SIR WILLIAM CROOKES
WILLIAM EARL HIDDEN

BY GEORGE P. KUNZ

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SIR WILLIAM CROOKES

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The death of the great physicist, Sir William Crookes, on April 5, 1919, at the ripe old age of eighty-seven years, removes from our midst one of the most noted of British scientists. His long life, spent in the cause of scientific progress, enabled him to accomplish much highly important work in various directions, so that his memory will endure as long as the history of science.

From an autobiographical sketch which he prepared in his own hand-writing and presented to the writer, the following account of his life has been prepared.

He was born in London, June 17, 1832, and became, in 1848, a pupil of the noted chemist, Dr. Hofmann, at the Royal College of Chemistry. A year later, when but seventeen, he won the Ashburton Scholarship, and after studying two years longer, was appointed junior assistant of Dr. Hofmann and soon thereafter senior assistant. In 1854 he left this position for the Radcliffe Observatory at Oxford, where he superintended the meteorological department. The following year found him professor of chemistry in the Training College at Cambridge. From 1859 dates his long editorship of the Chemical News, which he founded in that year. Under his able direction this journal has given perhaps the most complete record of chemical progress of any in the world.

The bent of his mind was rather toward the discovery of new laws governing matter, and new aspects of material evolution, than toward a painstaking systematization of results already attained. That this tendency was shown early in his career is proved by his discovery, in 1861, by chemical and spectroscope tests on a residue obtained in the manufacture of sulfuric acid, of the new element thallium. Its atomic weight was reported

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by him to the Royal Society in 1872. His close study of the relation of the elements to one another culminated in 1887 in his theory of their genesis. The results here attained had been rendered possible by his success in producing extreme vacua, thus nearly realizing the ideal conditions of space, so that he could observe the passage of gases into the form of radiant matter. The production of this extreme tenuity of matter was also utilized for the incandescent lamp, and the experiments carried on by Crookes paved the way for the discovery of the Röntgen rays, and led up to the use of the "X-rays" in the investigation of diseased human tissue, as well as to the therapeutic use of the cathode rays. His construction of the radiometer (1875) and of the spinthariscope (1903), had much to do with the elaboration of the electronic theory of matter.

It may be worth noting that in 1905, when addressing a meeting of the British Association at Kimberley, South Africa, on the phosphorescence of the diamond, Crookes' exhibited there, as an altogether exceptional example of this quality, a diamond belonging to the wife of the present writer.

For his investigations and discoveries Crookes was rewarded with many honors. He received the degree of Doctor of Science from Dublin (1904), Oxford (1904), Cape of Good Hope (1905), Cambridge (1908), Sheffield (1910) and Durham (1913), and that of L.L.D. from Birmingham in 1909. Many medals were awarded him; in 1862, from the International Exhibition, London, for the discovery of thallium; 1875, the Royal Medal of the Royal Society; 1880, Gold Medal and a prize of 3,000 francs from the Académie des Sciences, for discoveries in molecular physics and radiant matter; 1885, a Gold Medal, International Inventions Exhibition, for the invention of the radiometer; 1885, the Ferguson Medal, Soc. of Arts; 1888, the Davy Medal, Royal Soc.; 1889, a Medal of the Exp. Universelle, Paris; 1889, the Albert Medal, Soc. of Arts; 1904, the Copley Medal, Royal Soc.; 1912, the Elliott Cresson Medal, Franklin Institute, Phila., Pa. The highly-prized decoration of the Order of Merit was bestowed on him in 1910. To enumerate his memberships in scientific societies, at home and abroad, would be about equivalent to giving a list of such societies.

In 1877–9, 1894–6, and 1907–14, he was member of the Council of the Royal Society, and in 1906 he was elected corresponding member of the Académie des Sciences.

The writer had excellent opportunity to become personally acquainted with Sir William. He was a graceful, courtly gentleman of the old school, kindly in manner, with bright sparkling eyes, intense in a quiet way. I well remember the glee with which he showed us some natural diamond crystals of various colors, and also several diamonds set in brooches belonging to Lady Crookes, the surfaces of which had been entirely altered into graphite by the bombardment of electrons, and altho both Lady Crookes and the collector who owned the unset diamonds objectcd most strongly to the change operated in the stone, Sir William was delighted to know that he could produce such a change in natural crystals of carbon. In another direction, it is a great satisfaction for me that I was able to present him with a quantity of samarskite, from which he obtained a number of the rare elements with which his name is connected.

Sir William Crookes had an exceptionally keen insight into the mysteries of chemistry and physics. Had it not been for a trip made to the Cape to examine the African gold mines, he might have been the discoverer of what are now named the X-rays, for the discovery of which he had blazed the path.

His two famous lectures on diamonds at the Royal Institution in 1896, and more particularly the lecture he delivered at Kimberley in 1905—for which the British Association for the Advancement of Science awarded him £ 600 for excess expenses, all of which sum he employed in furthering his experiments,—were so popular that tickets of admission sold freely for £ 5 apiece.

In the last letter I received from him, dated October 19, 1918, the depth of his love for his wife was tenderly and strikingly expressed. He wrote, "Evidently you have not heard of the terrible calamity that fell upon me in 1916, when I lost my dear companion, Lady Crookes, which has eclipsed anything that has happened, or that can happen in the future." They had just celebrated the Diamond Wedding, the sixtieth anniversary of their marriage.
REMINISCENCES OF WILLIAM E. HIDDEN

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The late William Earl Hidden was a very keen, observing and intelligent collector. His early training as designer for a bank-note company—a profession in which he was very proficient—was brought to a close when he was twenty-four years of age, thru lack of proper encouragement on the part of the company, and thru his own restlessness. He preferred to spend his time looking up mineral localities, in mining, in the collecting and selling of coins, etc. Had he remained at his bank-note designing, no doubt he would have attained eminence in that line. He attended the evening chemical lectures at the Cooper Union from 1873 to 1876. We were students together in the chemistry and physics departments of the Cooper Union.

Among the many mineralogical trips which we took together, one which we made to Kingsbridge on the Fourth of July, in the early part of our acquaintance, was notable for our discovering, in an old wall, a splendid, doubly-terminated crystal of tourmaline. We narrowly escaped arrest for damaging this wall!

Hidden was highly “temperamental,” and preferred not to settle in business in any one place; this resulted in his being more or less unfortunate in a business way, but it gave him the opportunity to visit many localities and to secure fine mineral specimens, which would not otherwise have been obtained.

William Earl Hidden was the son of James Edward, and Abbie Angel Hidden, and was born in Providence, R. I., February 16, 1853. He died, from heart trouble, in Newark, N. J., on June 12, 1918, being thus in his sixty-sixth year at the time of his death. He received his education in the public schools of Providence, New York, and Washington. In 1873–1877 he attended the chemical lectures of Prof. Charles F. Stone; and he joined the New York Academy of Sciences in 1875. For some time he was employed as draughtsman by the American Bank Note Company, and was unusually successful in this art, but his interest in minerals, stamps, coins, etc., weaned him from it, and he finally abandoned it in 1884.

Hidden was married, October 30, 1883, to Miss Josephine Morton of Newark, who died a few years ago. There are three
surviving children, Irad Morton Hidden, Morton Earl Hidden, and Miss Abigail Elizabeth Hidden. He was a member of the Rocky Mountain Club, a fellow of the Royal Geological Society of London, and member of the American Numismatic Society and of other organizations.

In 1879, in connection with the recently introduced electric lights, Hidden was sent by Thos. A. Edison on a five-months' search for platinum in the Appalachian belt of North Carolina, South Carolina, Georgia and Alabama. He failed to find any deposits of the metal, but was more successful subsequently in the search for other minerals, having developed, in connection with the Welsbach Light Co. in North Carolina and South Carolina, deposits of the rare thorium mineral monazite.

On the first of his many trips to North Carolina, Hidden made the acquaintance of Mr. J. Adlai D. Stephenson, of Statesville, who had devoted himself ardently for several years to the collection of North Carolina minerals, and who had discovered emeralds at Stony Point, Alexander County, in that State. Concerning this discovery Mr. Stephenson states that in 1875 he obtained his first emerald. It was small and rather opaque, but of fine color, and the file-like markings on its planes were very distinct. In the following year he collected two others at the same locality, neither of which quite equalled the first in color, altho one of them was more transparent. During 1877, two emeralds, of good color and quite transparent, were brought to him from a point about 3 km. distant from the first locality.

Mr. Stephenson also found, in April, 1879, specimens of a chrome-green mineral which he conjectured to be diopside. Of these he gave Hidden several examples, and the latter sent the supposed diopside for analysis to Dr. J. Lawrence Smith, of Louisville, Kentucky, who determined it to be a variety of spodumene. Unaware that another specimen had previously been sent by Stephenson himself to Norman Spang, the great collector of Pittsburgh, Pennsylvania, Doctor Smith named the new mineral "hiddenite," after William E. Hidden. This led to a heated controversy between Mr. Spang, Mr. Stephenson, and others. As a memorial of the discovery the name of the Post Office Stony Point was changed to Hiddenton.

Later on, the emeralds and the hiddenite were mined, the

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1 Killed in the recent war.
2 Am. J. Sci. [3], 21, 128, 1881.
property having been secured by the newly organized Emerald and Hiddenite Mining Company. Altho the emeralds were not of great gem value, many notable crystals, remarkably interesting as mineralogical specimens, were found, one of them measuring 22 centimeters in length and another weighing as much as 280 grams.\(^1\) The emerald occurrences were described by Hidden before the New York Academy of Sciences in 1882.\(^2\) The two finest crystals are now in the Bement-Morgan Collection in the American Museum of Natural History, New York City. Other examples are in the Garland Collection of Harvard University, the Lea Collection of the United States National Museum, Washington, D. C., the Kunz Collection at Albany, New York, the Field Museum of Natural History, Chicago, etc.

The North Carolina emeralds were remarkable as crystals, and as such are among the finest in the world; but they had the deep emerald hue, the true gem color, on the surface only, and were almost white within. A few very pale gems of 9 carats' weight were cut, but no fine gem of even one carat was ever obtained from the Stony Point material.

Besides being instrumental in the determination of “hiddenite,” Hidden discovered another new precious stone, the garnet variety “rhodolite” (from *rhodon*, the Greek for rose) in the Cowee Valley, Macon County, North Carolina. He also discovered a number of new mineral varieties, one of which, a form of rutile, he named “edisonite,” after Thomas A. Edison\(^3\); another, a hydrous silicate of thorium and uranium, he named “mackintoshite” after his faithful collaborator, J. B. Mackintosh. In connection with the latter, Hidden also described auterlite, a hydrous phospho-silicate of thorium, named after Dr. Carl Auer von Welsbach, inventor of the Welsbach light; sulphohalite, a chloro-sulfate of sodium; yttrialite, a silicate of the yttrium metals and thorium; thorogummite, a silicate of thorium; and rowlandite, a silicate of yttrium, named after Prof. Henry A. Rowland.

Another mineral described by Hidden, in collaboration with J. B. Mackintosh, was the eudialyte (eucolite) of Magnet Cove, Arkansas; and with Dr. James Hyde Pratt he reported on an

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1 These are illustrated in the present writer's “Gems and Precious Stones of North America,” Pl. 5.
3 See bibliography at the end of the paper.
occurrence of the rare platinum mineral, sperrylite, near the summit of Mason Mountain, North Carolina, in fissures and cavities of a rock made up essentially of rhodolite and biotite.

In the midst of his various activities, which he was able to follow owing to having leisure whenever he desired it, Hidden was instrumental in naming directly, or in collaboration with others, fourteen different species of minerals; and in addition to this, he collected many unique specimens which, because of his trained eye and artistic temperament, he frequently rescued when they would otherwise have been overlooked or lost.

Hidden was greatly interested in meteorites, and described the following falls:

Chulafinee; from Cleberne County, Alabama. Found in 1873; weight 14.75 kg. (32.5 pounds). It originally weighed more, but a piece of about $1\frac{1}{2}$ kg. was broken off by a blacksmith who worked the iron into horseshoe nails and a plow point.

Fort Duncan; from Maverick County, Texas. Weighs 43.5 kg. (96 pounds) and is associated with the great meteoric fall in the State of Coahuila, Mexico.

Dalton; from Whitfield County, Georgia.

Hayden Creek; from Lemhi County, Idaho.

Joe Wright Mountain; from Independence County, Arkansas.

Laurens County; from Laurens County, South Carolina.

Lick Creek; from Davidson County, North Carolina.

Mazapil; from State of Zacatecas, Mexico.

About 1880, he examined and described the meteorite found in 1877 on a farm some twenty miles northeast of Dalton, Whitfield Co., Ga. As he saw it in the State museum at Atlanta it weighed 4.4 kg. (9.7 pounds), but it is said to have originally weighed 6 kg. He found it to be of the usual composition, with deliquescent chloride of iron in many spots, and he notes that the region where it was discovered, near the Tennessee and North Carolina boundaries, is remarkable for the number of meteorites it has afforded.

One of the principal American meteorites was the famous Mazapil meteoric iron from the State of Zacatecas, Mexico, seen to fall on the night of November 27, 1885, weighing about 4 kg., and believed to have had some connection with Eneke's

1 See bibliography at the end of the paper.
Comet. Hidden's entire collection was purchased by the Imperial Museum of Vienna, where it now is.

Hidden profited by many of his discoveries, exploring and developing each deposit, only to sell out and turn to another. He was the strongest factor in developing North Carolina gem occurrences, the emerald, hiddenite, rutile, quartz, etc. Later, he aided in the opening up of the turquoise mines of New Mexico. The development of the Welsbach light led to his search for zircon and monazite deposits in the South Atlantic States, and later the rare minerals in Llano County, Texas.

Early in 1903 he had purchased from the Piedmont Mineral Company, Limited, of London, England, a tract of mineral land in Texas, 24 acres in extent. It is described in the deed as being on the west bank of the Colorado River, in Llano Co., Texas, and the deposits include many of the rare yttrium and erbium ores. The altered variety of zircon, cyrtolite, is also mentioned as being present. In May, 1903, a few months after his purchase, he was able to sell the property to the Nernst Lamp Company, the Trustees of which have since resold the land, reserving the mining and mineral rights. His articles describing his explorations of this deposit, and the remarkable minerals found there, make extremely interesting reading.

Hidden subsequently became interested in the Nipissing Mining Company, and wrote a report on the mines of this company at Cobalt, Canada. He also described the La Rosa mining property at the same place. And still more recently he was connected with the development of a large copper property known as the “Sunshine” in southern California.

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