

SCIENCE

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RADIATION AND ATOMIC STRUCTURE¹

WHILE the study of the physical and chemical properties of matter has produced our present atomic theory and furnished most of the information which is available about the way in which the myriad molecular structures are built up out of their atomic constituents, it has been chiefly the facts of radiation which have provided reliable information about the inner structure of the atom itself. Indeed, during all the years in which the dogma of the indestructible and indivisible atom was upon the stage, it was the complexity of the spectra even of simple gases which kept the physicist in the path of truth and caused him continually to insist that the atom could not be an ultimate thing, but rather that it must have a structure, and a very intricate one at that—as intricate, in Rowland's phrase, as a grand piano.

Yet the evidence of spectroscopy, though tremendously suggestive in the series relationships brought to light between the frequencies of the different lines of a given substance, was, after all, most disappointing, in that it remained wholly uninterpreted in terms of any mechanical model. No vibrating system was known which could produce frequencies related in the manner corresponding to the frequencies found even in the simplest of series, viz., the Balmer series of hydrogen. The discovery and study in the late nineties of corpuscular radiations of the alpha and beta type, with the changes in chemical properties accompanying them, merely

¹ Address of the president of the American Physical Society, New York, December, 1916.