

We study the cellular and molecular mechanisms involved both in plant growth and development, and in the interactions between plants and pathogens. To do this, we integrate molecular genetics and genomics with new technologies in microscopy.

Plants grow as their cells divide and expand. We analyse: how cell cycle controls regulate the divisions that produce new cells in plant meristems; how the cytoskeleton provides a dynamic internal framework for dividing and expanding cells; and how cells produce cellulose for their walls and align it to control the shapes of expanding cells.

All plants interact with pathogens and we study how the important pathogens of the genus *Phytophthora* are adapted to infect plants and how plant resistance genes interact with fungal avirulence genes to determine the course of pathogen infections.



Tomato leaflets infected with the powdery mildew fungus *Oidium lycopersici*.

PLANT CELL BIOLOGY

Group Leader: Prof. Richard Williamson

HIGHLIGHTS



Single stem-borne flowers of the native tobacco, *Nicotiana benthamiana*, the source of the necrosis-inducing protein described in the adjacent text.

- Demonstrated variation in plant response to *Phytophthora* elicitors originates downstream in the signalling pathway that leads to plant cell death and is not due to differences in elicitor perception.
- Identified a small, secreted protein from native tobacco (*Nicotiana benthamiana*) that triggers a necrotic response in cultivated tobacco (*N. tabacum*) carrying the tomato *Cf-9B* disease resistance gene. This necrosis-inducing protein may enable isolation of a corresponding protein from tomatoes that is a target for plant pathogen attack but is kept under surveillance by the *Cf-9B* protein.
- Made domain swaps to explore the factors that make the multiple cellulose synthase enzymes present in each species non-interchangeable. Chimeric enzymes can retain considerable function or acquire dominant negative traits.
- Developed a high-throughput screen to isolate genes that are able to influence plant ovule development to provide a means to engineer fertile seed that retains beneficial attributes of the parent plant such as hybrid vigour.