John Campbell Rankin (1876–1954)

President of the Ulster Medical Society 1927–28

Presidential Opening Address
Ulster Medical Society
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THE BEARING OF
BOTANY, ZOOLOGY, CHEMISTRY, AND PHYSICS ON
MEDICAL RESEARCH AND PRACTICE

Ladies and Gentlemen, The honour you have done me in electing me President of your Society is one which I deeply appreciate. I shall try to follow the high example that my predecessors have set.

In a survey of the year that has passed it is a sad reflection that our first thoughts should be turned to the work of the Reaper. His ways are inscrutable, as ever.

Dr. R. L. Sinclair, Ballylesson, M.A., Trinity, served as captain in R.A.M.C., and had a good war record. He was appointed this session to Ballylesson.

Dr. Moses Henry has passed, in the full tide of his manhood. He was an active member of this Society for twenty-four years; he had a large practice. During the war he did good work at the Victoria Barracks, and, later, in the R.A.M.C. in France. He was, still later, Commandant of the Special Constabulary in his district. He was a man without fear in the honesty and strength of his convictions.

Dr. Eleanor Wheeler was cut off at the very outset of her career. She had just finished her year as Resident in the Royal Victoria Hospital. A member of one of the oldest and most esteemed medical families in Ulster, she will be sadly missed. She was the type of woman doctor that would have brought great credit to our School.

Sir Peter O'Connell had retired from practice,and settled in Dublin, so was not known to many of our younger men. Senior Surgeon to the Mater Hospital, member of the Belfast Corporation, an ex-President of this Society, the older members will not easily forget his kindly and genial presence.

The honorary Secretary has already written our condolences to the families on our behalf, but it is fitting that they should be remembered here, at this, our first meeting.

We are all pleased that our past president, Dr. Nolan, has been honoured by being made a magistrate for the County of Down.

Sir Thomas Houston we heartily congratulate on his knighthood. He has already been honoured by this Society.

The most important event of the year to the medical profession was the issue of the report of the Commission, over which our esteemed Fellow, Professor R. J. Johnstone, presided. Everybody recognises in Mr. Johnstone the ideal chairman, but I wonder do many of us realise what the adjective involves. It means he must make himself thoroughly acquainted with all the aspects of the subject before a meeting, grasp essentials, and be able to tackle details. He must have patience, but not endless patience; and tact – infinite tact. A sense of humour is an important ingredient. He must be capable of rapid decisions. All these qualities Mr. Johnstone has in a high degree, but we, as medical men, can see and appreciate that in the long three years' grind he never lost sight of the interests of our profession. Mr. Johnstone comes through this severe test as a man in whom his professional brethren have every confidence.

I am glad to say that the Society is in a sound condition. The new epidiascope will be of great use in our meetings. We owe this acquisition primarily to the forethought, activity, and business acumen of our honorary secretary, Dr. Beath.

I notice in looking over the addresses of former Presidents that they all had to take thought on the subject on which they would address you. One might suppose that in my case it would be an easy matter, but a specialist has a restricted field, and on an occasion such as the present a more comprehensive survey is demanded.

In the great advance in science during this century medicine has kept up the pace. In the advance of medicine, in all the fields of its activity, to my mind the most striking thing is the importance of the so-called preliminary subjects; the fundamentals on which our education is based.

I refer to ZOOLOGY, BOTANY, CHEMISTRY, and PHYSICS.

Do you remember, when you were a first-year student, your impressions of these subjects ?

Zoology we used to look upon as a rather long and tedious approach to the understanding of the human body, but a better approach, from the cultural aspect, could not be conceived. It is now much more than that. New diseases are being discovered, due to parasites from many different animal sub-kingdoms. When Sir Thomas Houston examines the amoeba and recognises the cysts in a case of dysentery he is acting as a pure zoologist. We have all laughed at the picture of the old zoologist running about with his butterfly net, but many of our young men who go abroad may have to act this very part. For example, it is essential that the presence or absence of the tsetse fly should be established in a district to determine the presence or absence of sleeping-sickness. He who goes abroad will have to differentiate amongst the mosquitoes, to tell culices from anopheles. He will want to recognise the stagoemia. Our honorary Fellow, Major Sinton, is spending a great deal of time in the purely zoological work of classifying the different varieties of sandflies. This is necessary before further advances can be made in our knowledge of such diseases as kala-azar, Delhi boil, Baghdad sore, and other diseases. Here I may draw your attention to the Colonial Medical Service, which is attracting a number of younger men. It is not only abroad that these zoological problems are coming to the front. Only recently has the life history of the round worm, *ascaris lumbricoides*, been established. I well remember the long zoological investigation in the Royal Victoria Hospital of my colleague, Dr. Hiram Monypeny, which ended in establishing the identity of *bothriocephalus latus*. The nematode worms, the flukes, are becoming a subject of study. Even the species of cockroaches become important, so that in this multiplicity of organisms we must go back to our zoology textbooks to see where we stand.

BOTANY.

One subject merges into another, and the laboratory is the meeting-place of zoology and botany. We have animal and vegetable parasites. Bacteriology has had its triumphs.

What greater than that of our honorary Fellow, Sir Almroth Wright? I quote figures from Sir David Bruce's address to the British Association in 1924.

In the South African war, before anti-typhoid inoculation was perfected, the figures are:

Average Strength.	Typhoid Cases.	Deaths.
208,000	58,000	8,000

In the Great War, with the men inoculated against typhoid, the figures are:

1,250,000	7,500	266

On the Western Front at first the French were not inoculated, and in the first sixteen months they had:

	96,000	12,000 nearly.

While, for this period, the English had:

	2,689	170

Later the French were thoroughly inoculated, and their figures came down to the English level.

At the present time the material in the hands of the bacteriologists is so great that the help of the botanists, the pure systematists, is being sought. For example, in what department are we to put the spirochaetes? Sound classification is the basis from which subsequent advance must spring.

The days of the old simples are over, when a doctor grew foxglove and other herbs in his garden, and knew quite a lot about botany. The history of digitalis, by the way, is not without interest and instruction. In 1775 William Withering, physician at Birmingham, heard that a case of severe cardiac dropsy which was considered hopeless had been cured by an old woman herbalist in Shropshire. He got the recipe, and out of twenty or more herbs he was able to pick out foxglove as the active ingredient.

He found that its action differed according to the time when the herb was culled, and recognised the importance of an inadequate dosage.

Are we really better when we prescribe some active principle in tablet form, as advertised by one of the great proprietary firms? Do we know more of these drugs than did our fathers of theirs? Who bothers about the pharmacopoeia now? Who bothers about dosage? A tablet, or maybe two, is perfectly safe. We must keep up our cultural connection with botany if we are not to be ousted entirely out of what is, after all, a very large part of medical treatment.

This question of drugs brings us naturally to the next branch of our subject.

CHEMISTRY.

The scientific chemist of late has almost overwhelmed us with new drugs. Some of these are so wonderful that one pauses to consider does the future of medicine lie in pure chemistry. The earlier examples of synthesis, antipyrin, phenacetin, aspirin, are so manifestly efficient that they have almost passed out of the hands of the physicians. Salvarsan, Bayer 205, triparsamine, are even more important. They almost come to the point of meeting our requirements, standing up to laboratory proof, and wonderfully specific in their effects. The chemists, however, do not get it all their own way. The medical man still comes in. Ehrlich postulated a purely chemical effect, an antiseptic drug that combined chemically with the invader in preference to the animal tissue. When he came to salvarsan he found it did not kill the parasites outside the body, although it destroyed them in the body. Ehrlich, still thinking chemically, suggested that the drug oxidizes in the body, and it is this oxidation product that kills the parasite. This explanation is not generally accepted: the body tissues are generally believed to take an important part in the action. Sanarelli mixed salvarsan with fresh liver extract, and got a product that killed the spirochaetes outside the body. Moreover, bismuth, mixed with cell-free liver extract, is toxic to the spirochaete outside the body while bismuth oxide is not. The liver is rising in importance in the medical world. We have the liver treatment of Addisonian anaemia, and now we find it takes part in the action of drugs.

A fresh crop of drugs has lately appeared – veronal, luminal, and other barbituric compounds. These drugs have followed the discovery of the combining possibilities of the ureides. Thallium acetate is another rather wonderful new drug. It causes epilation of the hairs temporarily, and is being used in the treatment of ringworm. It has certain advantages over X-ray epilation. Sanocrysin, the new gold salt, introduced for the treatment of tubercle, has an undoubted effect on the tubercle bacillus, and, though still in the experimental stage, it shows us that we have not come to the end of chemical possibilities.

Physiological chemistry is becoming more closely allied to pure chemistry. Your biochemist, the more he investigates the more he goes back to pure chemistry for a firm foothold.

In colloids we come to the frontier between chemistry and physics. The fundamental facts of colloids may be easily grasped. They all bear an electric charge. The substance is in a state of minute sub-division, and all the particles have the same charge. As mutual signs repel each other, they keep separate. Only on losing part of the charge do particles come together or agglutinate and precipitate. The numerous small particles come down like snow to form a large soft mass, a jelly.

PHYSICS.

In no case has the application of the methods of science reaped greater reward than in the realm of physics in the last quarter of a century, and in perhaps no branch has medicine been quicker to benefit. The X-rays have been of incalculable benefit. The electrical department now has many sides.

Diathermy, amongst other of its uses, has helped the surgeon to a real advance. The completer understanding of radiations has led to the perfection of apparatus, and this in turn allows of further discoveries. With all these rays and apparatus a return to the ideas of pure physics for a few moments might be helpful. A few points given historically will, I believe, lead to a better grasp of the subject.

Sir Isaac Newton made the first definite step in the investigation of the problem of radiation. He passed a pencil of light through a prism and got a regular dispersion of the light into the colours of the rainbow. Sending any part of this dispersion through a second prism failed to give further colour effects. Recombining the different parts on to one spot he got white light. He said, "I have analyzed light into its components, and it is made up of these colours." The row of colours he called a "spectrum." He saw violet, indigo, blue, green, yellow, orange, and red. Now, why the orange and the indigo? He said, “These are half tones, the others are whole tones. Together they make up an octave,” and he compared the spectrum to a scale of music. Newton was a mathematician, and at his time the best brains in the world were interested in mathematics. Newton and Leibnitz independently discovered the methods of the calculus. Newton described the binominal theorem. Descartes had simplified the algebraic symbols. Newton undoubtedly believed that the rules of harmonic progression would lead to a great advance in the knowledge of light. The public got hold of the word “harmony,” and in their imaginations they foresaw the understanding of the harmony of the universe, the music of the spheres acquired a fresh significance.

The next step was by Dr. Young. He passed a pencil of light through a pinhole. On a screen receiving the circle of light being moved away from the pinhole the circle of light enlarged. He next passed the light through two pinholes placed very closely together. On moving the screen away the two circles, as they enlarged, overlapped, and he made the wonderful discovery that in this overlapping part, which got double light, there were certain little dark dots. The dots were in different positions when the light came from different parts of the spectrum. To account for these dots he suggested waves, starting from the centre of each circle and passing out regularly in increasing circles. As the waves from the two circles meet and pass through each other a position should be found theoretically where the rise of one wave would exactly coincide with the fall of another wave; in other words, there would be perfect calm at that spot. These positions will be very rare. If the waves are of light the calm spot will accord with the spot where there is darkness. Calculating out from the position of the spots he got a wave length, a very minute wave, corresponding to each primary colour of the spectrum.

The next step was when Kirchhof and Bunsen did their work on spectral analysis. Kirchhof discovered the dark lines in the solar spectrum. The bright line spectra of incandescent metals was soon discovered, but investigation in this line was latterly almost altogether in the hands of specialists.

Why do astronomers and these specialists go across the world to view an eclipse of the sun? One point is of interest. At the moment of total eclipse the solar spectrum disappears or is reversed, and all Frauenhofer’s dark lines come out with great brightness. Spectroscopists are anxious to get precise positions for these lines to enable mathematicians to do exact calculations. The mathematicians are eventually able to get formulae to account for the position of the bright lines in the spectra given out by elements. Each element that gave a characteristic spectrum, like sodium, etc., had a spectral number which was related to its atomic weight. From these facts the specialists foretold the possibility of acquiring knowledge of the structure of the atom.

These are the three main points – the spectrum, the wave length, and the spectral number – upon which all subsequent investigations have been based.

In the last few years the subject has again come into great prominence, when the X-rays were found to be of the same nature as light rays, though of widely different wave length. On account of the small wave length the X-rays gave promise of giving further knowledge of the structure of the atom, and at the present day this is of most absorbing interest to the physicist. I have said that the X-rays are of the same nature as light rays, travel at the same speed, and obey the same laws of the electro-magnetic theory of Clark Maxwell. Newton postulated an octave, now we have eighty octaves. Of these regions the ultra-violet has been one of the easiest worked, but there are other regions hitherto little explored. The red light of heat has a wave length of, say, 7,000 Angstrom units. We go through the spectrum to violet, about 4,000. Ultra-violet gets smaller to 2,000. Then an unexplored region till we come to X-rays, with about 1 or ½. On the other side, invisible heat-rays longer than 7,000 have been recognised, and even photographs taken with them. The radiant heat given off by a boiling kettle has a wave length of about 12,000, and there is some reason to anticipate that the radiations of the animal body, when we get the instruments to measure them, will be found about the region of 14,000. As the waves get larger and larger we come to wireless waves.

This is a huge and fascinating subject of great interest to our branch of medicine. The new views on the nature of electricity and the structure of the atom will have far-reaching effects, and have already been very fruitful.

I am getting too far, however, and am afraid of wearying you. I am still more afraid of getting out of my own depth.

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Hitherto my remarks have been mainly on the high note of discovery and achievement. It is perhaps well to adopt a more subdued tone. The problem of cancer surely brings us down. On speaking about this subject to a colleague he said, "To sum it all up, we know nothing about cancer." Now, this, I submit, is an attitude we should not adopt. Such an attitude permits the next man to say, "Well, I believe it's caused by_ and you have ruled yourself out of all discussion. Although we do not know the cause of cancer, we do know something about the subject. Many of us have seen a large number of cases.

When microbe after microbe was discovered as the cause of a disease, on the laws of probability it looked as if we were going to find a cause for cancer on these lines. As each separate cause of disease was made plain, reasons were found to show that cancer was something different, so that the scale became weighted on the other side, and, later on, the probabilities were that cancer was not of microbial origin. The laws of probability are simple. On one side we put down all the facts that would be favourable to cancer being of microbial origin, and on the other side all the facts known against cancer being of microbial origin. At present I would say, if we take microbial origin to include animal parasites, it looks as if the scales were about even.

Research involves some method of approaching the subject. As Wright says, "We have got to get hold of a loose end of the tangled skein that may lead somewhere." At the present moment three lines of research seem to be finding favour.

1. Jensen, of Copenhagan, started scientific research in cancer. He was able to inoculate mice with cancer, that is, mouse cancer. Methods of propagating cancer have since been elaborated which enable attempts to be made at curing the disease.

2. It has been known that cancer occurred amongst workers in certain mineral oils, shale workers, mule spinners. Experimental work on animals, initiated by the Japanese, showed that long-continued irritation from certain paraffin products led to the production of malignant growths. This line of investigation is being worked.

3. Fibisher, of Copenhagen, discovered that certain rats were frequently found to be suffering from a gastric cancer. In the growth he discovered a nematode worm. These rats came from a certain mill where cockroaches abounded. The cockroaches were found to be infested with this nematode. Rats from another grain mill, although cockroaches abounded, did not seem to suffer from gastric cancer. The cockroaches in this case were found to be of another species, and were not infested with the worm.

Sambon, struck by the suggestiveness of this discovery, investigated certain villages in Italy where cancer was rife. He found cancer houses to be a feature, and in all these cases he found they were situated beside a bakery where cockroaches abounded. This clearly is a line of enquiry well worth following up.

The effects of X-rays and radium on cancer are known to all of us, but in animal experimentation other factors have been found, and are being investigated.

1. Russ, at the Middlesex Hospital, found that an animal tumour that was capable of producing a growth in another animal of the same species on inoculation, did not develop if the tumour were exposed to X-rays beforehand. Not only did it not grow, but the animal was found to be insusceptible to subsequent inoculations; in other words, it was immunised. This line of investigation is full of technical difficulties, as under-exposure or over-exposure to the X-rays spoils the effect. Moreover, the technique of transplantation is not perfect, that is to say, one cannot be absolutely certain that the growth will take, and, furthermore, inoculations of various things seem to have an effect in inhibiting the growth.

2. Gye and Bernard's line of investigation is still awaiting confirmation.

3. Blair Bell's method may be mentioned.

4. Lumsden, in the Lister Institute, is pursuing a new line of enquiry. Tissue culture has now a wonderfully reliable technique. We can get growths in vitro of cancer tissues as well as of other tissues. Lumsden has prepared antigens by inoculating rabbits with rat cancer, and thereby preparing an immune serum. This serum will agglutinate and dissolve these cancer cells in vitro, and be without effect on other tissue cells.

An immune serum has a great advantage as an antidote. Ehrlich remarks that immune bodies are like magic bullets, constrained by a charm to hit the mark and turn aside from any other object.

These are only a few examples of the many lines of research on which work is being done. In the pursuit of the cancer problem surely it is along such lines as these that progress is to be expected.

I have finished. If anything I have said has thrown some light on our position in medicine, if I have shown that we are workers pressing every available method into our service, if I have convinced you that medicine deserves the high and respected place that it holds in the community, I shall indeed be gratified.