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OBITUARY

Obituary: Dr Maurice Vernon Carter– plant pathologist and epidemiologist, 1926–2014

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Fig. 1 Portrait of Maurice Carter

Dr Maurice Vernon Carter (Fig.1) was born at Victor Harbor in South Australia on 20 March 1926. He attended Scotch College, Adelaide as a boarder from 1935 to 1944 following which he enlisted with the RAAF as a Radio Operator, and was stationed at Wilson's Promontory, Victoria and on an island north of Darwin, before being discharged in 1946. He then spent 2 years on the family farm in Western Victoria before enrolling at the University of Adelaide and graduating with a Bachelor of Agricultural Science degree with Honours in 1952. He then worked at CSIRO in Canberra for 2 years before joining the Waite Agricultural Research Institute of the University of Adelaide in 1953 as a Research Officer in the Department of Plant Pathology, and was appointed a lecturer in 1956.

Maurice Carter's early research concentrated on genes for resistance to barley powdery mildew (Pugsley and Carter 1953). In 1960 he spent a sabbatical leave at Rothamsted Experimental Station in the UK where he was greatly influenced by the expertise of Drs Philip Gregory FRS and Jim Hirst FRS on aerial and splash dispersal of fungal pathogens and worked with them on the development of spore trapping devices (Carter 1961).

Maurice pioneered the use of spore traps to study the epidemiology of ascochyta blight in peas. This work contributed greatly to an understanding of the epidemiology of the disease. He established the pattern of ascospore release by *Mycosphaerella pinodes* (Carter 1961, 1963; Carter and Moller 1961), was promoted to Senior Lecturer in 1963 and was awarded a PhD for his work by the University of Adelaide in 1964. He contributed to the development of the Burkard Seven Day Recording Volumetric Spore Trap and the Burkard Quadruple Ascospore Liberation Tunnels. These traps are routinely used around the world by epidemiologists studying aerobiology, including collecting ascospores liberated from *Mycosphaerella* pathogens of eucalypt leaves. He built an open circuit wind tunnel to observe the liberation, dispersal and deposition of uredospores of prune and snapdragon rusts (Carter et al. 1970a, b) as well as spores of various fungal pathogens causing barley scald and leaf spotting of tree, ornamental and vegetable crops, and was responsible for establishing a Hirst spore trap at the South Australian

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Department of Health for the quantification of pollen and spore counts for asthma sufferers.

Maurice Carter established a lifelong research interest and obtained international recognition for his studies of apricot gummosis disease, the causal pathogen and its control. The teleomorphic stage of the causal fungus, originally identified as *Cytosporina* by G. Samuel, was renamed *Eutypa armeniacae* (Carter 1957) but reverted to *E. lata*, which was described earlier, since it was morphologically indistinguishable from this species. The host range of the fungus was expanded to include ornamentals, fruit trees, and, most importantly, grapevine. His PhD student William Moller proved that *E. lata* is the cause of dieback and what was previously termed "dead arm" of grapevines (Moller and Kasimatis 1981). The geographical range of eutypa dieback was expanded to include apricots in France, Switzerland, Spain and South Africa, new information that typically coincided with visits by Maurice to affected orchards. *Eutypa lata* is now known to be a widely distributed wound pathogen, with a host range of about 88 woody plant species (Carter 1991). Reducing infection rates of pruning wounds (Carter 1965; Carter and Moller 1970, 1971) was initially achieved by advising growers to 'prune in June', when ascospore release was at its lowest. The advent of systemic fungicides led to the demonstration that application of benomyl to pruning wounds reduced infection rates (Moller and Carter 1971). Isolates of the antagonistic fungus *Fusarium lateritium* were found to protect wounds if inoculated before *E. lata* and, together with Terry Price, he elucidated the mechanism of this protection (Carter and Price 1974, 1975). One of their sampling techniques involved using a dentist's drill to take drilled sawdust samples from pruned stems and isolate fungi from them. In collaboration with virologist colleague Dr Richard Francki, Maurice used serological methods to identify mycelial isolates of *E. lata* from overseas (Francki and Carter 1970) and isolates from barberry and grapes were also shown to be serologically related to isolates from apricot (Carter and Price 1973). He published an extensive bibliography on *E. armeniaceae* (Carter et al. 1983). The possibility of integrated biological and chemical control of the disease was tested (Carter and Price 1975; Carter 1983) and in collaboration with an engineer he developed a pneumatic -powered spraying secateur for use in commercial orchards and vineyards (Carter and Perrin 1985). This enterprise led to the production of the FELCOMATIC-WASP secateur for small scale use by growers, a tool which is still available from Felco, Victoria. His colleagues admired this dedication to supplying a solution for a serious and ongoing plant disease problem. Design, production and marketing issues took much ingenuity, time and effort.

Maurice retired from the University of Adelaide in July 1987 but he continued his interest in and enthusiasm for eutypa dieback during retirement and in 1991 he published the definitive monograph on the disease (Carter 1991). He made a valuable contribution to research on eutypa dieback of grapevines in South Australia conducted by Trevor Wicks, Mark Sosnowski, Eileen Scott and colleagues in the Cooperative Research Centre for Viticulture (2000–2006) and subsequent projects. He also appeared in an educational video on identification and control of eutypa dieback in grapevines, prepared by John Whiting (Department of Natural Resources and Environment, Victoria).

Maurice Carter was well respected as a kind, considerate and inspirational teacher by both his undergraduate and postgraduate students and his laboratory assistants. He helped supervise and visited Philip Keane in Papua New Guinea in the early 1970's and assisted him with some spore trapping and epidemiological aspects of his PhD studies on vascular streak dieback disease of cocoa. He willingly gave of his time to impart his knowledge and skills in plant disease epidemiology to postgraduate students working on lettuce anthracnose disease, snapdragon rust (Carter et al. 1970b), and barley scald (Carter and Banyer 1964) and to other plant pathologists/disease epidemiologists from other Australian States. His studies provided the framework for extensive studies in Victoria on ascochyta disease of field peas (Bretag et al. 2006). He encouraged and supported junior scientists in attending international conferences on mycology and a NATO Advanced Study Institute meeting. He was a keynote speaker at an Epidemiology and Crop Loss Assessment Workshop held at Lincoln College, New Zealand, in 1977. Maurice Carter was a pioneer, discoverer and innovative researcher who was appreciated not only as a friend, mentor and colleague at the Waite Campus, but also as a scientist who showed students and collaborators in Australia and abroad that practical solutions can be found for plant disease problems.

Maurice was a devoted husband and father. He met Geraldine Elizabeth Brookes who was working at the Waite Institute as a laboratory assistant, and they married in 1954 and had a son and daughter. Geraldine died from cancer in 1978. Following retirement in 1987 Maurice and his second wife Julie moved to Normanville in the Fleurieu Peninsula in 1993. He was a keen gardener and established a native garden on his property and also grew his own vegetables. He also actively participated in activities at his local Anglican Church and in the University of the Third Age. With advancing years Maurice and Julie returned to Adelaide in 2006 where his mobility decreased and he needed constant care. He was hospitalised a few times in 2013 and following another period at the Royal Adelaide Hospital he passed away on 20 July 2014.

Maurice was a founding member of the Australasian Plant Pathology Society in 1969 and continued his membership until his death. He is survived by his wife Julie, son Graham, daughter Alison, stepdaughters Michele and Elise, their spouses and eight grandchildren.

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