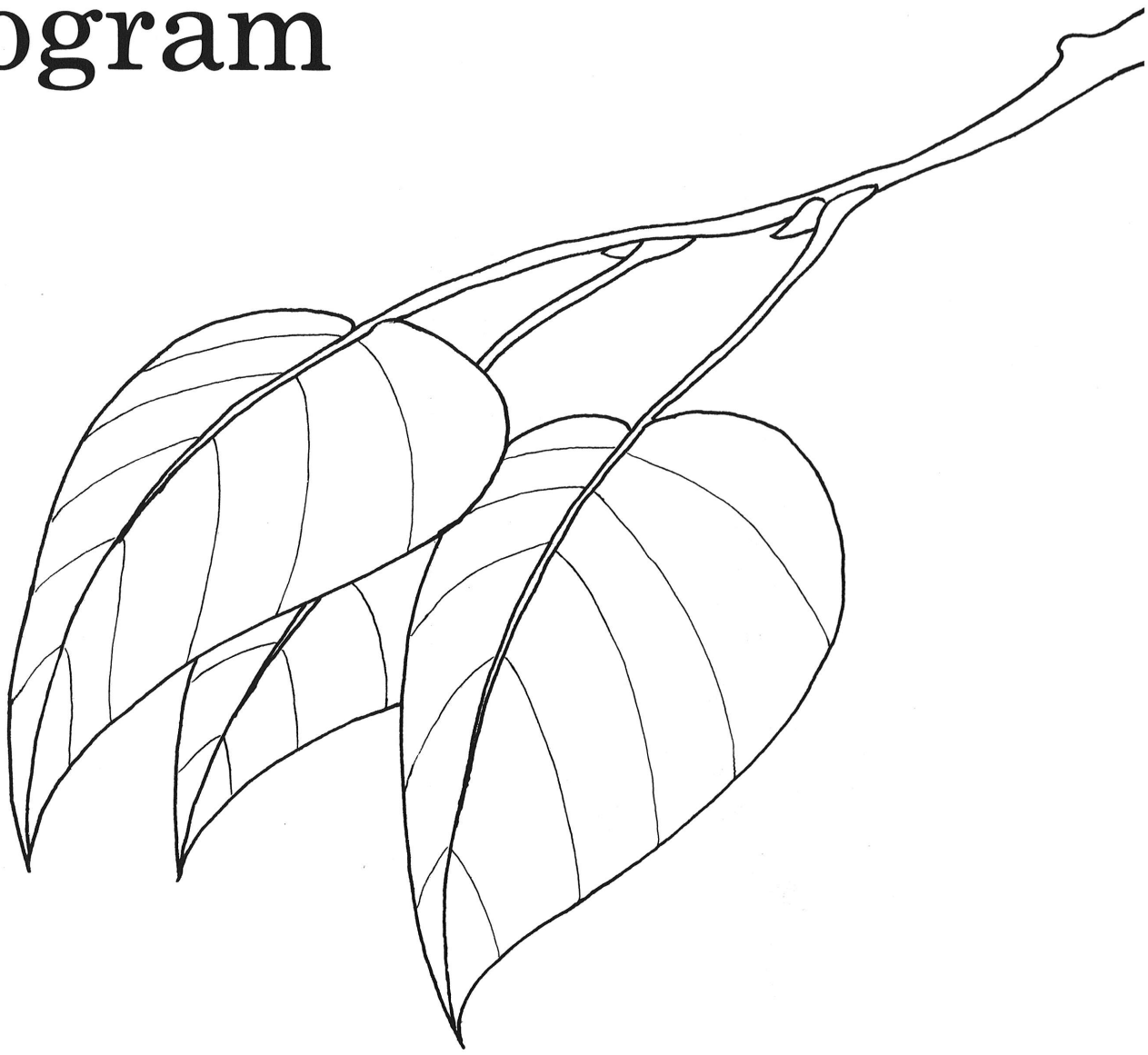
Awards and Honors Program



71st Annual Meeting

The American Phytopathological Society

Fellows

Eight members of The American Phytopathological Society were elected Fellows of the Society at the 1979 Annual Meeting in Washington, D.C. Election as a Fellow of the Society is a reflection of the high esteem in which a member is held by his colleagues. The award is given in recognition of outstanding contributions in extension, research, teaching, or other activity related to the science of plant pathology, to the profession, or to the Society.

Robert Aycock

Robert Aycock was born in Lisbon, Louisiana, December 23, 1919. He received a B.S. degree in 1940 from Louisiana State University and an M.S. degree from North Carolina State College in 1942. After serving in the U.S. Army Medical Corps from 1942 to 1946, he completed his Ph.D. degree at North Carolina State College in 1949. From 1949 to 1955 he worked on sweet potato and cucurbit diseases at the Edisto Experiment Station, South Carolina, a branch of Clemson College. He joined the North Carolina State College faculty in 1955 as an associate professor and pathologist, specialized in research of ornamental crops, and was advanced to professor of plant pathology and horticultural science in 1968. When Dr. Aycock was appointed head of the Department of Plant Pathology in 1973, he assumed administrative responsibility for a faculty of 55 professors, 40 to 50 graduate students, and a staff of about 53 other persons.

Dedicated service is the essence of Dr. Aycock's life. This service has been achieved through his many contributions to The American Phytopathological Society, to farmers, to students and faculty, and to science. He became assistant editor in 1969 and was editor-in-chief of *Phytopathology* 1970-1973. During those four years he polished and published more than 1,000 papers, shepherding them through the laborious steps of review, editing, and printing.

His distinction in service as editor of *Phytopathology* led to his election as president of APS. As chairman of the Program Committee in 1974, he organized that historic week in Houston, Texas, where the society stretched its collective mind to comprehend its responsibilities in the world food and population confrontation. In 1975, he presided over the difficult debates that followed the Paddock and Niederhauser proposals. As APS president in 1976, he marked the occasion of the National Bicentennial with an impressive address that detailed the parallels in the histories of the nation and of The American Phytopathological Society. His flair for history and skill with the King's English converged to achieve a memorable occasion for reflection and rededication to the practical arts of crop protection.

Dr. Aycock firmly believes that the science of plant pathology should emphasize the practical. He has written with feeling about the value of diagnostic service to farmers, nurserymen, and homeowners: "Both research and diagnosis are absolutely necessary and complementary to each other. If we cannot take the results of our findings out of the laboratories and make practical use of them in diagnosing plant diseases and devising control measures, then we have failed to advance our discipline."

Dr. Aycock's knowledge of history and literature, gained by extensive reading, provides a depth of understanding of human nature and human events that is unusual among scientists and valuable in leadership. His patience, humility, personal charm, and eagerness to listen and to be helpful make him responsive to real needs—whether those of a graduate student in academic difficulty or a colleague who is discouraged in his work.

He is the principal architect of a unique and highly successful system for evaluating classroom instruction. As head of the department, he personally interviews a series of students in every graduate and undergraduate course and takes extensive notes that are later shared with instructors. The system provides effective feedback to teachers, allows for changes of teaching assignments, and makes it clear to students that "*this* department cares about good teaching."

Dr. Aycock's determination to make plant pathology useful shows in his personal record of scientific publications, which extends over 26 years and includes more than 50 papers. His scholarly review on diseases caused by *Sclerotium rolfsii*, his development with Robert Milholland of hot water treatments for obtaining disease-free planting stock, and his research on nematode diseases of woody ornamentals merit special recognition.

In 1977 Dr. Aycock was invited to give the C. W. Edgerton Memorial Lecture at Louisiana State University. He was elected president-elect of the North Carolina Association of Plant Pathologists and Nematologists in 1978, an association he was instrumental in founding in 1977. He is a member of Alpha Zeta, Sigma Xi, Phi Kappa Phi, and Gamma Sigma Delta. The most significant honor to Dr. Aycock is the confidence placed in him by his peers—as head of his department, as editor of *Phytopathology*, and as president of The American Phytopathological Society.

Victor H. Dropkin

Victor H. Dropkin was born March 21, 1916, in Staten Island, New York. He received a B.A. degree in zoology at Cornell University in 1936 and a Ph.D. in zoology (parasitology) at the University of Chicago in 1940. During World War II, Dr. Dropkin served as a parasitologist in the Sanitary Corps of the U.S. Army and worked on malaria control in the South Pacific. He was discharged as a captain in 1945.

Dr. Dropkin taught general biology at Roosevelt University from 1946 to 1951. In 1952, he accepted a postdoctoral fellowship with the Naval Medical Research Institute, where his interest in plant nematology developed. His career as a plant nematologist with the U.S. Department of Agriculture began in 1953 at Hicksville, New York. Later, Dr. Dropkin was transferred to Beltsville,

Maryland (1959-1969). During 1967 he was a visiting professor in the Department of Plant Pathology in Madison, Wisconsin. He joined the University of Missouri-Columbia as professor of plant pathology in 1969.

Dr. Dropkin teaches nematology with vigor and sensitivity. He has organized workshops on nematology for personnel of the Missouri Department of Agriculture, outlying agricultural experiment stations, and the Shaw Botanical Garden. He is in demand for special seminars and guest lectures and has participated in numerous international meetings, including the Society of European Nematologists and conferences on the use of radioisotopes. In 1978, Dr. Dropkin presented a full summer course in nematology in the Department of Plant Pathology at the University of Wisconsin-Madison.

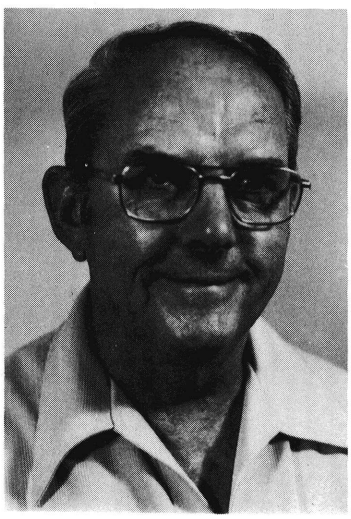
Dr. Dropkin received a National Science Foundation U.S.-Australia Cooperative Science Program Travel Grant and, during his sabbatic leave in 1976 and 1977, worked at the Waite Agricultural Institute in Australia. There he investigated the nature of the stimulation for secretion of the gelatinous egg sacs by root-knot nematodes and the ultrastructure of the glands that produce the egg sac. During his leave he also largely prepared a general text on plant nematology that will be published soon. His chapter on "How Nematodes Induce Disease" will be in Volume 4 of "Plant Disease, An Advanced Treatise," edited by James G. Horsfall and Ellis B. Cowling.

Dr. Dropkin's scholarly research has dealt primarily with diseases caused by root-knot (*Meloidogyne*) and cyst (*Heterodera*) nematodes. These investigations have ranged from histopathology and studies of resistance to basic biochemical investigations involving giant cells (root-knot) and syncytia (cyst) resulting from nematode infections. The latter research has used electron microscopy, electrophysiology, and ultramicrochemistry. Giant cells were found to be extraordinarily stable, maintaining their normal membrane potentials and higher than normal concentrations of carbohydrates, proteins, and certain other compounds. These unique pathological cells maintain their internal homeostasis by altering their metabolism despite repeated removal of the cell contents and dramatic changes in appearance. Cell wall alterations during development of syncytia in the soybean cyst nematode (*Heterodera glycines*) suggest precisely controlled action by hydrolytic enzymes on plant cell walls. Other research has focused on techniques for studying cyclic AMP and GMP that occur in the life cycle of free-living nematodes. Dr. Dropkin has championed the concept in nematology that it is as important to study the intimate association of host and pathogen as it is to study the host and pathogen separately.

Dr. Dropkin is now systematically studying population genetics of *glycines*. In the United States, breeding for resistance to this nematode is being done without knowledge of genetic variability within different populations of the organism. As a result, resistant soybean cultivars have a life expectancy in the field of several years or less. Dr. Dropkin's cooperative genetic research involves detailed study of six monoculture populations of the soybean cyst nematode reproducing on six representative lines of soybeans used as sources of resistance. It is hoped that these studies will provide plant breeders with the tools to produce soybean cultivars that will not lose their resistance. Dr. Dropkin expects to determine how many different sources of resistance to the soybean cyst nematode exist, develop an improved set of differentials to distinguish nematode genotypes, and determine the number of resistance genes that are involved.

Dr. Dropkin has served on the editorial boards of *Phytopathology* and the *Journal of Nematology*. He was active in organizing the Society of Nematologists, served as that society's treasurer, vice-president, and president, and has represented it on the governing board of the American Institute of Biological Sciences. He also is an active member in the American Association for the Advancement of Science, Sigma Xi, the Missouri Academy of Science, and the American Society of Parasitologists.

John B. Rowell



John B. Rowell was born at Pawtucket, Rhode Island, in 1918. After graduation with high honors from the University of Rhode Island in 1941, he entered graduate school at the University of Minnesota. He served as an officer of the U.S. Coast Guard from 1942 to 1945 before continuing his graduate work at Minnesota and receiving a Ph.D. degree in plant pathology in 1949. He was appointed instructor at the University of Rhode Island in 1947 and assistant professor in 1948. He was a research associate in the Department of Plant Pathology at the University of Minnesota from 1949 until 1955 when he joined the U.S. Department of Agriculture to work on chemical control of cereal rusts and related physiologic and genetic problems in cooperation with the University of Minnesota. He became a member of the Cereal Rust Laboratory when it was organized in 1962 and became its director in 1969. He was named associate professor at the University of Minnesota in 1956 and professor in 1967.

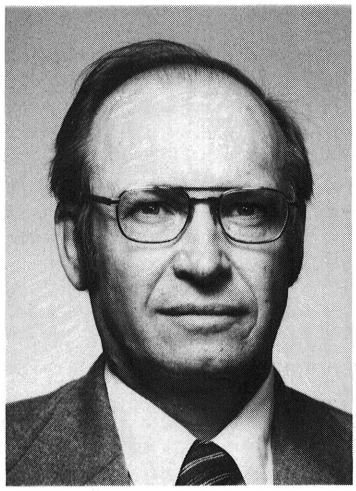
Dr. Rowell has an unusually broad intellectual grasp of science and its implications. He consistently uses a fresh, innovative approach to attack problems, has frequently developed new methods, and always does careful, systematic experiments that clearly demonstrate new findings. His major accomplishments have been with cereal rusts. He devised an oil suspension method for urediospore inoculation that is widely used throughout the world. He established the concept of the "quadratic check" as the genetic model for investigating host-parasite interactions in specific resistance. He developed a rain sampling system that detects rust spores very early in the season of the northern wheat crop. This increased the understanding of seasonal rust epidemiology and helps to predict rust epidemics. His field observations showed that practical use of fungicides for cereal rust control depend on coordinating the timing of the application and the development of both the host and the rust epidemic. For many years, Dr. Rowell has maintained a thorough program of fungicide screening and testing in the field. After earlier trials establishing the efficacy of the bisdithiocarbamates and nickel salts, he demonstrated the potential effectiveness, at low rates, of several systemic compounds such as the oxythiins and 4-*n*-butyl-1,3,4-triazole for cereal rust control. His methodology and extensive work have contributed to the responsible use of pesticides that will be needed to protect crops in a food-deficient world.

When the classic approach to rust race identification became obsolete after biotypes of stem rust race 15B became widespread, Dr. Rowell, through his own work and that of persons he supervised, resolved the chaos into a meaningful system to show the pathogenic potential of the fungal forms collected in surveys. This made it possible to determine the effective resistances in existing cultivars and plant breeder lines for the virulences present in the rust population, in lieu of the more expensive testing done for many years in Puerto Rico. Dr. Rowell has contributed to other areas of knowledge of plant pathology as well. In sum, Dr. Rowell's research and administrative leadership has had unusual breadth and

includes significant contributions in genetics of pathogens, genetics of host-parasite interactions, physiology of disease, epidemiology, and chemical control.

Dr. Rowell has advised several graduate students, has contributed regularly to seminars and committees of the Department of Plant Pathology at Minnesota, and has authored numerous scientific publications. He is "Technical Advisor" for coordinating research on wheat rusts for the USDA and has served on various committees of APS, the American Type Culture Collection, The National Academy of Sciences, and as a consultant to the Ford Foundation in India.

Robert P. Scheffer



Robert P. Scheffer was born January 26, 1920, in Newton, North Carolina. He received his B.S. and M.S. degrees from North Carolina State College and his Ph.D. degree in 1952 from the University of Wisconsin, under the direction of Professor J. C. Walker. Dr. Scheffer spent one and one-half years as a research associate with Drs. M. A. Stahman and J. C. Walker, studying the nature of Fusarium resistance in tomato. Dr. Scheffer has been a faculty member in the Department of Botany and Plant Pathology at Michigan State University since 1953. In 1960 and 1961 he took sabbatical leave to work with Drs. A. C. Braun and R. B. Pringle at the Rockefeller University where his research with fungal toxins was initiated.

Dr. Scheffer has done innovative and creative research on the physiology of disease development and resistance. He was among the first scientists to study host-selective toxins and to show that the physiologic effects of certain pathogen-produced toxins duplicate the changes induced by the pathogen. He also was among the first to demonstrate the effects of disease on plant cell organelles, on amino acid incorporation into protein, on electropotentials across cell membranes, and on the active uptake of nutrients by plant cells. He demonstrated the genetic control of production of a specific determinant of disease by a plant pathogen and was among the first scientists to use isolated protoplasts and membranes in plant disease studies. In a research area of great interest and diverse opinion, his work and approaches can be characterized as thorough, rational, and critical.

Dr. Scheffer's first major area of research was on the physiology of Fusarium wilt of tomato. He showed that xylem dysfunction is the immediate cause of wilting. Extracellular enzymes from the fungus were studied as possible contributing factors. There was indirect evidence that diffusable, systemic toxins are involved, but the known toxic substances produced by the fungus in culture (lycomarasmin and fusaric acid) were found to be of minor significance, at most. Resistance to Fusarium was found to be a property of every cell in tomato plants of a resistant genotype, rather than a property of special tissue as was thought at the time. These studies were followed by comparative studies of respiratory metabolism in Fusarium-infected tomato plants, which involved use of mitochondria isolated from diseased and healthy tissues. More mitochondrial protein was isolated from diseased than from healthy tissue, and mitochondria from diseased tissue had higher activity per unit protein than those from healthy tissue. However, P:O ratios were equal for mitochondria from diseased and healthy tissues. The general conclusion was that the respiratory effects of Fusarium infection are secondary and not significant causal factors in disease development. The work on respiratory metabolism refuted two ideas prevalent at the time: (1) the phosphorylation data showed that uncoupling is not a significant causal factor in disease development, and (2) fusaric acid, which was considered the important "wilt toxin," is not involved significantly in disease development.

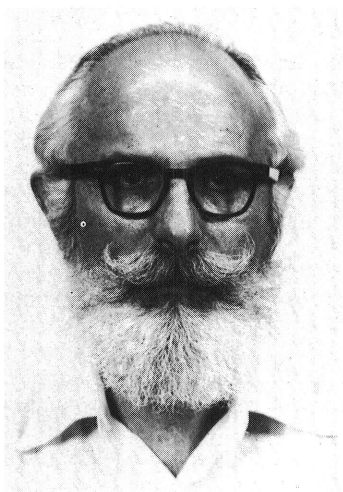
Dr. Scheffer's second major area of research has been on host-specific fungal toxins in relation to pathogenesis and disease resistance (1961 to date). As a result of this work, a number of fungal species are now known to produce low molecular weight toxins that affect only the host species; nonhost species and resistant genotypes of the host are highly tolerant. Dr. Scheffer's studies were on the toxins from *Helminthosporium victoriae, H. carbonum, H. maydis* race T, *H. sacchari, Alternaria citri,* and *Periconia circinata*. Resistance to most of these fungi is the same property as tolerance to the toxin involved, as shown by genetic and other data. Abilities of the fungi to produce toxins are controlled by the same genes that control pathogenicity. Physiologic, biochemical, and histological data have shown that the toxins are determinants of pathogenicity and host specificity for these fungal species. The toxins from *H. victoriae, H. carbonum,* and *P. circinata* change the properties of cellular membranes in susceptible but not in resistant plants, and this appears to make possible the colonization of host tissue by the toxin-producing fungus. The toxins presumably have receptor or sensitive sites in the cells of susceptible plants, but the location of such sites is uncertain. If resistant cells lack such sites, then resistance to the fungus and its toxin may be constitutive rather than induced.

Dr. Scheffer's research has been supported by the National Science Foundation from 1958 through the present. He has been invited to participate in numerous international symposia.

Dr. Scheffer is a demanding and talented teacher. Graduate students consistently rate his course entitled "Pathogenesis and disease resistance in plants" as the best plant pathology course in the department. Dr. Scheffer also is an outstanding graduate advisor, as evidenced by the number of his students who have become recognized scientists and teachers.

He has served The American Phytopathological Society as North Central Regional Councilor (1965 and 1966), as associate editor of *Phytopathology* (1972-1975), and as chairman of several committees.

Irving R. Schneider



Irving R. Schneider was born in 1915 in San Francisco, California. After serving in the U.S. Army from 1942 to 1945, he attended the University of California at Berkeley and received his B.S. and Ph.D. degrees there in 1949 and 1953, respectively. He worked at the Illinois Natural History Survey from 1953 to 1956 before joining the U.S. Department of Agriculture as a member of the Growth Regulator and Antibiotic Laboratory at Beltsville, Maryland. In 1963, he transferred to the Plant Virology Laboratory at Beltsville, where he has remained except for a year as a National Science

Foundation Senior Postdoctoral Fellow at the John Innes Institute at Norwich, England, in 1968. Dr. Schneider served as associate editor of *Phytopathology* from 1965 to 1967 and as associate editor of *Virology* from 1972 until the present. He has been a member of the APS Virology Committee and presently serves on the American Type Culture Collection Subcommittee.

Dr. Schneider made his first significant contribution to plant pathology as a graduate student when he found that tobacco mosaic virus survived exposure to chloroform whereas many plant components of similar size did not. Subsequently, use of chloroform and other organic solvents became a standard procedure in the purification of plant viruses.

During his tenure as a member of the Growth Regulator and Antibiotic Laboratory, Dr. Schneider gained a reputation as an authority on virus translocation. He showed that southern bean mosaic virus moves through sections of bean stem killed by steam, thus unequivocally establishing that virus could be transported into, through, and out of the xylem to infect living cells.

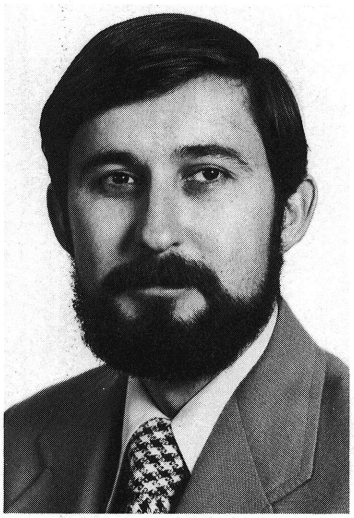
Dr. Schneider and his colleagues purified and characterized the first virus shown to infect blue-green algae and later purified a second one. These viruses are potential biological control agents and, by resemblance to bacteriophage, confirm the similarity of blue-green algae to bacteria.

For the past several years, Dr. Schneider has worked on tobacco ringspot virus. He and his colleagues have showed that the different components of this virus are synthesized concurrently, that RNA II of the virus can be packaged in the bottom nucleoprotein component as well as in the middle (which is the usual) component and that degradation of RNA *in situ* in virions either *in vitro* or *in vivo* can cause loss of specific infectivity.

During the past several years, Dr. Schneider has performed a series of investigations on a satellite virus that he discovered in certain cultures of tobacco ringspot virus. The satellite virus replicates only in hosts also infected with tobacco ringspot virus and, in such doubly infected hosts, interferes with the replication of tobacco ringspot virus. The satellite virus has a single-stranded RNA of 7s that is incapsidated in virions of tobacco ringspot virus capsid protein with 12 to 25 copies of the RNA per virion. The replicative, double-stranded satellite RNA occurs in many sizes, including some of high molecular weight.

Apart from his own original research, Dr. Schneider has contributed significantly to that of his colleagues by constructive and logical criticisms that are cheerfully and willingly provided to all who seek his assistance.

Joseph S. Semancik



Joseph Steven Semancik was born June 9, 1938, in Barton, Ohio. He received his A.B. degree from Western Reserve University in 1960 an his M.S. and Ph.D. degrees in 1962 and 1964, respectively, from Purdue University. He has been at the University of California at Riverside since 1964, except for an interim sojourn as associate professor of plant pathology at the University of Nebraska from 1969 to 1972. He spent 1977 at the State University, Leiden, The Netherlands, as a Guggenheim Fellow and NATO Senior Scientist.

Dr. Semancik's early research concerned the relationships and functions of the multiple electrophoretic and centrifugal components in cowpea mosaic, bean pod mottle, and tobacco rattle viruses. He was the first to reconstitute tobacco rattle virus rods from protein and RNA. At Nebraska, he participated in the characterization of bacteriophage Ø6, the only known phage with a segmented, double-stranded RNA genome.

Most of Dr. Semancik's research has been on the causative agent of citrus exocortis. He purified and characterized this agent and showed it to be a viroid or naked pathogenic RNA of low molecular weight. This was only the second viroid discovered, and he contributed significantly to development of procedures for purifying and characterizing viroids and to the interpretation of results, for which he shared the Alexander Von Humboldt Prize in 1975. Dr. Semancik has studied the viroid-host cell interaction as a model system of a minimal infectious molecule functioning as a regulator of host cell genome expression. His laboratory demonstrated the presence of RNA complementary to the viroid, which presumably functions in the process of replication or pathogenesis.

In recent years, Dr. Semancik has collaborated in using techniques developed to characterize plant viroids in an effort to expand the biological significance of viroids to animal systems by characterization of the curious and lethal agents that cause sheep scrapie, human kuru, and Creutzfeldt-Jakob and similar diseases.

Dr. Semancik is an imaginative researcher, a stimulating colleague, and an inspiring teacher. Several of his graduate students have already embarked on outstanding careers of their own.

Wilson L. Smith, Jr.

Wilson Levering Smith, Jr., USDA research plant pathologist and a leader in the area of postharvest plant pathology, was born on March 4, 1915, in Baltimore County, Maryland. After beginning undergraduate studies at the University of Virginia, he transferred to the University of Maryland where he earned his B.S. degree in horticulture in 1939 and his M.S. degree in plant pathology in 1942. He worked as junior plant pathologist with the USDA Rubber Plant Investigations group at Savannah, Georgia, from 1942 to 1944. In 1944 he entered Cornell University and received his Ph.D. under the direction of W. H. Burkholder in 1948. Dr. Smith accepted a position as plant pathologist with the Bureau of Plant Industry, Soils, and Agricultural Engineering at Beltsville, Maryland, in 1948. He remained at Beltsville through numerous administrative reorganizations and served as leader of the Postharvest Plant Pathology Research Unit, Horticultural Marketing Laboratory, Agricultural Marketing Research Institute, from 1972 until his retirement in 1979.

Dr. Smith's early studies on the factors governing suberization and cork formation in potato tubers after wounding have become the key references cited by workers in this field. The results of this research have been used by the potato

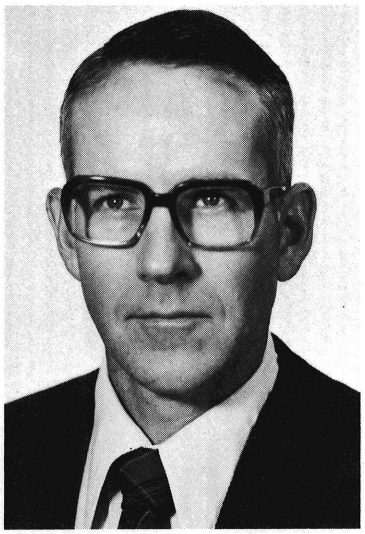
industry to devise transit and storage conditions that promote rapid wound healing and reduce bacterial decay. His research also aided the development of the precut potato seed industry and the breeding of cultivars that rapidly form wound barriers.

Although his continuing expertise in vegetable pathology is evidenced by the 1978 publication of his handbook entitled "Market Diseases of Potatoes," Dr. Smith's major research since 1955 has dealt with methods of reducing postharvest losses in stone fruits and small fruits. This work is exemplified by his coauthorship of the handbook "Market Diseases of Stone Fruits." His papers cover the spectrum of control measures—sanitation, hydro-cooling, heat treatments, preharvest and postharvest fungicide applications, and modified storage atmospheres. Dr. Smith was the first to demonstrate the effectiveness of heat as a nonchemical method for controlling postharvest decays of temperate fruit and to show that brief hot water dip treatments would control postharvest decays of peaches. His studies resulted in commercial use of hot water and hot air treatments in the United States and abroad and won him the USDA Certificate of Merit in 1965. His publications stimulated additional research throughout the world on the use of heat treatments on citrus, pome fruits, semitropical fruits, and various vegetables.

In addition, Dr. Smith also has published bulletins and handbooks that are used extensively by plant pathologists, regulatory agencies, and industry. Since 1952 he has annually taught USDA inspectors to recognize market diseases of fruits and vegetables at training schools in New York or Chicago. He also has been effective in working directly with growers and packing house operators to reduce marketing losses and has extended his influence abroad through his cooperation on PL 480 projects.

Dr. Smith was the APS representative to the Food Protection Committee of the National Academy of Sciences and was a representative of the USDA's National Program Staff on the National Academy of Sciences program dealing with postharvest pathology in developing countries. He has served as an associate editor of *Phytopathology* and of the *Plant Disease Reporter*. His promotion of postharvest pathology within the Society led to the establishment of the APS standing committee on "Postharvest Pathology and Mycotoxicology." He was the first chairman of this committee and was program chairman for the Postharvest Pathology Area for the Second International Congress of Plant Pathology in 1973. Dr. Smith has had a major role in the organization of postharvest plant pathology and postharvest plant pathologists nationally and internationally.

Paul H. Williams



Paul H. Williams was born on May 6, 1938, in Vancouver, British Columbia, Canada. He completed his B.S.A. degree in plant science at the University of British Columbia, Vancouver, and earned his Ph.D. degree at the University of Wisconsin in 1962, as a student of Glenn S. Pound. He was appointed assistant professor in the Department of Plant Pathology at the University of Wisconsin in 1962 and was advanced to associate professor in 1966 and to professor in 1971. In 1963 and 1964, he completed a period of postdoctoral study at the Boyce Thompson Institute for Plant Research in the laboratory of Richard C. Staples. In 1978, Dr. Williams received a John Simon Guggenheim Fellowship in support of a study leave for genetic research at the Botany School, Cambridge University, and the Plant Breeding Institute in Cambridge, England.

Dr. Williams' fundamental research on the host-parasite relationships of clubroot of cabbage is an excellent example of a program in which biochemical, cytochemical, and ultrastructural technology has been integrated to examine host-parasite relationships of a complex, intracellular, obligate parasite. His research has provided new insight in the manner in which obligate parasites gain access to host cells and regulate host cell metabolism. He has developed a host-pathogen model system that is amenable to intensive genetic, biochemical, and biophysical analysis.

In addition to his fundamental research, Dr. Williams has maintained an impressive program of applied research in which innovative methodology has been developed to identify new sources of disease resistance in those crops (carrot, radish, cauliflower, and cucumber) of primary concern to his program. Techniques for the simultaneous inoculation of seedling plants with eight to 10 different pathogens have been of great value to plant breeders searching for new forms of disease and pest resistance. Applications of this methodology in Dr. Williams' cabbage and cucumber breeding programs have yielded the major world source of multiple disease-resistant germ plasm in these vegetables. This applied research has contributed significantly to stabilizing the supply of fresh vegetables for the consumer market and for industrial processing in the United States, not only through insurance of disease-free seed, but also in the development of varieties of improved quality and productivity.

Among his major contributions has been the identification of resistance to eight diseases of cabbage and incorporation of this resistance into more than 20 advanced inbred lines. These inbred lines now constitute the major source of resistant germ plasm used by cabbage breeders throughout the world. Dr. Williams also had an important role in the development and release of a tipburn-resistant variety of cabbage. At a recent national meeting, a cabbage breeder with a major U.S. seed company stated that more than 65% of all the materials currently being used originated from breeding programs in which Dr. Williams has been involved.

Recently, Dr. Williams' research has focused on the development of easily manipulated, short-cycle genetic stocks within six *Brassica* species. In the course of these studies, he has determined various forms of genetic resistance to a number of major pathogens of this genus. Identifiable genetic markers have been detected in each species, and studies are under way to determine linkage relationships of these markers with genes for resistance to various pathogens. Such markers will greatly facilitate the specific transfer of disease and insect resistance. Intraspecific transfer of disease resistance in *Brassica* has not been exploited, largely because of the lack of basic genetic information on the various species and the cytogenetic complexity affecting chromosome behavior and gene transfer.

He has now set the stage for the manipulation of genetic material in a manner that may serve as a model for breeding for resistance in other crops as well. His research is pointing the way toward intercrossing the germ plasm of diverse *Brassica* crop species to provide new sources of broadbased disease resistance for use by plant breeders. Some species that he has available are capable of reproductive cycles every 40 to 75 days. This makes it possible to complete studies that would normally have taken many years of research in a period of a year. In addition to their use in basic research, some of the techniques developed in this program have been adopted for use in teaching plant breeding, genetics, and population biology courses.

Dr. Williams has held the following

offices in The American Phytopathological Society: chairman, New Projects Committee (1970-1971); chairman, Genetics Committee (1975-1976); and councilor, North Central Division (1978-1980).

He has been invited as a symposium speaker at a number of international congresses and conferences.