Radiotherapy for benign and malignant tumors: The specific sensitiveness of different kinds of cells constitutes the most important single factor in the treatment of neoplasms. The value of roentgen rays or radium in different varieties of tumor depends mainly on this feature. The susceptibility of tumors to irradiation agrees closely with the radiosensitiveness of normal cells of the same kind as those from which the tumors are derived and of which they are largely composed. Thus, the inordinate hyperplasia of lymphoid structures which characterizes Hodgkin's disease, lymphosarcoma, and lymphatic leukemia retrogresses under irradiation at the same rate as normal lymphocytes are known to be destroyed by similar exposure. In fact, so striking is the parallel that irradiation is now being used daily as a means of distinguishing such conditions when their clinical features do not permit absolute identification. In some cases, indeed, the radiotherapeutic method of diagnosis is more accurate and dependable than microscopic examination.

The only tumor which approaches lymphoblastoma in susceptibility to irradiation is the embryonal carcinoma, or seminoma, of the testis, the radiosensitiveness of which corresponds to that of normal spermatogonial cells. This is the most common neoplasm affecting the organ and heretofore has often been mistakenly regarded as a variety of sarcoma. Primary and secondary growths of this kind retrogress rapidly and some disappear completely after irradiation. The reaction of mixed, or teratoid, tumors of the testis is less rapid and seems to vary with the proportion of spermatogonial epithelium entering into their structure.

Knowledge of the relative radiosensitiveness of different cells has enabled Ewing and others to distinguish a group of bone tumors from other neoplasms which affect the skeleton. Ewing has designated this tumor as endothelial myeloma, because endothelial cells are a prominent feature. Among the malignant tumors of bone they are the most sensitive to irradiation. In fact, the other malignant growths which attack bone can hardly be said to have any sensitiveness; rather they are noteworthy for their resistance. Endothelial myeloma, on the contrary, is distinctly sensitive, and large tumors of this kind melt away with astonishing rapidity. The only other bone tumor which is radiosensitive is the usually benign giant-cell tumor, but its reaction to irradiation is unlike that of any malignant neoplasm. Instead of being followed by rapid or slow, but steady regression, irradiation of such growths causes them to swell and become tender. The patient and the uninitiated physician may naturally conclude that exposure to the rays has stimulated the tumor to increased growth, and the limb may be unnecessarily sacrificed. Such inflammatory reaction is a transient phase which lasts two or three weeks and is followed by slow regression and repair of the tumor by deposition of new bone. This characteristic reaction of giant-cell tumor constitutes at once a valuable means of identification and treatment and furnishes additional evidence that tumors of this kind, at least at the outset, are not true neoplasms but chronic inflammatory lesions.

Many other examples might be mentioned, but the foregoing are sufficient to illustrate the important bearing on medical diagnosis and treatment of the radiosensitiveness of cells and tissues. Heretofore, for some reason, biologists have seldom made use of radiation for experimental purposes. As soon as they begin to realize its possibilities, they will find in the method a means of acquiring much valuable information, and such increase in knowledge will help to extend the diagnostic and therapeutic applications.

OBITUARY

JAMES WILLIAM TOUMEY

JAMES WILLIAM TOUMEY, D.SC., D.FOR., professor of silviculture at the Yale School of Forestry, died at his home in New Haven on May 6, 1932. He was one of the pioneers and founders of American forestry. He was a great teacher and educator, a scientist of distinction, an author, and an influential leader in advancing the movement of forestry. He had been associated with the Yale School of Forestry from the time of its establishment in 1900. His part in building the school, in setting and maintaining high educational standards, and making the institution a force in the development of forestry in the nation can not be measured.

Trained as a botanist, he brought his extensive knowledge of plant science to bear on the problems of forestry. By his own study and experience he mastered the technical aspects of forestry and made a large contribution to the application of forestry principles to American conditions. His power as a teacher lay in his unflagging enthusiasm, in his personal interest in students and sympathetic understanding of their needs, and in his ability to stimulate individual effort on their part. He possessed high qualities as a scientific investigator, keen perception, unusual sense of values, originality and ingenuity in research, and persistence in carrying his studies to a conclusion. He had unfaltering faith in the work he

was doing and in the value and necessity of forestry in our national life. He was ever optimistic and courageous in the face of obstacles and he possessed a spirit of devotion that won a following in all his enterprises.

While intense in the application of his efforts to teaching and research in his special field, his general interests were broad, as exemplified in his reading, his university associations, and his participation in public affairs. He was simple and straightforward in thought and in his dealing with men. He was tolerant of the opinions of others, but he swiftly detected pretense, sophistry and self-seeking. His general personality and kindliness won the affectionate regard of his students and made a host of other friends.

Professor Toumey was born in Lawrence, Michigan, on April 17, 1865. His youth was spent on the farm of his father, Dennis Toumey, and his early educational work was in the local schools. He prepared for college at the Decatur High School, but taught school for several years before entering the Michigan State Agricultural College, from which he graduated in 1889. In college he directed his chief efforts to the study of botany. His work was given recognition by an appointment as an instructor in the college in 1890, and by the degree of Master of Science in 1893.

In 1891 he was called to the University of Arizona where he remained until 1898, advancing by steps to a full professorship in botany. At the same time he held the position of botanist in the State Agricultural Experiment Station, under whose auspices he conducted his scientific research. He served as the acting director of the station in 1897–1898. During this period Professor Toumey made very distinctive contributions to plant science. He conducted investigations in the fields of taxonomy, ecology, physiology and pathology, and also in entomology. He did special work on the date palm and became widely recognized as an authority on cacti. He established a cactus garden at Tucson which has been continued by his successors. He built up a large cactus herbarium, drawing upon it to aid the plant collections of Kew and other institutions. In 1897 he visited England and personally assisted in the systematic arrangement of the collection at Kew. About twenty-five articles and bulletins remain as a record of his investigative work in Arizona.

Professor Toumey began his formal work in forestry in 1899 when he was appointed superintendent of tree planting in the Division of Forestry, U. S. Department of Agriculture. He was selected for the post because of his knowledge of trees and in recognition of the experimental work which he had already done in tree planting. His duties were to encourage reforestation and to cooperate with private owners. He traveled extensively, studying local problems in various regions and assisting individuals by direct advice and through numerous publications.

When the Yale Forest School was established in 1900 Professor Toumey was chosen as one of the two regular members of the staff. Forestry was new and untried in this country, and there was little instructional material applicable to American conditions. It was a period of building the first foundations both of forest education and of the science and practice of American forestry. In this work Yale played a prominent part and Professor Toumey's contribution was large.

When the dean of the school, Henry S. Graves, was called to Washington to take charge of the U. S. Forest Service in 1910, Professor Toumey succeeded him as head of the school, a post which he held until 1922. During this period he materially enlarged the endowments and the physical facilities of the school. He was responsible for the gift of the new central building, Sage Hall. He enlarged the forest properties of the institution and secured large accessions to the library. He himself donated a collection of some 2,500 specimens to the forest herbarium. Even more important, he developed and strengthened the educational work, adhering to high scholastic standards and ideals as essential in a professional preparation for forestry.

In 1922 he retired from the deanship and devoted his efforts to teaching and research. The last decade of his life was the richest in his personal contributions to the science of forestry. Many research projects which he had previously initiated were brought to fruition.

He directed his chief efforts to the study of forest tree seeds and seedlings, to the environmental factors affecting the life of seedlings, trees and stands, and to the application of the principles of silviculture in intensive practice. He developed the property owned by the school at Keene, New Hampshire, as an experimental and demonstration forest of first importance. He secured funds for additional land, bringing its area to about 1,500 acres or about two thirds of its projected size. During recent years he made the Yale Forest at Keene a center of his silvical studies and his practical experiments in silviculture, and on it conducted a summer camp, with a selected group of graduate students. Before his last illness he was able to complete a report describing the forest, the history of the operations upon it, and the practical results of management. The Keene Forest will always stand as a memorial of his work in forestry.

Professor Toumey contributed extensively to the literature of forestry. His "Seeding and Planting" and "Foundations of Silviculture" are standard works

widely used as text and reference books by students in the forest schools and by others interested in forestry.[1] He was responsible for initiating at the School of Forestry a series of scientific bulletins, now comprising thirty-three numbers. Of these he was author or co-author of eight, and seven others were written by graduate students working under his direction. In addition he wrote extensively for the forestry journals and other periodicals. His bibliography covers a wide range of subjects, including articles of a scientific character, discussions of applied silviculture, forest taxation, watershed protection, forest economics and public forest policy.

Professor Toumey was called upon frequently for public addresses and for participation in public enterprises through committees and advisory boards or as an officer in technical and civic associations. In 1929 he was a member of the American delegation to the International Congress of Forest Experiment Stations at Stockholm, Sweden. He was granted the honorary degree of Doctor of Science by Syracuse University in 1920 and the honorary degree of Doctor of Forestry by the Michigan State College in 1927. He was a fellow of the Society of American Foresters, and a member of Sigma Xi, and of a large number of organizations engaged in advancing the interests of forestry and conservation.

In 1897 Professor Toumey married Miss Constantia Blake, of New Haven, who died in 1904, leaving a son, James W. Toumey, now a surgeon in New York. His second marriage was to Miss Nannie Trowbridge, of New Haven, in 1908.

His ashes will be taken to the Keene Forest, to which he was deeply devoted and which will be an appropriate sanctuary for his last resting place.

HENRY S. GRAVES

SCHOOL OF FORESTRY,
YALE UNIVERSITY

SCIENTIFIC EVENTS

BRITISH SOLAR ECLIPSE EXPEDITION TO CANADA

ACCORDING to the astronomical correspondent of the London *Times*, preparations are well advanced for the observation of the total eclipse of the sun on August 31 by an expedition from the Royal Observatory, Greenwich. The eclipse will be visible only from North America and limited regions surrounding that continent, the path from which the sun will be seen totally eclipsed crossing Hudson's Bay, Quebec Province, and the northeastern states, where totality will last about 100 sec. The observers, Dr. John Jackson and Mr. C. R. Davidson, F.R.S., of the Royal Observatory staff, will proceed to a selected station near the town of Parent, in the Province of Quebec, on the Canadian National Railway, to observe the eclipse.

There is to be no attempt to solve the problem of the bending of light-rays as they pass the sun that has formed part of the program on the occasion of some recent eclipses, but the equipment is chosen for making photographic records of the corona that is seen surrounding the sun only during total eclipses, and of its spectrum and of that of the chromosphere or solar atmosphere for which these occasions are specially suitable. Photographs of the corona will be taken with a telescope that has an object-glass 6 inches in diameter and of 45 feet focal length, giving therefore an image of the sun 5 inches in diameter. This will be placed in a fixed horizontal position and fed by a rotating coelostat.

The spectra of the corona and of the chromosphere will be photographed with a telescope with object glass 7 inches in diameter, of 21 feet focal length, producing, therefore, an image of the sun 2.3 inches in diameter. The spectrum will be formed by a prism, whose effective angle is 45 degrees, placed before the object glass. Such photographs result in a series of parallel arcs, which are actually pictures of the edge of the sun formed by light of different wavelengths. It is hoped that these will enable a connection to be traced between the chromosphere and the corona, and a differentiation to be made between the individual rings, or layers, which it is believed make up these solar surroundings.

Apparatus is also being taken with which to photograph the spectrum of the chromosphere and of the corona in its red and infra-red region. This is a grating slit spectrograph, the sun's image being formed on the slit by a mirror 9 inches in diameter and of 10 feet focal length. Another spectrograph of a different type, the spectrum in this case being produced by a prism with refracting angle of 30 degrees, will be used to photograph certain groups of lines due to calcium, and then deduce their absolute relative intensities at different heights in the chromosphere. Use will be made of curved films in some of these operations to secure good definition over a considerable length of the spectrum and advantage will be taken of the new Ilford infra-red sensitive plates.

INVESTIGATION OF COSMIC RADIATION

ACCORDING to information from the Massachusetts Institute of Technology, it will participate this summer in the world-wide survey of cosmic radiation to

[1] *Seeding and Planting.* James William Toumey. John Wiley and Sons, New York, 1916. Revised by J. W. Toumey and C. F. Korstian, 1931.
Foundations of Silviculture. James William Toumey. John Wiley and Sons, New York, 1928.