surement of Intangibles in Education. On Tuesday afternoon the program will consist of reports of national committees: The President's Committee on the National Reorganization of Education, by Dr. Floyd W. Reeves, and the Cooperative Study of Secondary School Standards, by Drs. George E. Carrothers and Carl G. F. Franzén. On Wednesday afternoon the section will have a joint session with the Section on Psychology (I) at which the subject will be "Educational Psychology." A forum on "The Problems of Teaching in the Social Studies in High Schools" will also be held on Wednesday afternoon. A joint luncheon will be held Wednesday noon with the Botanical Society of America, following which the report of the Committee on Botany Teaching will be presented and discussed. The joint dinner of Sections I and Q will be held on Wednesday evening, at which Dr. E. S. Evenden will deliver his retiring vice-presidential address on "Factors Affecting the Salaries of College and University Teachers." Headquarters: Columbia Club.

OTHER PROGRAMS

American Science Teachers' Association. Friday. The morning session will consist of a symposium on "New Knowledge of Matter." Speakers: Drs. A. H. Compton, Irving Langmuir and Wendell M. Stanley. At the luncheon at the Columbia Club, Dean George D. Birkhoff, president of the American Association for the Advancement of Science, will deliver an address. The first part of the afternoon program will be devoted to papers on "Science in Elementary and Junior High Schools," by W. Knox, Miss Mary Melrose, Miss Bertha Parker and Dr. Morris Meister; the second part of the afternoon program will be devoted to papers on "Science in Senior High Schools," by Homer W. Le Sourd and George L. Bush, which will be followed by discussions. Headquarters: Columbia Club.

The Society of Sigma Xi will hold its thirty-eighth annual convention on Tuesday at 4 P. M. At 8:15 on Tuesday its sixteenth annual lecture will be delivered as one of the general sessions of the association by Dr. Irving Langmuir on "Biological Applications of Surface Chemistry." Headquarters: Claypool Hotel.

The third annual Phi Beta Kappa-American Association for the Advancement of Science lecture will be delivered at 8:15 on Wednesday as one of the general sessions of the association by Dr. George Lyman Kittredge on "Shakespeare and the Critics." An exhibit of *The American Scholar,* Phi Beta Kappa's quarterly, will be included in the Annual Science Exhibition.

The American Association of University Professors will hold its twenty-fourth annual meeting on Friday and Saturday. The program will consist of a symposium on "What the American Association of University Professors is and What it is Not," followed by an open forum and reports of various committees of the association. At the annual formal dinner on Friday evening, Dr. A. J. Carlson will address the delegates as retiring president. Headquarters: Claypool Hotel.

Sigma Delta Epsilon, Graduate Women's Scientific Fraternity, will meet on Monday afternoon and Thursday afternoon. It will have a luncheon for all women in science in Claypool Hotel on Tuesday at 12:15.

The Honor Society of Phi Kappa Phi will hold business meetings on Monday morning and afternoon and a delegates' breakfast on Tuesday morning. Headquarters: Lincoln Hotel.

OBITUARY

PROFESSOR DUNCAN STARR JOHNSON

IN the death of Professor Duncan Starr Johnson, of the Johns Hopkins University, the science of botany has lost one of its most active and profound scholars. Born at Cromwell, Connecticut, on July 21, 1867, he died at the Johns Hopkins Hospital, in Baltimore, on February 16, 1937.

In 1892 Johnson received the degree of bachelor of science at Wesleyan University, Middletown, Connecticut. The same university conferred on him the honorary degree of doctor of science in 1932. After studying at Yale University for a short time he entered the Johns Hopkins University in 1893, where he was most fortunate in coming under the influence of the great Lotsy and the brilliant young James Ellis Humphrey. It was the former who suggested the first objectives of research for Johnson, and the latter who guided him in the pursuit of them. The untimely death of Humphrey, in 1897, left Johnson as his first and only graduate student. Johnson received his Ph.D. degree from the Johns Hopkins University in 1897, and the whole of his after life, except for summer responsibilities at various outside laboratories, was spent in the service of that institution. He was first an assistant, then an associate in botany, becoming associate professor in 1901 and professor of botany in 1906. He had spent a few months of study with von Goebel at Munich in 1901. In 1913 he became director of the new botanical garden at the Johns Hopkins University, for the planning and planting of which he was directly and wholly responsible.

Among Johnson's many lines of botanical activity only a few can be mentioned in this short account. He led seven summer expeditions to Jamaica, with short

excursions to other Caribbean regions, being accompanied by his own students and often by others. In 1927 he became a member of the National Research Council and was chairman of its Division of Biology and Agriculture for the year 1931–32. He was secretary of the Botanical Society of America from 1907 to 1909, and vice-president of the Botanical Section of the American Association for the Advancement of Science in 1912. He was in charge of botany at the Cold Spring Harbor Biological Laboratory, on Long Island, from 1896 to 1900 and in charge of cryptogamic botany there from 1902 to 1911. Afterwards he was vice-president of the Harpswell Laboratory, on Casco Bay, Maine, from 1914 to 1923 and of the Mount Desert Biological Laboratory from 1924 to the time of his death. In 1918 he was engaged in federal inspections for grain diseases in the Atlantic states, under the auspices of the U. S. Department of Agriculture. In 1935 he lectured in the summer laboratory of the University of Virginia, at Mountain Lake.

He was a most faithful attendant at botanical meetings, both here and abroad. After conducting a tour of a number of European botanical gardens, he took active part in the Fifth International Botanical Congress, held at Cambridge, England, in 1930. The writer saw him for the last time at the Sixth International Botanical Congress, held at Amsterdam in 1935. He was then far from well, but his dogged determination had not allowed him to stay at home that summer.

During his many years of teaching and research, Johnson produced results unsurpassed in American botany. The writer has never known a man more devoted to his work. He thought, talked, lived and died with his beloved science. His unflagging energy and persistence were nothing less than marvelous, and throughout his happy and fruitful life he constantly advanced and improved his knowledge and philosophy and rose ever higher in the esteem of his associates.

When we consider his notable contributions we are inclined to think first of Johnson's eminent success in leading and influencing his students, whose achievements have been notably important and conspicuous. Their publications make a very impressive list. Many of those who had the benefit of his guidance in their formative years now hold prominent positions in American science. Johnson's remarkable success with his students, which was doubtless related to his inspiring personality to a great degree, was in large part due to his unusually broad knowledge and alert interest in the whole extensive field of structural botany. It was this knowledge and interest which enabled him to choose with such great success lines for investigation. His students had to include in their studies every group of the plant kingdom, and throughout each of his courses they had to satisfy his most exacting demands as to quality of work. No student of his could fail to be permanently influenced by his remarkable capacity for unremitting labor and almost religious insistence on accuracy in both observation and description.

Johnson's interest in his students was not confined to the classroom; they frequently gathered at his home in the evening. Besides something good to eat, which is expected by students, there was always music at these gatherings; Mrs. Johnson played the piano and young Duncan the flute, with other incidental talent joining in.

Students who had accompanied Johnson to Jamaica liked to tell how his striking personal characteristics were evident in these round-the-clock associations. He was known for his skill in carpentry and finer wood work. At his home he had a room devoted to such work, where he spent some time almost every day. He designed and made with his own hands the special boxes and cases required for the tropical expeditions. The contents were carefully specified, even as to the manner of packing, and each box had to be exactly right in weight and shape for pack-saddle transportation. He did nearly all the carpentry work that was required to transform the unused coffee-packing house at Abbey Green into a very satisfactory laboratory. They say that he was always the first one of the group to appear in the morning, going out to study and photograph the early cloud effects in the mountains. He was very fond of fruits, and his companions told how, when they arose and looked out of the window in the morning, they usually saw their chief at his favorite observation station, his eyes intent on the clouds while one hand held his camera and the other grasped a mango. He was an expert photographer. The finest plant photograph the writer has ever seen is his well-known portrait of the flowers of the giant cactus, taken in Arizona.

Throughout Johnson's entire career all the manipulations—imbedding, sectioning and drawing—required in his researches were performed with his own hands. So far as the writer knows, he never had a technical assistant. His unusually great ingenuity was very happily demonstrated in the details of construction and arrangement of his greenhouse rooms and in his outdoor garden at the university. In very small space he and the university gardener succeeded in growing an astonishingly large number of plant forms, to illustrate many interesting and important phases of plant organization, habit and relationship. In an interesting paper that appeared in SCIENCE for April 29, 1910, he presented the plan of the garden and described various ingenious devices by which practical difficulties had been overcome. In the small greenhouse at the side of the garden he brought together a

large number of plants from tropical and arid regions, many of them collected by himself. The writer remembers especially the unusual richness of the collection of Piperales and ferns. He was always most generous in sharing his interesting plants with other laboratories and gardens.

After his first paper, on the crystallization of cellulose, published in 1895, which thoroughly reflects his characteristic care and precision in research and writing, he turned to the field of morphological botany and, excepting several excursions into ecology, he confined his studies mainly to morphology throughout the remainder of his life. In his next two papers, on the sporocarps of the water-ferns, Marsilea and Pilularia, the very intricate developmental history of these fruit bodies was made known for the first time. These and subsequent contributions on the Marsileales placed Johnson among the leading young men in American botany.

In 1900 Johnson began a series of studies on the Piperales, which eventually resulted in ten publications. In the first of these, on the endosperm and embryo of *Peperomia pellucida,* he announced the discovery of a quite unexpected type of embryo-sac development, in which sixteen free nuclei are formed in the sac at first, eight of them subsequently fusing to form a single endosperm nucleus. Equally interesting and important is his discovery that in several genera of this family seed germination begins with a remarkable proliferation of the endosperm, which thus breaks through the seed coats and extends well beyond them while it still encloses the cotyledon tips. His discoveries in this family led him to the generalization: "The embryo sporophyte is perhaps everywhere nourished through the gametophyte and not by the parent sporophyte directly." From the results of his subsequent investigations on various species of the Piperales he made it clear that this group exhibits a remarkable variation in the development of the sac and other parts of the seed—a variation not yet known to be surpassed in any other group of the angiosperms. Thus Johnson convincingly confirmed an opinion of the great Hofmeister, that the developmental history of the embryo sac, endosperm and nucellus does not furnish a satisfactory general basis for classification.

The great breadth of Johnson's botanical interest is illustrated by his excursions into the field of ecology and plant distribution. In 1900 he published his paper on the flora of the banks and sounds near Beaufort, North Carolina, and fifteen years later he and Harlan H. York were joint authors of a contribution on the relation of plants to tide-levels in the region of Cold Spring Harbor. In 1921 and 1927 were published two very interesting papers by Johnson on plant migration into a Jamaican valley that had been suddenly denuded by a torrential downpour of twenty-seven inches of precipitation in only two days. His last ecological paper is the one in which he showed that flowers of the giant cactus (Carnegiea) were more numerous and opened several days earlier on the east side than on the west side of the stem. The stem tissues on the east side were generally found to be about two degrees warmer than on the west side when the floral buds were enlarging and opening, in May and June.

In 1931, at the close of his thirtieth year as professor in the Johns Hopkins University, Johnson's students arranged a dinner in his honor and on that gala occasion he was greatly pleased by being presented with a portfolio of appreciative letters and photographs from his students and colleagues. At the same time was first shown the Johnson portrait, done in oils by Mr. T. C. Corner, which now hangs in the main reading room of the library at the university.

On June 22, 1904, Dr. Johnson married Miss Mary E. G. Lentz, of Baltimore, a graduate of Goucher College, who still resides at their beautiful home in Roland Park. Two sons also survive him—George Duncan, who is now in Venezuela with an oil corporation, and David Starr, who is with a commercial firm in Baltimore. Both are graduates of the Johns Hopkins University and the elder received the Ph.D. degree there in 1934.

In conclusion, the writer must add a few words in appreciation of the character of his old friend. Dr. Johnson's mind, heart and body were always in complete harmony. He never expressed a mean or ungenerous thought, and I do not believe that he ever entertained one. Throughout four years of close association with him as student and friend the writer never knew him to show any sign of anger or undue excitement. His life seemed to run smoothly always, like a gently flowing river, too deep to be agitated, ever becoming deeper and broader as it ran its appointed course.

W. C. COKER

UNIVERSITY OF NORTH CAROLINA

RECENT DEATHS

REAR ADMIRAL RAYMOND STANTON PATTON, since 1929 director of the U. S. Coast and Geodetic Survey, with which he had been connected in various capacities since 1904, died on November 25 in his fifty-fifth year.

DR. STORRS BARROWS BARRETT, until his retirement with the title emeritus in 1930 associate professor of astrophysics at the University of Chicago, died on November 26 at the age of seventy-three years.

HENRY WARD TURNER, consulting geologist and mining engineer, formerly geologist in the U. S. Geological Survey, died on November 26 at the age of eighty years.