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SIGNIFICANT PLANT VIRUS WORK IN THE UNIVERSITY OF QUEENSLAND.

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The first significant work was done by Dr. (later Professor) D.A. Herbert of the Botany Department, who reported the applied transmission of cucumber mosaic virus from Lilium longiflorum, symptoms of tomato spotted wilt virus in Iceland poppy and symptoms and inclusion bodies of dahlia mosaic virus in dahlia (Herbert 1939). In addition, he studied a curly top disease of Galinsoga parviflora, which he showed resulted from exposure to Myzus persicae, although it is not clear from this work whether a virus or an insect toxin was responsible.

Subsequently Dr. R.F.N. Langdon of the Botany Department supervised Masters programs dealing with potato virus Y and tobacco mosaic virus in tomato (Sturgess 1956) and viruses affecting cucurbits (Greber 1967), but the work was done at the Queensland Department of Primary Industries.

In 1965 Dr. J.G. Atherton of the Department of Microbiology revived plant virus work in the University, and G.D. McLean completed B.Sc.Hons. under his direction with a study of plant tissue culture related to viruses and the in vitro testing of perennial plants for resistance to weedicides (McLean et al. 1966).

A need was seen to expand the work and in 1966 Dr. D.S. Teakle was appointed to the Department of Microbiology. Since then Drs. Atherton, Teakle and their students and cooperators, both within and outside the University, have published (to early 1985) 4 research papers and 10 reviews in the field of virus and "virus-like" agents of plant disease.

The most noteworthy early research in the Department of Microbiology dealt with the tomato bid-bud and legume little-leaf complex. Originally this was thought to be caused by yellows viruses, but following the lead of Doi et al. (1967) in Japan, Bowyer and associates showed that mycoplasma-like organisms (MLOs) were associated in Australia (Bowyer et al. 1969, Bowyer & Atherton 1971a, 1972, Bowyer 1974).

More recently the MLOs have also been shown to be associated with purple top wilt disease of potatoes in Queensland (Harding & Teakle 1985). However, the major leafhopper vector of MLOs, Orosius argentatus, is also known to transmit the virus which causes bean summer death disease (Bowyer & Atherton 1971b).

Another interesting finding, comparable with the discovery of MLOs in plants, was that a coryneform bacterium was closely associated with the important sugarcane ratoon stunting disease (RSD), previously considered to have been caused by a virus, in Australia and overseas (Gillaspie et al. 1979, Teakle 1974, Teakle et al. 1973, 1980, Weaver et al. 1977). The ability to detect this bacterium in diseased plants has facilitated rapid diagnosis of RSD (Steindl & Teakle 1974, Teakle et al. 1975a, 1978b, 1979) and it has been shown that resistance is correlated with branching and narrowing of vascular bundles in stalk nodes (Teakle et al. 1975b, 1978a).

In other work Atherton (1968) reported that when diploid monkey kidney cells were supplied with infectious RNA extracted from tobacco mosaic virus, the cells degenerated and particles similar to this virus appeared in the supernatant fluid. Other discoveries were that galls of sugarcane affected by Fiji disease contain reovirus-like particles (Teakle & Steindl 1969) and that these particles contain a genome comprising 10 dsRNA strands (Reddy et al. 1975). Four strains of sugarcane mosaic virus (SCMV) were detected in Queensland (Teakle & Grylls 1973), and it was shown that high resistance to this virus was present in some lines of maize (Grogan & Teakle 1969) and sorghum (Teakle & Pritchard 1971, Persley et al. 1985). Since sorghum can be severely affected by a necrotic reaction to SCMV (Teakle et al. 1970, Teakle & Moore 1972), the resistance of Krish sorghum was incorporated into commercial breeding lines of sorghum by classical plant breeding methods (Conde et al. 1976). In contrast, elimination of beet mosaic virus from beetroot in Queensland was achieved by employing a beet-free period (Teakle & Persley 1974). Passiflora foetida, a common weed in Queensland, was shown to be a host of the passionfruit woodiness virus (Leggat & Teakle 1975), periwinkle, a common ornamental in Queensland, was found to be a latent host for broad bean wilt and cucumber mosaic viruses (Shukla et al. 1980), while potato virus S was identified for the first time and shown to be the most common sap-transmissible virus of potatoes in Queensland (Holmes & Teakle 1980).

Viruses which are soil-borne, at least under experimental conditions, have been of particular interest. Galinsoga mosaic virus was shown to be readily transmitted mechanically in soil (Shukla et al. 1979), while red clover necrotic mosaic virus was similarly transmitted with difficulty (Lyness et al. 1981).

An unstable tobacco necrosis virus (TNV), which was stabilized by low pH, was obtained from lettuce (Teakle & Finlay 1969). Examination of bean seedlings inoculated on either leaves or roots with ten different viruses showed that the type of symptom , either necrotic or non-necrotic, was the same in both organs (Leggat & Teakle 1976). Sowbane mosaic virus was discovered in the native plant, Chenopodium trigonon (Teakle 1968), and tobacco ringspot virus found in gladiolus (Reynolds & Teakle 1976). The soil-borne vectors, Olpidium brassicae and O. radicale, reacted differently to temperature, and O. brassicae could be eliminated from mixed cultures by use of a warm environment (Teakle & Thomas 1985).

Current work in the Department of Microbiology involves studies on tobacco streak virus by Ratana Sdoodee, and an investigation of papaw dieback disease by R.M. Harding.

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