

## LEADERS IN PLANT PATHOLOGY: L. R. JONES

♦3697

*J. C. Walker*

Department of Plant Pathology, University of Wisconsin,  
Madison, Wisconsin 53706

Born in the closing days of the Civil War in a farming community in Fond du Lac County, Wisconsin, Lewis Ralph Jones had the usual boyhood of a pioneer family. His mother, a native of Vermont, was a country school teacher. His father, a native of Wales, migrated to America as a young man with his family to southern Wisconsin and later moved to Fond du Lac County.

There was a high school in Jones' home village of Brandon, where he was encouraged by the principal, Kirk Spoor, to go to college. Ripon College, a Congregational school, was not far away. After two years there he was encouraged by C. Dwight Marsh, Professor of Chemistry and Biology, to go to the University of Michigan, where he matriculated in 1886. He majored in botany under Professor Volney M. Spalding. After one year he withdrew to teach three terms at Mt. Morris Academy, Mt. Morris, Illinois, in 1887–1888. Returning to the University of Michigan in 1888, he completed his undergraduate education in 1889.

During his final year at Michigan he was invited by Professor Spalding to attend a final PhD examination. The candidate was Erwin F. Smith, who had returned from his position with the United States Department of Agriculture (USDA) to present his thesis, which consisted of a report of his pioneering work during the previous three years on peach yellows. This experience influenced Jones' early interest in plant pathology. It was only four years after the discovery of Bordeaux mixture by Millardet in France and three years after the establishment of a section of mycology in the USDA devoted primarily to research on plant diseases. With the passage

of the Hatch Act in 1887, which provided annual federal grants for agricultural research to state experiment stations, state botanists were being appointed in many states. In 1889, Jones accepted the new position of Botanist at the Vermont Agricultural Experiment Station. The appointment also carried an instructorship in natural history. He advanced to Professor of Botany in 1893 and retained this joint position until 1910.

During his twenty years at Vermont, Jones rose in stature as a leader in botany and plant pathology in the United States. His lovable disposition suited him admirably for his dual role as teacher and investigator. He told me that soon after going to Vermont he heard of a group of lay botanists who went on frequent forays and realized that many of them knew the local flora much better than he did. He was instrumental in organizing them into the Vermont Botanical Society, of which he served as secretary for several



*Figure 1* L. R. Jones.

years. He was also active in study of the physiology of sap flow in sugar maple. He initiated the organization of the Vermont Forestry Association, served for a time as its president, and maintained a vital interest in this field during his entire period in Vermont. The L. R. Jones State Forest is a perpetual tribute to his interest in and service to forestry.

Potato was then a major crop in Vermont and late blight found there an ideal climate in which to prosper. I remember his telling me how he took a knapsack sprayer and a cask of Bordeaux mixture in a wagon, and sprayed certain patches in farmers' fields to demonstrate the need to adopt this new and effective control measure.

Carrot was another important food crop adapted to winter storage. He showed that the principal storage decay was a bacterial soft rot, of which he described the causal organism, *Erwinia carotovora* (Jones) Holland. During this time he was given a semester leave which he spent in E. F. Smith's laboratory in the USDA at Washington DC. Here he associated not only with Smith but with other pioneers in plant research, such as A. F. Woods, B. T. Galloway, M. B. Waite, M. A. Carleton, and Theodore Holm. He was not content to describe the causal organism during this notable period when Smith was engaged in a debate with certain German scientists who maintained that bacteria could not act as plant pathogens. He went on to show how it acted as a pathogen—by secretion of pectolytic enzymes which dissolved the middle lamella of carrot cells. This was the first report of this fundamental process in bacterial plant pathology. He used the report on this research as the basis of his PhD thesis which he presented at the University of Michigan in 1904.

Mrs. Jones once told me that the year 1904 was a very notable one for Ralph, for in that year he took his doctorate, built them a house, and went to Europe. His preeminence in potato disease research was responsible for his being assigned by the US Department of Agriculture the task of traveling to Europe to study, among other things, the possibility of controlling late blight of potato through disease resistance. He found European varieties, as a class, somewhat more tolerant than American varieties and brought back an extensive collection, which he turned over to William Stuart, his colleague in horticulture at Vermont, who was at that time transferring to the USDA in Washington where he spent the rest of his active life in potato improvement through breeding.

By the middle of the first decade in the twentieth century, plant pathology in the United States was about to take off as a distinct science. In 1908 the American Phytopathological Society was formed not without some hard feeling on the part of some prominent mycologists who tried their best to keep it under their wing. Jones told me that he took no active part in this controversy, but he did consent to become the first president of the new

Society, and some two years later as he moved to Wisconsin he became the first editor in chief of *Phytopathology*.

His call to found the new department of plant pathology in the University of Wisconsin came at a time when similar action was taking place in several states including California, Minnesota, and New York.

Already well grounded in botany in the broad sense and fully appreciative of the scientific needs of agriculture, Jones was well fitted to meet the peculiar needs immediately ahead in plant pathology. He realized that future growth in this area rested upon the best possible postgraduate education along with high-quality research. His cadre of graduate students grew steadily as he attracted students from most states and many foreign countries. His success in development of an outstanding graduate department rested upon several fundamental principles. The first of these was an innate interest in young people and their development. He realized, however, that there was little to be gained in expending his efforts on individuals who were temperamentally or inherently unfit to become good scientists. He felt that a successful teacher of science must be continually on the alert for students whose talents fitted them peculiarly for a career in science. This conviction is well illustrated in one of his favorite anecdotes. During their Vermont days together, Cyrus Pringle made frequent collecting trips in Mexico and often tried, without success, to get Jones to accompany him. On this particular occasion, as an inducement, Pringle, in his enthusiasm, exclaimed: "Jones, if you will only come along with me, you may even have the thrill of discovering a new plant." Jones' quiet answer was: "Yes, Pringle, and so I might, but while you are in Mexico, I may have the thrill of discovering a new scientist right here at home."

Despite this faculty of sizing up and selecting his students carefully, there never was a teacher or adviser who was more patient and sympathetic with his students, nor one who strove harder and with more success in bringing out the best talents of the individual. Many a time he deftly guided a temperamental student or colleague away from personal or selfish ideas and induced him to respond to the fundamental challenge of scientific achievement—a challenge that could be accepted best with teamwork. He once remarked to me concerning his great and good friend, Liberty Hyde Bailey, that the latter had the uncanny faculty of "bringing out the Bailey" in those with whom he was associated. Perhaps he little realized his own great talent of "bringing out the Jones" in his own students and associates.

Jones insisted that successful education in plant pathology must be built on a thorough foundation in botany. Thus, most of his students spent more graduate course hours in botany than in plant pathology. He insisted on having an up-to-date departmental library and directed his courses in such a way that students became familiar with the literature of their special field.

His seminars laid strong emphasis on the history of plant pathology, the nature of parasitism and disease resistance, the relation of climatic factors to disease development, and other fundamental topics. An important feature of his educational method was the principle of learning by doing. He insisted on holding formal course instruction to a minimum in order that each student would have more time for original research.

He believed that the best way to develop the research instincts of a student was to have plenty of research going on about him. Thus, in spite of increasingly heavy administrative duties, he set a pace for his staff and students by always having a number of research problems under way. His long list of scientific papers attests to his continuous productivity as a scientist.<sup>1</sup> At the time of his retirement after 25 years at Wisconsin, nearly 150 doctors' degrees had been granted to students majoring in his department. However, his world-wide reputation in the field of plant pathology rests as much, if not more, upon the continuous flow of original research papers from his laboratory.

Before he left Vermont he was fully aware that research in plant pathology during the previous fifty years was concerned predominantly with the description of diseases and their causative pathogens. As he arrived at Wisconsin he was determined to shift emphasis to fundamental aspects of the nature of disease. He chose as his first direction of emphasis the relation of environmental factors to disease development. Possibly because some of the diseases needing immediate attention in Wisconsin were induced by soil-inhabiting pathogens, e.g. cabbage yellows, pea wilt, tobacco root rot, seedling blights of corn and wheat, his first emphasis was on soil factors. With his associates he perfected thermostatically controlled equipment in which plants could be grown over a range of constant soil temperatures in infested soil. This equipment soon became widely known as the "Wisconsin soil-temperature tank." With this equipment and with supplementary devices, many plant diseases were studied and the focus of attention on phytopathological research was influenced remarkably under his leadership.

Early in this century with the rediscovery of Mendel's laws of inheritance and the founding of the science of genetics, an increasing amount of attention was being directed toward disease resistance as a means of control. Successes reported by Bolley with flax wilt in North Dakota, by Orton with cotton wilt in South Carolina, and by Bain and Essary with tomato wilt in Tennessee were attracting attention. The most immediately pressing prob-

<sup>1</sup>A complete list of Jones' publications is included in a biographical memoir by J. C. Walker and A. J. Riker published in *Biographical Memoirs of National Academy of Sciences* 31:156-79 (1958).

lem presented to Jones by Dean H. L. Russell when he came to Wisconsin in 1910 was disease in the cabbage crop in the southeastern part of the state. Russell had described the black rot disease of cabbage, induced by *Xanthomonas campestris* (Pam.) Dows, in this area some fifteen years earlier, but Jones found that the practically unknown disease he named "yellows" to be the major trouble. It was a fusarium vascular disease similar in many respects to the three wilt diseases mentioned above. Moreover he noticed at once that in most severely devastated fields a few plants remained healthy. From these plants he was able to develop a resistant variety which he released only six years later.

He stimulated others among his students and staff to keep on the lookout for possibilities of controlling specific diseases by means of developing resistant varieties. The work he initiated on disease resistance in cabbage has continued up to the present time. Resistance to five different diseases of cabbage have been incorporated into a single variety. In his laboratory, success in development of varieties was extended to pea wilt, cucumber scab and mosaic, bean mosaic, onion pink root, and wilt of China aster.

One of the keys to success in this area is the development of rapid techniques for accurate screening of resistant individuals in segregating populations. By the use of controlled environment, this was done in several instances, e.g. cabbage yellows, onion pink root, cucumber scab, cucumber mosaic, pea wilt. Professor Jones was continually reminding his students and colleagues to watch out for leads by which to enlighten our science as to the *nature of disease resistance in plants*. While skepticism prevailed generally over the possibility of tying the resistant character to specific genes, this was done in due time in the cases of cabbage yellows, pea wilt, cucumber mosaic, cucumber scab, bean mosaic, onion smudge and others. The isolation of the chemical which formed the basis of resistance in colored-bulb onions to smudge and neck rot was accomplished with his encouragement by the author and Karl Paul Link in the Department of Biochemistry.

It is natural that a man of such outstanding ability and leadership should be drafted into many extracurricular activities. While he shunned many such calls within and without the university, he seldom refused to give support to what he considered a worthy cause for which he could wisely spare the time.

He was elected to the National Academy of Sciences in 1920. He was one of the organizers of the Division of Biology and Agriculture of the National Research Council, on which he served as vice-chairman from 1919 to 1921 and as chairman in 1922. During his period of service on the council, *Biological Abstracts* was launched on its successful career. He was president of the Tropical Research Foundation from 1924 to 1943. He was on the

original board of trustees which organized the Boyce Thompson Institute for Plant Research and continued to serve on that board for several years. In 1934 he was appointed by President Franklin D. Roosevelt to the President's Science Advisory Board.

Professor Jones was a regular attendant at meetings of plant science societies. In addition to being the first president of the American Phytopathological Society in 1908, he was president of the Botanical Society of America in 1913. He was vice-president of Section O (Agriculture) of the American Association for the Advancement of Science in 1924, chairman of the Section of Mycology and Plant Pathology of the Fifth International Botanical Congress at Cambridge, England, in 1930, and an honorary president of the Third International Congress of Microbiology in New York City in 1939.

He received honorary degrees from University of Vermont (1910), Cambridge University (1930), University of Michigan (1935), and University of Wisconsin (1936). He was an honorary member of the following foreign scientific societies: British Association of Applied Biologists, Phytopathological Society of Japan, Société de Pathologie Végétale et Entomologie Agricole de France, and Verein für Angewandte Botanik in Germany.

Professor Jones had many nonprofessional interests. He was a lover of the out-of-doors and enjoyed long hikes in summer and winter. He frequently organized parties of his students to accompany him. In his fifties he took up golf and became an enthusiastic devotee. He was a member and regular attendant at the First Congregational Church of Madison and served a term as deacon. He was a regular and later an honorary member of the Madison Rotary Club, an association which he greatly enjoyed and which he continued after retirement.

In 1890, Jones married May Bennett, a classmate at Ripon College. They had no children of their own but were very fond of young people and made a practice of inviting graduate students into their home. These were memorable occasions for all of us.

Mrs. Jones passed away on September 26, 1926. They had only recently returned from a trip to Hawaii and had attended a gathering of his former students at the International Congress of Plant Science at Cornell University. At this gathering his students gave him an oil portrait that hangs today in his beloved departmental library at the University of Wisconsin.

On July 27, 1929 he married Anna Clark, a former student at Vermont and professor of biology at Hunter College, New York City. The following year he asked to be relieved of administrative responsibilities at Madison. He and Mrs. Jones spent several months of that year in the British Isles, western Europe, and Russia. In 1931 they traveled extensively in Japan, Korea, and China. After retirement in 1935 they continued to visit col-

leagues and friends making their headquarters in the summer at Mrs. Jones' home at Brookfield, Vermont, and during the winter at Orlando, Florida, where he passed away peaceably in his eighty-first year on March 31, 1945.

It is appropriate in closing this treatise to quote a tribute to L. R. Jones written by Gardner L. Green of the University of Vermont.

A man of science to the manner born,  
Who labored hand in hand with the Divine.  
All prejudice he taught himself to scorn  
As deadly sin. Truth was his holy shrine.  
The plastic minds of youth he looked upon  
As gardens to be nurtured for the gods.  
His spirit, gentle as the breaking dawn,  
Revealed a kindness that the world applauds.  
His cup of joy was brimful just to know  
The secrets of God's children of the soil.  
And nothing that was ornament or show  
Intrigued him like experiment and toil.  
He needs no shaft to tell us when he went—  
His work will always be his monument.