J.W.F Durrtz

Professor R.W.James

May I start by saying how honoured I feel at being invited to pay a tribute to Professor James. The honour is richly undeserved, and is due largely to the fortuitous circumstance that my experience of him extends further back in time than that of most other people who are still extant hereabouts. I first heard him while still a schoolboy in 1937, when my parents took me to a lecture by the newly arrived Professor of Physics on his experiences with the ill-fated Shackleton expedition to the Antarctic.

This was my first experience of Professor James's brilliance as a lecturer, and though I heard him repeat this particular talk several times subsequently it never lost its fascination for me. But of that more later.

Reginald William James was born in Paddington, London, iin 1891. Details of his early life and schooling may be found in the excellent obituary written by Sir Lawrence Bragg for the Royal Society in 1964. From this we learn that his early interest in astronomy impelled him towards mathematics and science generally, and that he proceeded on a scholarship to St. John's College, Cambridge, studying physics, chemistry and geology, and obtaining a first class in the physics tripos.

After this, when he was offered a post in Liverpool University, he surprisingly, and almost impulsively, elected instead to join Sir Ernest Shackleton's Antarctic expedition as physicist. As Bragg puts it: "When confronted with the alternatives of the obvious safe post in Liverpool and the adventure with its unknown difficulties and dangers, he had no hesitation in accepting its challenge", and accepted it after a ten minute interview.

Difficulties and dangers there were in plenty. Shackleton's ship, the "Endurance", was trapped in the ice, crushed, and finally sank nine months later, while the party of 28 camped on the ice alongside it for the last month. Drifting northwards on their ice-floe for some four months, they took to their boats when it broke up under them, and finally reached Elephant Island, an uninhabited mountainous rock in the South Shetland Islands, in April 1916.

James used to describe their privations graphically, as they lived on their ice-floe, under three upturned boats, for many months. In particular, the remarkable change of mood, from a general surliness before a meal to good humour all round after partaking of a dish of seal meat, however unappetising it might have appeared under normal circumstances. Bragg relates how on one occasion James flung himself bodily upon a seal to prevent its escape until someone could shoot it.

The diifficulties of making scientific observations under these

conditions can well be imagined. One in particular that James mentioned was that one´s breath was liable to freeze one´s beard and moustache on to the glass of the instrument one was observing. (That James had a beard at that time is confirmed by Bragg: "James grew a beard to match his red hair; he liked recalling with a chuckle that one of the sailors had said: `Jimmy, you look just like a rat peering through a bale of oakum´").

James´s language also ripened to match the conditions. To quote an eye-witness account: "I happened to be passing the door which was open (this was on the Endurance) and I heard a stream of obscene and virulent invective pouring forth as I passed and looked in, and to my surprise saw Jimmy there by himself fiddling and dropping various glass tubes - he always was the most clumsy fellow with his hands I ever came across. I was dumbfounded as I had never heard him swear before and could not think how he could have picked up such a selection of swear words. I tip-toed away,and told some of the others, and we silently made our way back to the `lab´ and stood outside shaking with silent laughter till someone tittered and Jimmy looked round blushing to the roots of hiis hair that his flight into the realms of sailor language should have been overheard. A sailor´s comment: `Jimmy, for a landsman you´re not doing too badly.´"

James´s observations, however played a part in getting the castaways safely to Elephant Island. The chronometers could no longer be relied on, and he taught himself how to get the time from lunar occultations and, using a Nautical Almanac, was able to determine their longitude while afloat.

Leaving most of the party on Elephant Island Shackleton then made his historic small boat trip of 800 miles to South Georgia, followed by a pioneering mountain traverse, and the Elephant Island contingent was eventually rescued four and a half monthhs later.

Returning to England they found that Europe was in the midst of a Great War. James joined the sound-ranging section of the British army that Bragg had established, and his valuable contributions brought him to the rank of Captain, in charge of the sound-ranging school.

After the war James became successively lecturer, senior lecturer and reader at Manchester University. It was during this period that he established himself as a leading authority on X-ray crystallography, producing many seminal papers. He took part in several ground-breaking conferences, together with W.L.Bragg and C.G.Darwin, and spent the year 1931 to 1932 in Leipzig working with Peter Debye. (Here he attended a performance of J.S.Bach´s St. Matthew Passion in Bach´s old St. Thomas church which James, who was not otherwise devout, described to me as one of his most moving musical experiences.)

In 1936 and 1937 James took two more impetuous and unexpected

steps, both of which were to prove extraordinarily successful. In December 1936 he married Anne Watson, Classics mistress at the Manchester High School for girls; and in mid-1937 he arrived at the University of Cape Town to take up the chair of Physics.

On his arrival he found himself faced with an unprecedented lecturing load. He was expected to take both large first year classes, in addition to a large part of the senior courses, in all about 15 lectures a week. He managed to shed one of the first year courses, but remained the principal coontributor to all of the others. In addition to this he did all his own correspondence and recording of examination and test results - there was no permanent secretary at that time - and supervised the preparation of demonstration experiments for his lectures.

(In passing - to verify my statement that the recording of exam results was done by Professor James himself, I inspected the old record books, and find I can claim that I was done an injustice: my aggregate mark for Physics I was 74%, for which I was given a second while another student, also with 74%, received a first class pass. I have been wondering whether I should ask for a remark; or alternatively demand that the other be deprived of his first.)

Professor James (I hope you won't mind my referring to him in this stilted way; but in those more formal days that is what we always did. Present students would probably find it difficult to believe that first names were scarcely ever used, that many lecturers wore gowns while lecturing, and that all residence students were obliged to do so for meals) set great store by experimental demonstrations during lectures. In these he was ably assisted by our workshop technicians, R.D.Linton and E.J.Heald. He rarely spent less than an hour or so an afternoon preparing the demonstrations for the next day's lecture. In view of the remarks above, you will appreciate that his assistants never let him handle too much of the apparatus; but the experiments always worked according to his instructions, as opposed to a story told by Mrs James of her experience in a girls' school, when the science teacher was forced to say "Well girls, the experiment has failed, but the principle remains." James established a valuable tradition of experimental illustration of physical principles that we do our best to preserve.

A propos of demonstrations: James himself told a story during our tea break that had me giggling all through his subsequent lecture: John Tyndall, English physicist of the last century, once gave a lecture at the Royal Institution in which his enthusiasm was so great that he vaulted right over the lecture bench in order to demonstrate an effect from in front of it. Unfortunately the impact of this was somewhat lessened for a group of American visitors who, while being shown over the Institution during the afternoon, had accidentally seen the professor practising this feat in advance.

James's lectures in all courses were models of clarity. His notes on quantum mechanics were based on lectures he had had from Hans Bethe, and those on relativity were equally stimulating. I remember particularly his remark on deciding between the conflicting space and time measurements of observers in uniform relative motion: "Unfortunately there is no superior observer to tell us which is right, except possibly God; and he doesn't tell us about our clocks and metre sticks." I was fortunate enoough to inherit many of his lecture notes, first when he went on leave overseas for a year, and later when he relinquished the lecturing of some of his large courses to me. What is remarkable is that they contain numerous alternative versions, consequent upon his continual up-dating and re-writing of them each year.

Personally he was immensely engaging and entertaining, and his conversation in the tea-room was delightful. Only I was (unfortunately) able to put a stop to it. At that time, as the most junior member of staff, it fell to me to calculate the tea-club accounts. Once a month I did this with meticulous accuracy, and presented everyone with their accounts for four shillings and threepence-three-farthings, or whatever it was. When Prof. James saw me approaching with the account book, he invariably rose, saying Well, well, I must be getting back to work, and disappeared. In this way he was often three or four months in arrear, and it was almost impossible to collect.

As a lecturer some people used to think that he was nervous. They based this partly on the observation that he fiddled with the chalk, constantly picking up pieces and breaking them in two. This is a complete misinterpretation. As James explained to me, this procedure raises the natural frequency of the chalk's vibration above the audible limit, and eliminates the appalling screeches that accompany the efforts of less experienced lecturers.

He was quite insistent on accurate observation of the lecture time-table. When some engineering students explained that they were late for his lectures because a lecturer in their faculty over-ran his time, he said "Please give my compliments to Dr. So-and-so, and tell him that it is an elementary courtesy to end a lecture on time." How the students managed to ppresent this is not known, but it is recorded they were never late again.

James himself, however, was on one occasion accused of similar irregularity. A disturbance arose among the class about the time. James dealt with this adroitly -- the clock in the lecture room was on the side wall, viewed obliquely by the class. "You've got an error of parallax in your reading" said James, and proceeded happily with his lecture.

In addition to his musical enthusiasm (which led him at unguarded moments to sing hymns in duet with his very devout secretary, Emmarentia Fick, in imitation possibly of Rutherford, who used to sing hymns while waiting in the basement of the Cavendish for his eyes to become dark-adapted for scintillation counting) James was

also an excellemt classical scholar, and used to enjoy reading classical Greek in the original. This enabled him to get the better of one of our Classics professors who, at the staff lunch table, had decried the ignorance of scientists regarding classical learning. He was able to show that, on the whole, scientists were better informed about classics than classics scholars about modern science.

In spite of the enormous demands made on his time by lecturing and administration James managed to institute and maintain a flourishing school of research in X-ray crystallography. Many of his post-graduate researchers went on to important and influential posts. To mention a few: J.N.van Niekerk ("Big Van", the rugby star), D.H.Saunder (whom James strangely always called Mr.Sanders), Betty Archer, Frank Herbstein, and of course Aaron Klug. Our other Nobel laureate-to-be, Allan Cormack, also took his first steps in that direction with work in the physics of diffraction inspired by James. James was able to complete his standard text, "The Optical Principles of the Diffraction of X-rays", published in 1948. His sense of humour momentarily deserted him when I pointed out to him that, in their publishers' leaflet announcing it, G.Bell and Sons had given its title as "The Optional Principles .....". He stated his intention of writing them a very stern letter.

In 1952 the Physics department was visited by James's old friend, Professor Sir Lawrence Bragg, and a photograph of them hanging in the department shows clearly James's delight as he welcomed Bragg. (In the background can be seen his little Austin which, thanks to the temder ministrations of the workshop technicians, was kept going years after it should have been laid to rest.)

James not only made an admirable dean of the Faculty of Science, but was also called upon to serve as Acting Pribcipal of UCT for the greater part of four years (1953 and 1955, while Perincipal T.B.Davie was on leave and 1956 and 1957, after the latter's untimely death.) He thus played a major role in the University's protest against the Government's proposed bill to limit the rights of non-whites to attend the existing universities, which, with true Orwellian Newspeak, they called the "Extension of Education" bill. He not only gave an inspiring address to an audience of 2000 assewmbled in the City Hall, but also led (together with the Chancellor, Justice Centlivres) the protest march of 3000 members of the university through the streets of Cape Town in June 1957.

From August 1958 he returned to the Physics department in the, by comparison, inconspicuous role of temporary part-time lecturer; and with indefatigable zeal embarked on a research project aimed at elucidating the mysteries of the spatial location of interference fringes. It was my great pleasure to have had many discussions with him on this topic, and to have had him carry out some of his experiments in my room at the top of the old Physics building. James wrote a lengthy paper, elucidating the whole subject in a way which is nowhere to be found in the standard

literature. (He was particularly pleased to find that one seminal principle of which he made use was to be found in the physical optics lectures he had received at Cambridge in 1911 from C.T.R.Wilson, inventor of the cloud chamber.)

James died on 7 July 1964, shortly after completing the text of this paper, and with the figures not yet finally drawn. I was able to complete these from his sketches, and the whole was submitted to W.L.Bragg for inclusion in the Philosophival Transactions of the Royal Society of London.

What happened subsequently is somewhat hazy. Mrs James and I both suspected that, for various reasons, the paper was somewhat overlooked, and eventually submitted for refereeing to someone who didn´t have the time for detailed examination of its 43 pages of close geometrical reasoning and 21 elaborate figures, and came to the conclusion that it was "classical physics" that ought to be findable in the standard texts. It was thus only three and a half years later that it was returned, with a polite note of rejection.

While it is a pity that James´s last contributiion has thus not seen the light of day, we need not mourn it unduly. His reputation rests firmly on his own earlier work, and that of those he so brilliantly inspired.

J.W.F. Jarritz