PROC. N.S. INST. SCI. (1993)
Volume 40, pp. 47 - 51

Obituary of K.A. Harrison

K.A. Harrison was born on a farm in the St. John river valley about 16 km east of Fredericton in 1901 and died at Kentville Nova Scotia on November 5 1991. Like many other notable biologists from the Maritime Provinces, his education in applied biology started at the Nova Scotia Agricultural College and continued, specializing in horticulture, at the Ontario Agricultural College where he obtained a B.Sc in 1924. He then read plant pathology at Macdonald College, studying anthracnose of beans. Harrison noted that beans, a minor crop, were worth in 1917-1921 about $502,000 in Nova Scotia (In 1980 (anonymous, 1980) their value was $78,000!).

These studies, published in his early twenty's, show a remarkable grasp of the complexities of fungal infestation of plants and notably include investigations of material from his home in Maugerville, New Brunswick. The data presented in these papers clearly show the range of virulence of different isolates of *Colletotrichum lindemuthianum* on some 65 cultivars of *Phaseolus* spp.. The papers are also remarkable because of the methods described for study of the growth of these isolates in the laboratory - methods used with little modification or acknowledgement, twenty years later during the development of penicillin manufacture.

Harrison joined J.F.D. Hockey at the Kentville Research Station in 1926. Hockey had been asked to start a plant pathology unit at the Station in response to demands by the horticultural industry in the Annapolis Valley. The two botanists created a laboratory that not only provided a service to growers in Nova Scotia but also initiated many new methods of forecasting outbreaks of disease and of disease control. In the case of predicting onset of disease, they were among the first in the world to use the sticky microscope slide spore trap. This instrument is mounted so that an aliquot of air in for example an orchard, impinges on the slide when the particles in the impacted air stick to the slide. The population densities of fungal spores - the agents of disease transmission, can then be determined microscopically. When the slides were exposed over leaves, in moist conditions, the trap caught spores of *Venturia inaequalis* as its ascospores exploded and thus provided a rational method of predicting the spread of apple scab caused by this fungus. An important offshoot of this spore trap work resulted from the exposure of the trap in orchards where it captured apple pollen. This demonstrated for the first time that wind was an important factor in pollination in apples, and also permitted estimations of pollen densities and hence the efficiency of pollination in orchards.

Harrison's work on diseases of horticultural crops and in stored fruit and vegetables spanned almost 40 years. Its range, so far as fungal diseases are concerned, was wide and a number of examples are worth giving to illustrate this and, hopefully to stimulate further work. Early taxonomic work on *Gloeosporium* and its teleomorph *Physalospora miyabeana* revealed the different susceptibility of different willow species to this fungus. Despite the known presence of many antibiotic metabolites in *Salix* spp. an adequate explanation of this phenomenon is not available and even the fungus is rare either as an Herbarium specimen or as a live culture (Brewer et al. 1991). Studies on storage problems revealed that these were frequently due to fungi, benign in the growing fruit, but capable of rapid growth during storage. This led to investigations of the mode of penetration and survival of such organisms, and a few mechanisms for these phenomena were proposed, though none substantiated - all aspects of such dormancy and growth stimulation remain obscure (see e.g. Wheeler, 1968).

The advent of chemically synthesized fungicides led to work on the control of fungal diseases in tomatoes, raspberries, and cranberries. This work, carried out in the 1950's and published in the period 1960-1968, reveals Harrison's understanding of the importance of the design and the (sceptical) use of statistical methods in the analysis of results of plot experiments. The results obtained were of use to commercial horticulture and Harrison's ability to write for two audiences - his scientific colleagues and working horticulturalists was an art many could profitably emulate. His pamphlet on cranberry diseases and their control has run through several editions.

The Basidiomycetes are a large group of plants devoid of photosynthetic pigments. They are collected for their medicinal properties (Kanematsu and Natori, 1970; Kubota et al., 1982)), as a source of dyestuffs (Stahlschmidt, 1877) and many are highly regarded for their nutrient and flavour constituents (Groves, 1975). However, every year, they are the cause of many cases of poisoning, mostly because of the difficulty of distinguishing toxic species e.g. the similarity of certain species of *Cantharellus* and *Clitocybe*. It is important to understand that problems of mistaken identity are not trivial - the professional mycologist is only less likely to be the victim of the taxonomic complexities of the Basidiomycetes (and other fungi).

Harrison was an enthusiastic collector of field mushrooms throughout his life and his knowledge of mycology made him a natural leader of forays, well able to provide expert taxonomic advice. On his retirement in 1966 he was able to greatly extend his studies of the taxonomy of the Hymenomycetales and in particular the Agaricaceae, Hydnaceae and Boletaceae. His many contributions to this speciality are well illustrated by a contribution to the Proceedings on Nova Scotian *Amanitas* - some poisonous, others not. In this paper the first collections of *A. wellsei* and *A flavorubus* var *gracilis* in Nova Scotia were reported. The paper contains beautiful photographs of the five species described, photography characteristic of Harrison's skill, often demonstrated in lectures he gave to the Institute, notably one in 1953 when 86 colour slides of 21 families of Basidiomycetes were shown. Some of these have been published (Groves, 1975; Ammirati et al., 1985).

However it is probably his studies on the taxonomy of the Hydnaceae that most characterise his work in the period 1966-1990. The basis for these studies was numerous field trips to, the Great Smokey Mountains on the Tennessee-N. Carolina boundary, New Mexico, the Michigan peninsula and the Pacific coast of Washington, Oregon and British Columbia. Much of this work was done whilst he was a research associate of A.H. Smith at the University of Michigan herbarium at Ann Arbor. During this time he described new species of *Steccherinum, Phellodon, Hydnum* (5 spp.) and *Hydnellum*(10 spp.), and contributed a taxonomic key and descriptions of the Hydnaceae. This work revealed many taxonomic uncertainties, particularly with respect to correspondence between European classification (Maas Geesteranus, 1971, 1975) and that proposed for N. American isolates. These uncertainties were reviewed in detail by comparison of the colour reproductions in Maas Geesteranus's monograph (1975) with Harrison's collection of Kodachrome photographs. It is clear, from the many discrepancies that much taxonomic work remains, though it seems unlikely that problems will be resolved on the basis of coloured or olfactory metabolites. Harrison was aware of these difficulties and towards the end of his life initiated investigations into the isoenzymes laccase and tyrosinase as taxonomic markers in the Basidiomycetes. Much necessary preliminary work was done to show that these markers were insensitive to the age of the fungal material, storage times or geographical location of the collection sites (Nova Scotia and New York State). Two species, *Hericium*

americanum and *H. ramulosum* were shown to be laccase positive and thus the stage seems to be set for a more objective taxonomy of the Hydnaceae.

Kenneth A. Harrison was a patriot who served his country with its armed forces in wartime and his fellow citizens in peace-time as a teacher, a professional plant pathologist and as an example to be emulated. It is entirely appropriate that Acadia University has dedicated a mycology laboratory in his honour. His many colleagues and friends mourn his loss and extend their condolences to his family.

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