purities in oxygen with which we have worked.[6] From these calculations it is found that when an excited oxygen molecule collides with an alcohol molecule the probability is slightly better than 1 in 1,000 that the vibrating oxygen molecule will lose its vibrational energy. This probability of transition is of the order of 5,000 times the probability of transition in collisions between two oxygen molecules. This probability of transition decreases progressively, and in the order named, for impurities of ammonia, benzene, water vapor, acetylene, hydrogen sulfide, carbon tetrachloride, carbon monoxide, hydrogen, carbon dioxide, nitrogen, helium and oxygen. A collision between two oxygen molecules is thus seen to be the least probable type of collision for producing transitions between normal and excited oxygen molecules. It also appears that hydrogen molecules are more effective than helium molecules for producing transitions.

As yet, insufficient data are available to offer a complete explanation of the collision process. However, a number of tentative assumptions are suggested by the data obtained to date.[6]

(1) The simple impulse theory of the transfer of energy at collision is inadequate, since hydrogen, for example, is more effective than the heavier helium.

(2) If an oxygen molecule collides with a molecule having a dipole moment, the collision is more likely to disturb the nuclear vibrations of the oxygen molecule than is the case in a collision with a molecule which has no dipole moment. Thus, our data indicate that carbon monoxide is more effective than the similar nitrogen molecule.

(3) Our results would seem to support the suggestion of Eucken and Becker that a strong disturbance should be expected if the collision partners have a high chemical affinity.

In conclusion, the experiments described in this paper indicate that the measurement of sound absorption in gases provides a new approach to a number of important problems related to molecular collisions. In addition, the absorption measurements in air are of general interest to the most casual observer. They not only clarify a large number of curious problems associated with the influence of the weather on the acoustics of the atmosphere, but they have an immediate and practical application in architectural acoustics and sound signaling.

OBITUARY

HUGO DE VRIES

1848–1935

ON May 21, in the little Dutch village of Lunteren, a kindly old man in his eighty-seventh year died, and the news was cabled to all parts of the civilized world. The passing of Hugo de Vries brings to a close a life rich in achievement.

De Vries was a botanist, but his early work on turgor in plants influenced the development of chemical theory. By means of the plasmolytic method he determined the relative influence of molecular solutions of various salts and organic compounds upon osmotic pressure of the cell sap and expressed these differences in terms of his isotonic coefficients. It was upon these studies that Van't Hoff and Arrhenius based their laws of disassociation in dilute solutions which form one of the fundamental concepts of physical chemistry.

De Vries is most widely known, however, for his influence on biological thought. In 1889 he published his theory of intracellular pangenesis, in which, on the basis of extensive observations, he argued that hereditary particles corresponding to the different adult characters must be present in all cells of the organism. This is an early statement of our modern concept of the gene. In his foreword to Gager's translation of "Intracellular Pangenesis," Strasburger writes as follows: "By creative imagination Hugo de Vries predicted much in his book that gained a material basis only through the histological research of the following decades . . . he predicted phenomena which were to furnish the basis for our conceptions of fertilization and heredity but which have become actually known to us only through later works on the most intimate processes of nuclear division." His powers of prophetic imagination are also shown in an address delivered at the opening of the Station for Experimental Evolution in 1904. He urged that attempts be made to alter the hereditary particles in germ cells by application of external stimuli. He pointed out that x-rays and radium have been found capable of bringing about important changes in living organisms. "If the same holds good for our dormant representatives in the egg we may hope some day to apply the physiological activity of the rays of Röntgen and Curie to experimental morphology." It was nearly a quarter of a century before this hope of de Vries was realized.

De Vries was the outstanding figure in the biological world in the early part of this century when genetics was being born and new and revolutionary ideas were appearing in rapid succession. More than any other man he helped to lead biologists from the speculative age of Darwin into an age of experimentation. He was the first of the three in 1900 who announced the discovery of the laws of Mendel from their own independent investigations. His name is more closely associated, however, with the mutation theory which he announced in 1901. In this, from study of a wealth of material, he was able to distinguish between fluctuating variations caused by the environment and changes due to the sudden origin of a new hereditary unit which he called a mutation.

In the evening primrose (*Oenothera Lamarckiana*) upon which the mutation theory was largely based, de Vries thought he had found a species in a state of rapid mutation to "elementary species." The literature on the genetics of this form from the pen of de Vries and his followers has reached a large volume, but it is now agreed that most of its frequent mutations are not due to new hereditary units (or genes, as we now call them) but rather to alterations in genic balance brought about by changes in amounts of relatively large blocks of chromosomal material. This change in interpretation does not detract from the value of the mutation theory which was a tremendous stimulus to research and which has become firmly established from facts in a wide range of forms among both animals and plants.

The mutation theory alone appears to be an inadequate explanation of the origin of species, but if the study of evolution ever becomes thoroughly experimental, as there are indications may be the case, a large share in the credit will be due to Hugo de Vries.

De Vries was born in Haarlem on February 16, 1848. His doctorate was received from the University of Leiden in 1870. After study in German universities, he was called in 1877 to a lectureship in the University of Amsterdam, where later he was advanced to the professorship of plant physiology, a position which he retained until he retired in 1918 at the age of 70. Upon this occasion his papers were reprinted in a series of seven volumes entitled "Opera e Periodicis Collata." His later years were spent in Lunteren, Holland, where he had a small greenhouse and garden in which he continued his experiments on the evening primroses almost to the end. He three times visited this country: in 1904 when he helped to dedicate the Station for Experimental Evolution of the Carnegie Institution of Washington and gave a course of lectures at the University of California; in 1906 again to give lectures at the University of California and in 1912, when he came to give an address at the opening of the Rice Institute.

Among published photographs of de Vries and accounts of his life may be mentioned those by Lehman,[1] Almquist,[2] Shull[3] and the writer.[4]

Few scientists have influenced so profoundly the theory and experimental practice in their fields of research as did de Vries. He brought to bear upon his investigations a combination of mental qualities which are rarely developed to the same degree in a single individual. He was a keen observer, a patient accumulator of data, an untiring and meticulous experimenter, skilful in interpretation of evidence and yet able to relate his findings to broad problems of fundamental importance. He was a man of theory and vision as well as a gatherer of details in laboratory and garden, a pioneer and prophet. The name of Hugo de Vries will forever remain an inspiration to all biologists.

ALBERT F. BLAKESLEE

WILLIAM PARKER CUTTER

WILLIAM PARKER CUTTER, librarian of the Bermuda Biological Station for Research, died at the Massachusetts General Hospital on May 20, 1935, and was buried in Mt. Pleasant Cemetery, Arlington, on May 22.

Mr. Cutter had been connected with several scientific institutions and important libraries in the United States before assuming charge of the library of the Bermuda Biological Station. He was born at Washington, D. C., on December 19, 1867; graduated at Cornell University in 1888; was chemist at the Agricultural Experiment Station, Logan, Utah, from 1890–1893; librarian of the Department of Agriculture, Washington, from 1893–1900; chief of the order department of the Library of Congress, 1901–1904; librarian of the Forbes Library, Northampton, Massachusetts, 1904–11; librarian of the Engineering Societies, New York, 1911–17; manager of the book department of the Chemical Catalog Company, 1918–20; librarian, Research Library, National Aniline and Chemical Company, 1921–22; director of the information department, Arthur D. Little, Inc., 1922–27; assistant librarian, Baker Library, Harvard University, 1928–32; librarian, Bermuda Biological Station, 1933–35. He was a member of the American Library Association and secretary of the joint committee on Classification of Technical Literature, 1915–17. He was the author of "Rare Books and Their Values," 1903, and also of various articles on library topics.

In his last years Mr. Cutter's health was frail, and he sought relief from the extremes of the New England climate in the more equable climate of Bermuda, where

1 E. Lehman, "Hugo de Vries, 6 Vorträge zur feier Seines 80. Geburtstages." Tübinger Naturw. Abhandl. 62 pgs. F. Enke: Stuttgart, 1929.

2 Ernst Almquist, "Grosse Biologen. Eine Geschichte der Biologie und ihrer Erforscher." 143 pgs., J. F. Lehmann, München, 1931.

3 G. H. Shull, *Journal of Heredity*, 24: 3–6, 1933.

4 A. F. Blakeslee, *Scientific Monthly*, 36: 279–280, 1933. This article has been drawn upon in preparation of the present note.