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**CURRENT SCIENCE 50 YEARS AGO**

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**Lord Rutherford\****Personal Tribute by one of his pupils*

I HAVE read with the shock of personal loss and grief of the sudden death of my great teacher, Lord Rutherford. I was keenly looking forward to meeting him in a couple of months at Calcutta at the forthcoming jubilee celebrations of the Indian Science Congress, over which he was to preside. But the cruel hand of death has dashed that hope to the ground.

It is now nearly a quarter of a century since I had the honour and the privilege of carrying on some research work under him on certain problems connected with the structure of the atom, and I can truly say that a kinder and nobler teacher it will be difficult to find. He was always ready to encourage and help the men working under him. I can still recall his open smiling face as he met me in the Physics laboratories of the Manchester University. The first question he would always put to me was: "Any luck?", and then he would discuss with me the exact point which was troubling me at the time in the particular research which I had in hand.

I was frequently invited to his table, generally at tea or supper, along with the famous Danish scientist, Dr. Niels Bohr, and Prof. Barnes of Montreal University. I think, I had also occasion several times to see him at his house alone. Not once did he show the smallest sign that he was conscious of his greatness. One could not leave him; even after only a brief talk with him, without feeling one's self a different man altogether; his very presence was a source of no small joy and inspiration.

Speaking of Dr. Bohr, I cannot but say a few words about the circumstances which led to the coming together of these two remarkable men and the great results which flowed rapidly from their close association with each other.

Dr. and Mrs. Bohr came to Manchester in 1912. Lord Rutherford had already announced the nuclear structure of the atom as consisting of a heavy positively charged central mass ( $\alpha$ -particle) with a number of electrons revolving in their own orbits round it. But the Rutherford model lacked something and this vital deficiency a great mathematical genius like Dr. Bohr alone could supply. Taking the nuclear conception of the atom as his basis, Dr.

Bohr worked out on a piece of paper the theoretical conditions which its component parts should fulfil *consistently with the then known and experimentally determined properties of the Rutherford model.*

Dr. Bohr was no experimentalist; he was a mathematician, pure and simple. He made a number of bold assumptions and it was in these bold assumptions that lay the real quality of his genius. He then worked out the properties which the atom *should possess* if the assumptions were to be accepted as correct. He showed that the Rutherford-Bohr model of the atom (as the conception of the atom outlined and envisaged by Bohr is called) not only explained with a fair approach to accuracy the known properties of the atom, but that it did something more. It possessed what all good hypotheses must possess, namely, the power of *prevision*. The Rutherford-Bohr model thus showed a way to test the validity or otherwise of Bohr's bold assumptions.

Now coming to Manchester in 1912, I think, Dr. Bohr explained to Lord Rutherford what assumptions he wanted to introduce into the nuclear conception and how upon these he had built up (with no other help than pencil and paper and guided by his great mathematical genius) the entire mechanism of the atom and its constituent parts. He suggested that his way of looking at the structure of the atom—which was only a modification or expansion of the way in which Lord Rutherford himself had looked at it—should be put to the test of experiment.

They fixed upon the line of attack. Dr. Bohr agreed to remain at Manchester on a small allowance to supervise and guide the progress of the epoch-making experiment. Two men—Mr. Evans, a lecturer in Physics at the University of Manchester, assisted by a senior research student—were deputed to look after the experiment day and night. A dark room was specially fitted up for the purpose. The necessary *eschelon* equipment was provided at considerable expense for the research.

It was a great event not only for the two scientists—one was already a Nobel Prizeman and the other was to get the same distinction some years later—but it was also an exciting event, in which all workers in the laboratories felt deeply interested.

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The experiment completely justified the expectations that had been built upon the Rutherford model of the atom, plus Dr. Bohr's assumptions. After two years' hard and incessant research, carried on in a large-sized dark room in the Manchester University laboratories, certain spectral lines made their appearance just where Bohr had said they should be looked for (1915).

Like an Indian *rishi* of old, Lord Rutherford peered into the secrets of nature. He saw truth, but, at the same time, in the spirit of a votary of modern science, he would not be satisfied with the vision that had passed before his mind's eye till he was able to catch it, fix it and analyse it minutely with such experimental devices and contrivances as were at his command, or as he could himself construct specially for the purpose of such an examination.

I can perhaps best explain my meaning by an illustration of what I was myself privileged to see, in the course of a popular lecture at Dalton Hall, at Manchester Lord Rutherford once tried to describe, as well as he could, the state of his mind with regard to a certain problem connected with the origin of the  $\gamma$ -rays which had been troubling him for a considerable time, and which he was only able to solve a good many years later.

With a trembling voice, but with child-like simplicity, truthfulness and humility, he said: "I feel, I

feel that the  $\gamma$ -rays proceed from a certain part of the atomic nucleus. But I do not know, really I do not know. Pray do not go away with the belief that they really proceed from that part of the atom. With all my efforts, I have not been able to trace them back to that particular spot. And yet I cannot help saying that, somehow or other, I *really do feel* that they come from that region and no other".

I have referred in general terms to the great event, the experimental vindication of the Rutherford-Bohr conception of the atom, and the incident at Dalton Hall not because I was privileged to be an eye-witness to both of them, but because they reveal the genius of Lord Rutherford (and incidentally, also of Dr. Bohr) better than any words of mine can possibly do. After this it will be easy to see what the world of science has lost in the death of Lord Rutherford. He filled such a large space and led such an active life in the now vast domain of atomic physics that not only his own pupils, who are personally grateful to him for help and encouragement in the course of their own research work, but all earnest students of science must feel pained and grieved that the great master is no more.

RUCHI RAM SAHNI

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## NEWS

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### NOBEL PRIZE IN PHYSICS

Georg Bednorz of West Germany and K. Alex Mueller of Switzerland won the Nobel Prize in Physics for their discovery of new superconducting materials. Both are researchers in the IBM Zurich Research Laboratory in Switzerland. Last year, the two scientists, Prof. Bednorz and Mueller, reported

their important finding superconductivity in an oxide material at a temperature 12 degree Celsius higher than previously known. The breakthrough in the discovery of superconductivity in ceramic materials is really a great achievement.

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### NOBEL PRIZE IN CHEMISTRY

Donald J. Cram and Charles J. Pedersen of the United States shared the Nobel Prize in Chemistry with French researcher Jean-Marie Lehn for their work in the syntheses of molecules that can mimic important biological processes. The Swedish Academy of Sciences cited their work in making

relatively uncomplicated compounds that perform the same functions as natural proteins. "Great progress towards this goal has been made over the last twenty years and it is the pioneering achievements in this particular area that are now being recognised" it said.

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