

SCIENCE

FRIDAY, NOVEMBER 21, 1919

CONTENTS

<i>Atomic Projectiles and their Collisions with Light Atoms: SIR ERNEST RUTHERFORD....</i>	467
<i>Second Award of the Elliot Medal</i>	473
<i>Proposed Constitution and By-laws of the American Association for the Advancement of Science</i>	474
<i>Scientific Events:—</i>	
<i>The Southwestern Geological Society; The American Physical Society; The History of Science and the American Historical Society; The Section of Zoology of the American Association; The Deflection of Light by Gravitation and the Theory of Relativity...</i>	477
<i>Scientific Notes and News</i>	479
<i>University and Educational News</i>	485
<i>Discussion and Correspondence:—</i>	
<i>A Helium Series in the Extreme Ultra-violet: PROFESSOR THEODORE LYMAN. Double Use of the Term Acceleration: PROFESSOR C. M. SPARROW</i>	481
<i>Notes on Meteorology and Climatology:—</i>	
<i>Aerological Work—Winds; Airplanes and the Weather: DR. CHARLES F. BROOKS</i>	483
<i>Special Articles:—</i>	
<i>A Preliminary Note on Foot-rot of Cereals in the Northwest: B. F. DANA</i>	484
<i>The New Haven Meeting of the National Academy of Sciences</i>	486
<i>The American Mathematical Society: PROFESSOR F. N. COLE</i>	487
<i>Meeting of the Committee on Policy of the American Association for the Advancement of Science: DR. L. O. HOWARD</i>	487

MSS. intended for publication and books, etc., intended for review should be sent to The Editor of Science, Garrison-on-Hudson, N. Y.

ATOMIC PROJECTILES AND THEIR COLLISIONS WITH LIGHT ATOMS¹

THE discovery of radio-activity has not only thrown a flood of light on the processes of transformation of radio-active atoms; it has at the same time provided us with the most powerful natural agencies for probing the inner structure of the atoms of all the elements. The swift α -particles and the high-speed electrons or β -rays ejected from radio-active bodies are by far the most concentrated sources of energy known to science. The enormous energy of the flying α -particle or helium atom is illustrated by the bright flash of light it produces when it impacts on a crystal of zinc sulphide, and by the dense distribution of ions along its trail through a gas. This great store of energy is due to the rapidity of its motion, which in the case of the α -particle from radium C (range 7 cm. in air) amounts to 19,000 km. per second, or about 20,000 times the speed of a rifle-bullet. It is easily calculated that the energy of motion of an ounce of helium moving with the speed of the α -particle from radium C is equivalent to 10,000 tons of solid shot projected with a velocity of 1 km. per second.

In consequence of its great energy of motion the charged particle is able to penetrate deeply into the structure of all atoms before it is deflected or turned back, and from a study of the deflection of the path of the α -particle we are able to obtain important evidence on the strength and distribution of the electric fields near the center or nucleus of the atom.

Since it is believed that the atom of matter is, in general, complex, consisting of positively and negatively charged parts, it is to be anticipated that a narrow pencil of α -particles, after passing through a thin plate of matter, should

¹ An address before the Royal Institution of Great Britain, June 6, 1919.

Science

50 (1299)

Science 50 (1299), 467-488.

ARTICLE TOOLS

<http://science.sciencemag.org/content/50/1299.citation>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.