbing the fundamental laws of the physico-chemical universe. But unless we are false to our scientific faith all such statements simply indicate that the phenomena of life involve many things which we as yet do not understand.

A crystal possesses some of the qualities of living matter, inasmuch as it can, given the proper nutriment, repair a damaged part. It effects this by physical action involving no chemical transformation, no metabolism. Nevertheless in this simple case we perceive the power of an internally arranged system to repair damage, we might almost say, to grow. A crystal, however, represents a state of static equilibrium, whilst the very essence of a living cell is that it possesses the power and faculty of change. Deprive it of its nutrient environment and it will pass into a state of static equilibrium and die.

The busy practitioner has little time for such flights of fancy, but it is refreshing sometimes to drop the petty trivialities of every-day life and let the imagination soar into the regions of the yet unknown.