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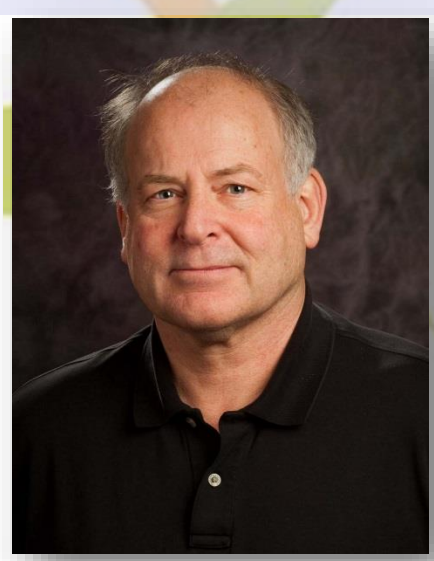
ALL ARE WELCOME

TEMASEK LIFESCIENCES LABORATORY

25 January 2016 (Monday), 4pm
The Auditorium (Level 1)
Hosted by: Dr Yin Zhongchao

TAL effectors and host susceptibility

Prof Frank White
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White earned his bachelor's degree from the University of Wisconsin and his doctorate in microbiology and immunology from the University of Washington. He also received the National Science Foundation pre- and post-doctoral fellowships. He is an international authority on plant-microbial interactions and the genetic basis of plant disease and resistance. Early in his career, White made major contributions to global understanding of the bacterium Agrobacterium, which transfers DNA to plants during plant infections. Agrobacterium is now used routinely for plant genetic engineering. More recently, his group discovered that the bacteria transfer proteins into plant cells during infection that have a profound effect on host gene expression. The proteins act directly as genetic expression factors, which he and his colleagues named transcription activation-like, or TAL, effectors. Subsequently, TAL effectors were discovered to be DNA sequence-specific binding proteins and are now used for genome editing (so-called TALENS) in all types of cells, including humans. Research continues on bacterial diseases of plants and the development of broad durable plant disease resistance strategies.

Xanthomonas species are the causal organisms of a broad range of plant diseases. Many strains utilize a large number of bacterial virulence factors known as the transcription activator-like (TAL) type III effectors. Advances in plant genome sequencing has facilitated the study of the function of TAL effectors in disease. Bacterial blight of rice is the premier system for TAL-effector mediated susceptibility in plants. In bacterial blight, TAL effectors have major effects on susceptibility, and rice, evolutionarily, has adapted to include an assortment of novel genetic controls for resistance. All strains of X. oryzae pv. oryzae, the causal agent, have a requirement for the induction of at least one member of the SWEET gene family, a family of plant sugar transporters. Other TAL effector targeted host genes are predicted to function in inhibitory RNA processing, macromolecule biosynthesis, and gene regulation. On the host side, host genes have been selected that alter the effectiveness of TAL-mediated susceptibility, involving both dominant and recessive mechanisms. TAL effector function in disease susceptibility has been identified in a broad range of Xanthomonas associated diseases, including citrus, soybeans, cotton, and wheat.

Recent Publications:

1. **White F**. 2016. Xanthomonas and the TAL Effectors: Nature's Molecular Biologist. Methods Mol Biol. 1338:1-8.
2. **White FF**, Frommer W. 2015. Deciphering durable resistance one R gene at a time. Nature Genet. 47:1376-1377.
3. Zhang J, Yin Z**, White F**. 2015. TAL effectors and the executor R genes. Front Plant Sci. 20;6:641.