

WILLIAM CROOKES, F.R.S.

The recent remarkable discoveries of Prof. Roentgen when engaged in experimental work with a Crookes tube have brought prominently before the world the name of William Crookes, a name that was already famous in the world of science. There are, indeed, few, if any, among the scientific leaders of the latter half of the nineteenth century who have had a more brilliant and varied career than the author of the vacuum tubes which have made possible the recent startling developments in photography.

He was born in London in 1832, and at an early age turned his attention to photography. After a course at the Royal College of Chemistry under Dr. Hoffman, during which, at the age of 17, he gained the Ashburton scholarship, he became in due time senior assistant to his tutor. His rise was rapid, and at the age of 22 he was appointed superintendent of the meteorological department of the Radcliffe Observatory at Oxford. In 1859 he founded the *Chemical News*, and five years later he became editor of the *Quarterly Journal of Science*.

Prof. Crookes had a natural love for original research. In 1861, while examining the residues from a sulphuric acid works, he discovered the new metallic element thallium. This was followed by his election as a fellow of the Royal Society. It was his "delicate spectroscopic investigations" in connection with the newly discovered element "which led him to the study of the 'rare earths,' which has proved so fruitful in his hands."

The mining world is deeply indebted to him for drawing attention to the value of sodium amalgam in the extraction of gold. At a later date he called in the aid of the alternating electric current. This agent, acting in concert with various mercurial salts, and particularly with mercury cyanide, has rendered possible the extraction of gold from highly refractory ores.

In 1872 he was at work on his investigations on "Repulsion Resulting from Radiation," to which question his attention had been drawn by his observing the action of heavy pieces of glass which he was weighing in a vacuum balance, which, by the way, was his own invention. In 1877 he invented the otheoscope; and in the same year Science signified its indebtedness to him by electing him a member of the Royal Society. In a paper before the society he stated that he had "succeeded in obtaining a vacuum so nearly approaching perfection that the pressure in it was only 0.4 millionth of an atmosphere." These experiments led to very important results; for it was found that in such an extreme vacuum gases pass into an ultra-gaseous state, which Prof. Crookes termed a state of "radiant matter;" and further, these extreme vacua opened up the way for the incandescent lamp.

A March number of the *Electrician* of 1891 says: "Professor Crookes' house in Kensington Park Gardens, electrically lighted in 1881, was, we believe, the first house in London fitted up with the electric light. It may be interesting to state that the wires were chiefly laid with his own hands. To meet the difficulty of obtaining carbon filaments for the glow lamps, not possessing the structure of the material from which they were made, Prof. Crookes dissolved cellulose in a strong solution of ammonium copper sulphate, dried up the solution into sheets, dissolved out the copper, and used the horn-like material

remaining for filaments. The lamps in the inventor's house, fitted with such filaments, remain still in good working condition."

In 1880, the French Academy of Sciences conferred upon Prof. Crookes an extraordinary prize of 3,000 francs and a gold medal, in appreciation of his researches in molecular physics and on radiant matter.

His studies of the "rare earths" have led Prof. Crookes to the conclusion that "the bodies which have generally been accepted as elements are not pri-



Sincerely yours
William Crookes

mordially distinct or independent, but have been formed by a process of evolution remotely analogous to that which we now recognize as having been at work in the formation of organic species." These views were put forth in his presidential address before the chemical section of the British Association, under the title "The Genesis of Elements;" and it is undoubtedly his most splendid among many brilliant contributions to the philosophy of science. In 1885 the So-

ciety of Arts, and in 1888 the Royal Society, gave him medals, the first "for his improvement in apparatus for the production of high vacua and for his invention of the radiometer," and the latter society "for his investigations on the behavior of substances under the influence of the electric discharge in a high vacuum."

In addition to his extensive work in the laboratory, Prof. Crookes has been a voluminous contributor to the scientific literature of the age. Among other works he has written "A Handbook of Dyeing and Calico Printing," "Select Methods in Chemical Analysis," a manual of "Dyeing and Tissue Printing," a work on "The Solution of the Sewage Question." He has translated and edited Reimann's "Aniline and its Derivatives," Wagner's great work on "Chemical Technology," and many other works of scientific prominence have emanated from his busy pen.

The splendid results which have attended Prof. Crookes' labors are not to be attributed solely to his undoubted genius for experiment and observation. They are largely the result of persistent hard work carried out on logical lines and with strict attention to method. He possesses that "infinite capacity for taking pains" which is indispensable to genius, if its powers are to produce valuable, lasting results.

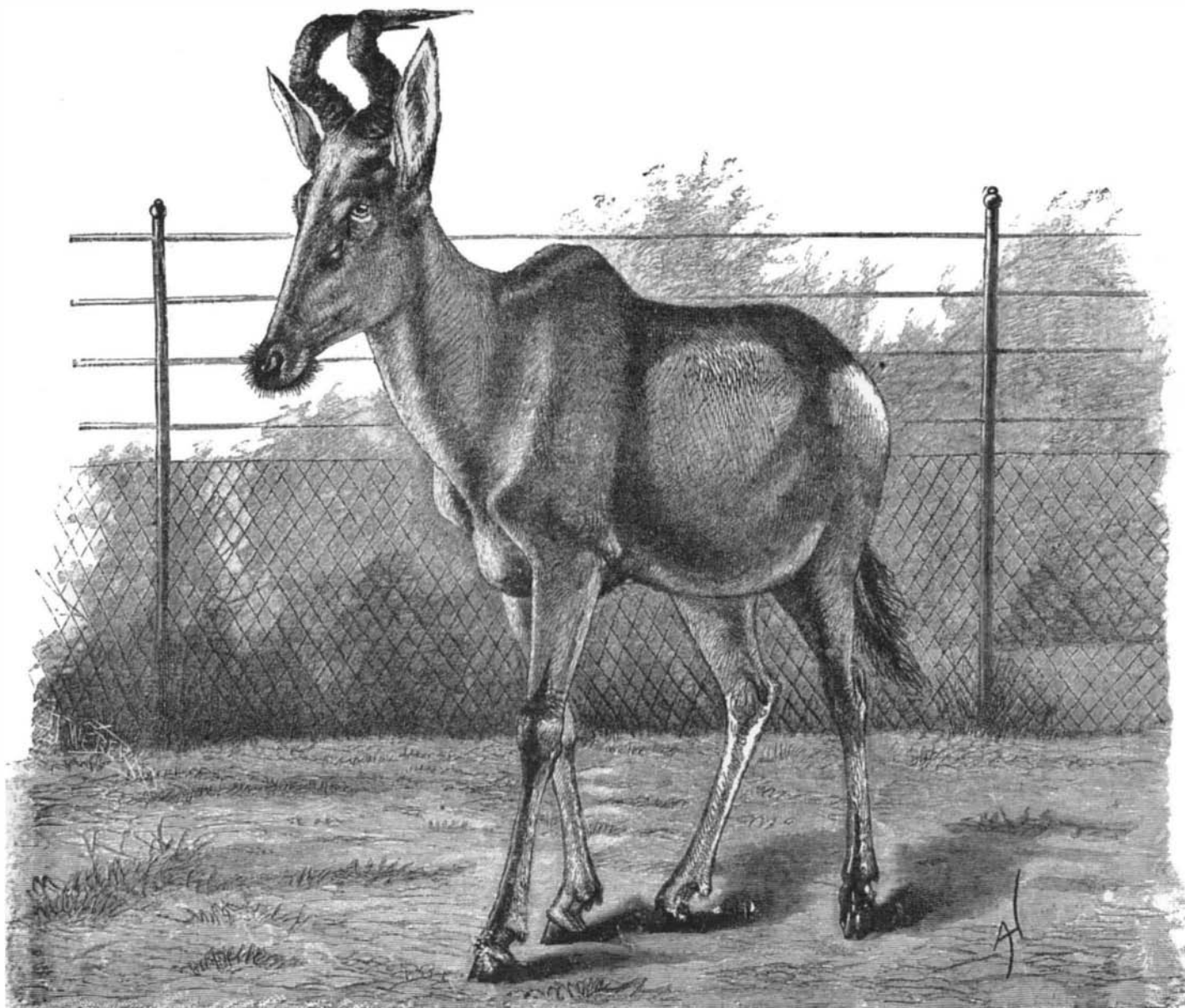
A COMPANY is being formed, it is announced, to work a coalfield at Astley, in Warwickshire, where, it is stated, the principal seams are over 20 feet in thickness, and are not deeper than 500 yards. The English Mechanic thinks it rather strange that a field so rich and so near London has not been worked before.

THE KONZI ANTELOPE IN THE BERLIN ZOOLOGICAL GARDEN.

For many years past antelopes of certain species have been a familiar sight in the zoological gardens, but explorers knew that there were many other species on the steppes of Eastern Africa that had never been exported. One of the most interesting of these is the konzi antelope, only one living specimen of which has been taken to Europe, and that is now in the Berlin Zoological Garden. Our engraving (for which we are indebted to the *Illustrirte Zeitung*) is taken from a drawing of this animal made by Anna Held. These antelopes graze in small herds on the grass-covered steppes while an old bull keeps watch from a neighboring eminence. They prefer places where fresh, new grass has started after the old grass has been burned over, but a short time spent in such a locality makes quite a change in their appearance. They are naturally of a golden brown color, so near the color of the ground on which they graze that it is difficult to distinguish them from a distance, but after grazing in

one of these burned districts they have black spots on their shoulders that might easily lead a naturalist to suppose they belonged to a different species from those that had grazed where there had been no fire. These spots are caused by rubbing their shoulders against charred trees, the black being retained by the oily secretion of the lachrymal glands. The only natural black marks are those on the legs.

DECEMBER fires in the United States and Canada caused a loss of about \$10,000,000, and the milling and allied industries contributed about \$410,000. The total loss for 1895 is \$130,000,000, against \$128,000,000 in 1894 and \$157,000,000 in 1893.



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