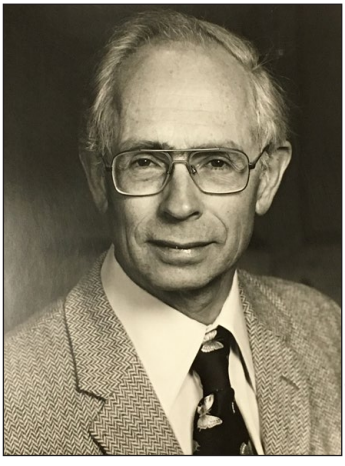

Biology, Queens' University

Gerard Robert Wyatt
(1925-2019)

Dr Gerard (Jerry) Wyatt is an honoured and respected entomologist, molecular biologist, biochemist, naturalist, community campaigner, family advisor and my collaborator and friend. He died peacefully on 28 March 2019, aged 93, in Kingston, Ontario.

Jerry was born in Palo Alto, California, and moved as a child to Victoria, British Columbia, where he attended Victoria College and subsequently transferred to the University of British Columbia to earn his BA in Zoology in 1945. He was particularly motivated by a gifted teacher, Dr George Spencer. Spencer had helped establish a large insect collection at the university and, in turn, inspired Jerry's love of "bugs", ultimately leading Jerry to take up a job monitoring a massive hemlock looper outbreak on Vancouver Island with the Forest Insect Investigation Unit. It was a powerful example of population collapse due to exhaustion of the food supply when the trees were stripped bare, and this experience pressed him to investigate insect control using viral diseases to help save vulnerable forests. Thus, after graduation he went to the University of California, Berkeley, laboratory of Dr Edward Steinhaus, noted for his work on insect-transmitted pathogens. After a year, he returned to Canada to take up a post at the newly constructed Laboratory of Insect Pathology in Sault Ste. Marie, Ontario.

Once in Sault Ste. Marie, Jerry was promptly sent to England in 1947 to ostensibly collect European insect viruses to control Canadian pests, but he also enrolled as a PhD student at the University of Cambridge to study insect viruses. His advisor was Dr Kenneth Smith, a plant pathologist with an interest in virology who was Director of the Plant Virus Station associated with the School of Agriculture. Jerry's arrival was timed just after Smith and his PhD student, Dr Roy Markham, had published a paper showing that the insect-transmitted turnip virus was composed of ribonucleoprotein. Markham, who eventually became Director of the John Innes Institute, was a pioneer in nucleic acid biochemistry and molecular biology and undoubtedly had an important influence on Jerry's science. Markham had developed a paper chromatography technique that could quantitatively analyze purine and pyrimidine bases in RNA viruses and Jerry applied this technique to insect DNA viruses, starting in Cambridge, but continuing in Sault Ste. Marie upon his return to Canada in 1950. It was while doing these experiments that Jerry discovered a new base, 5-methyl cytosine (5-MeC). Although it is Erwin Chargaff that is honoured for "Chargaff's Rules" or the 1:1 ratio of pyrimidine and purine bases in DNA, we know that it was Jerry's discovery that was key to explain why stoichiometric amounts of A + T and C + G were found in DNA as long as you could add the 5-MeC to the C. Indeed, Jerry and Dr Seymour Cohen, who sent Jerry some bacteriophages to analyze, submitted a manuscript that included their observations on the "regular structural association" of the DNA molecule that these experiments had suggested. However, this was eclipsed by the seminal 1953 Nature paper by Drs James Watson and Frances Crick on DNA's double-helix structure, which cited Jerry's 1952 paper on nucleic acids in 11 insect viruses, including precise measurements of 5-MeC. This contribution explains why Jerry Wyatt's discovery is mentioned in Watson's book, "*The Double Helix*" and also why Jerry's notebooks from this period have a place of honour in the Wellcome Library ("*The Gerard Wyatt papers*").

While still a student in Cambridge, Jerry sent samples of a virus originating from Sweden that was effective against pine sawfly back to Canada, and this was put to good use by the Sault Ste. Marie laboratory to reduce forest damage. Jerry, however, was not involved in those practical applications of this work. Indeed, shortly after his return to Sault Ste. Marie in 1950, Jerry married Sarah Silver Morton (d. 1981) and his newly honed biochemical expertise proved useful in assisting her to devise a medium for the culturing of insect tissues, as well as author an important series of papers on the chemistry of insect hemolymph. This knowledge ultimately contributed to the breakthrough by Dr Thomas Grace in Canberra, Australia, to modify the Wyatts' tissue culture formulation to obtain a novel insect-virus-cell culture system. Grace's medium continues to be important today for the *in vitro* production of commercialized products for agriculture and human health.

Jerry was recruited by Yale University in 1954 where his experience with the analysis of insect serum, combined with his expertise in paper chromatography, directly furthered the discovery of trehalose in the hemolymph of a variety of insect orders. Previously, this disaccharide had been found in some plants, but the discovery in Jerry's Yale laboratory showed that it made up the majority of the blood sugar in Lepidoptera, for example. Subsequently, trehalose has proved to be crucially important for providing energy for insect flight, in cryoprotection, for regulating feeding, and the stabilization of proteins as part of the stress response. It is made by the fat body, and work on carbohydrate metabolism and protein synthesis in that tissue, as well as Jerry's introduction to locusts during his PhD study in Cambridge, influenced his decision to construct an African migratory locust facility at Queen's University in Kingston after his move from Yale in 1973. African locusts were not allowed in the USA due to quarantine concerns but Canada's cold climate at the time mitigated this worry and Jerry had the distinction of receiving relatively generous USA National Institutes of Health funding as well as Canadian funding. Here, he conducted biochemical and molecular biology experiments on locust reproduction, which is regulated by the fat body through juvenile hormone action. His Queen's lab was among those that pioneered the cloning of genes from insects, apart from *Bombyx mori* and *Drosophila melanogaster*. It should be noted that the locust genome is more than an order of magnitude bigger than those of both those species and this was a daunting undertaking, initiated only shortly after the lifting of the Asilomar molecular biology moratorium.

In 1988 as a Professor at Queen's, he and colleagues, primarily from Queen's but also at other Canadian universities, submitted a proposal to the Government of Canada's Networks of Centres of Excellence program. This was awarded in 1990 with Jerry named as Scientific Director of Insect Biotech Canada, with 25 scientists working together as a team with the goal of developing better means for control of injurious insect species. The 4-year initiative was a success with ties forged between like-minded colleagues in Canada, the USA and Japan. These collaborations allowed Jerry to further his lab's experimental work on juvenile hormone, known for its importance in nymphal molting but also an enigmatic transcriptional regulator of egg production.

Upon retirement, Jerry was able to devote more time for the betterment of the community and he campaigned for environmental causes. He was an expert marmalade maker and woodworker, and was always ready to fix or make specialized lab glassware for others as well as offering sage advice on experiments. He is missed by his wife Mary Ev, his children Eve, Graham and Diana, as well as Mary Ev's children Jonathan and David, in addition to 8 grand and great-grandchildren. He is fondly remembered by his colleagues and saluted by all of us who benefited from his wisdom, his contributions to science, his friendship, and to the rich legacy of discovery he leaves to Canadian entomology.

Virginia K. Walker
Professor and Queen's University Research Chair