

MARSDEN AT QUEEN MARY COLLEGE

In the period from 1909-1913 E. Marsden together with H. Geiger carried out a-particle scattering observations which showed conclusively the nuclear nature of the atom. It is surprising to find that for a fair part of this time Marsden was on the staff of the Physics Department of Queen Mary College-then East London College. The literature shows clearly that in the period from 1910-1912 he carried out a-particle experiments at Q.M.C. in collaboration with a research student T. Barratt, a graduate of Q.M.C.

The East London College Calendar for 1910-11 lists Marsden as a Demonstrator in the Physics Department, whilst the Calendar for 1911-12 simply lists him as a member of staff. In one of the papers (ref. 2) he is referred to as "Assistant Lecturer at the East London College". Barratt had graduated from the College in 1908 with first class University honours. Marsden's work, which was carried out at Manchester, can be easily distinguished from that at Q.M.C. The Manchester work was published in the Proceedings of the Royal Society or Philosophical Magazine and submitted by Rutherford, whilst the Q.M.C. work was published in the Proceedings of the Physical Society and submitted by C.H. Lees then Head of Department at Q.M.C. There is often a sentence at the end of the paper which makes the place of work clear. For example in ref. 5: "This work was carried out at East London College and we are much indebted to the Research Grant Committee of that Institution and to Prof. Lees for placing the resources of the laboratory at our disposal."

Geiger and Marsden's well-known and important experiments on a-particle scattering were both carried out at Manchester (refs. 1 and 8). They were separated in time by four years. The authors first showed that wide-angle a-particle scattering could not be accounted for by the fortuitous sum of a large number of small angle random scatterings. In the interim came Marsden's period at Q.M.C. and Rutherford's celebrated scattering formula (ref. 4). The second experiment with much improved collimation showed the angular dependence of scatter to be precisely that predicted by the Rutherford nuclear atom.

Marsden's period at Q.M.C. did not relate directly to the scattering process, but did result in two experiments of fundamental significance. The first of the Q.M.C. investigations (ref. 3) concerned the time intervals between successive scintillations produced by a-particles. Earlier it had been suggested that the prevalence of small intervals between scintillations resulted from a correlation or grouping of events, (e.g. that which would be expected from a decay giving a product with a few seconds or less half life which itself then suffers a-decay). Marsden and Barratt however showed the scintillations follow a Poisson distribution. The final two Q.M.C. papers are of considerably greater importance. It was found that in decay equilibrium the numbers of a-particles given out by Thorium C1 and Thorium C2 were not equal. Previously Rutherford and Geiger (ref. 7) had noted 'irregular changes' in Thorium decay. Marsden and Barratt (ref. 3) however suggest that Thorium C1 and C2 are "not directly genetically connected". They suggested, apparently for the first time, a branching nuclear decay scheme, and drew a scheme to illustrate this for the Thorium system.

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