

## A Selective History of Nematology in Canada

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Historically, practitioners of nematology in Canada have been lonely people. Generally Canadian nematologists have not clustered in major 'centers of excellence', with the one exception of the nematode taxonomic unit which flourished in the Agriculture Canada Biosystematics Research Centre in Ottawa during the 1950s - '80s. Instead, by necessity, nematologists have worked singly or occasionally in small groups at Agriculture Canada research laboratories or at Universities in various Provinces. Since our discipline rarely employed more than a handful in Canada at any one time, we have tended to concentrate on problems of immediate relevance to our agricultural industry. Thus research is located where it is required, particularly in Agriculture Canada facilities, and teaching exists wherever an interested professor has been motivated to offer a course or to direct a graduate student.

Each decade, seemingly, some enthusiastic individual has promoted the need for nematology research. As far as can be determined, the first program on a nematode problem in Canada was initiated in 1929 by Dr. W. Newton, Pathologist-in-Charge of the Dominion Laboratory of Plant Pathology in Saanichton, British Columbia. The first 'formal' nematology papers resulting from this work were published in 1933, one by R.J. Hastings, J.E. Boshier and W. Newton on the bulb and stem nematode, *Ditylenchus dipsaci*, the other by Newton and Boshier on chemicals for control of root-knot in greenhouse tomatoes. From then until the early 1960s, Hastings, Boshier and co-workers investigated nematodes in western Canada, studying *Ditylenchus* spp. on bulb crops and potatoes, and also determining the relationship of lesion nematodes to strawberry and potato diseases. Hastings authored one of the earliest papers on the biology of the 'meadow nematode' *Pratylenchus pratensis*, in 1939.



In eastern Canada, an early nematologist of some stature was Dr. Alex D. Baker, Chairman of the Nematology Section, Entomology Research Institute, during the 1930s - 1960s. Beginning from an interest in helminths in poultry, Dr. Baker became the first to recognize the importance

of *Heterodera avenae* as a parasite of cereal grains in this country, and the first to explain the cause of what Canadian grain farmers called soil sickness. He was also an early pioneer in studies of *Ditylenchus destructor* on potatoes, and of *Heterodera schachtii* on brassicas in Ontario. His interest in the latter species attracted Mr. Roland Mulvey as a summer student. Roland later became Chairman of the Section, and a world authority on *Heterodera* taxonomy. Dr. Baker was a contemporary of such luminaries as Dr. Steiner and Dr. Gerald Thorne. Typical of many early scientists who discovered nematology, Dr. Baker was essentially self-trained, studying nematological problems to solve phytopathological puzzles.

In the early 1950s, the discipline expanded in Canada. Several nematologists who began their careers in this period included Dr. Harold Welch, Dr. W.B. Mountain, Roland Mulvey, and John Townshend. By the late '50s and early '60s, these pioneers were joined by several 'newcomers', including Dr. Richard Sayre, Bruce Hopper, Dr. Roger Anderson, Dr. Khalish Sanwal, Dr. L. Y. Wu, and such other scientists as Carl Willis, Ken Proudfoot, Martin Samoiloff, Bill Orchard and Ken Wright, who were trained in other disciplines but incorporated nematology into their research programs. Taxonomic studies became more prominent in this era, especially among the Ottawa unit comprising Mulvey, Hopper, Anderson, Sanwal, Wu, and later Drs. Barry Ebsary and Eldon Eveleigh.

In the post-WWII era, increased stimulus for recognition in Canada of the importance of plant parasitic nematodes came from Bill Mountain, a scientist trained in classical phytopathological approaches and a uncompromising champion of the application of Koch's Postulates to prove pathogenicity of nematodes in plant diseases. Mountain's best research was his collaboration with other scientists at the Agriculture Canada Research Station at Harrow, Ontario, in proving the role of nematodes in peach replant disease. However, his earliest recognition came from the axenic culturing of *Pratylenchus penetrans* on callus tissue, a preliminary step to proving the pathogenicity of the worm by standards acceptable to phytopathologists. Mountain later rose through the ranks of bureaucracy in Agriculture Canada and Environment Canada to become a Deputy Minister before retiring.

Concurrent with Mountain's work, John Townshend was busy at Agriculture Canada at Vineland Station, Ontario, proving the role of *P. penetrans* in causing diseases in strawberries and celery, while Carl Willis and co-workers were investigating the effect of lesion and other nematodes on forage crops in Canada's Atlantic Provinces. At Harrow, Dr. Richard Sayre was quietly developing his classic studies on the effect of cold temperatures and freezing on the winter survival of the root-knot nematode *Meloidogyne hapla*, having recognized the problem of nematode survival in inhospitable climates. At the same time, Roland Mulvey was developing his stature as a taxonomist of the genus *Heterodera*, and investigating the importance and taxonomy of the Mononchidae, a group of hyper-parasitic nematode predators of other nematodes. Roland and also Dr. Harold Welch were probably about three or four decades ahead of their time in being in the forefront of biological control before that area of research became fashionable. Following in the footsteps of Dr. Welch, Dr. Bill Nickle and later Dr. John Webster

worked at the Agriculture Canada Research Institute at Belleville, Ontario, a center devoted to biological control of insect pests.

More expansion in nematology within Agriculture Canada took place through the 1960s, when Dr. Mountain became Director of the Vineland Research Station. During this period, Dr. Theo Olthof was recruited from McGill University, where he had completed his Ph.D. under Dr. Ralph Estey. Later, Dr. John Potter and Dr. Frank Marks joined the Vineland staff, from North Carolina State University and UC Davis respectively. Subsequent to Dr. Mountain's transfer from Harrow to Vineland, Dr. Sayre left the Harrow Research Station for Beltsville, to be succeeded by Dr. George Bird and later Dr. Wade Johnson. Also during this period, Dr. Joe Kimpinski joined Agriculture Canada at Charlottetown, PEI, while Thierry Vrain arrived at Agriculture Canada, St.-Jean-sur-Richelieu, Quebec in 1973, later taking educational leave to acquire his Ph. D. at NC State in 1977. After working at the Agriculture Canada Institute at Belleville during 1966-1967, Dr. John Webster left to join the newly-formed Simon Fraser University in Burnaby, BC when Belleville closed. Also on the West Coast, Dr. Fred McElroy worked at Agriculture Canada in Vancouver in the early 1970s, to be succeeded in 1978 by Dr. Thierry Vrain. Since the 1970s, Canadian nematology has entered a period of slow decline, broken only by the fairly recent appointment of Ms Sylvia Miller at the Plant Health Directorate in the Ottawa area. Dr. Marks now directed the Agriculture Canada laboratory complex in London/Delhi/Vineland before retiring in 2000, and Dr. Johnson is now one of the Science Directors at Agriculture Canada.

Outside of Agriculture Canada, nematologists on the academic scene have included Dr. Roger Gordon and Dr. Jean Finney-Crawley at Memorial University, Newfoundland; Dr. Steve Fushtey at University of Guelph; Dr. Ralph Estey at McGill University; Dr. Ken Wright at University of Toronto; Dr. Harold Welch in University of Manitoba; and Dr. John Webster at Simon Fraser University. The contributions of Dr. Jack Sutherland in forest nematology in British Columbia must also be noted; Jack was distinguished by being the only trained nematologist specializing in forest nematology research in Canada through much of the past 40 years.

With the most recent retirements of Dr. Roger Gordon, Dr. John Webster, and Dr. Terry Vrain, currently nematology in Canada is represented by Dr. Qing Yu with AAFC in Ottawa; Dr. Joe Kimpinski with AAFC in P.E.I; Dr. Tom Forge at Agriculture Canada at Agassiz, BC; Mr. Guy Belair at Agriculture Canada in St. Jean-sur-Richelieu, Quebec; Mr. Tom Walckly at Agriculture Canada at Harrow, ON; Ms Sylvia Miller, and Dr. Fengcheng Sun with CFIA in Ottawa; Dr. Jean Finney-Crawley at Memorial University, Newfoundland; Dr. Mario Tenuta at University of Manitoba.