Coordination of cellular behavior to internal and external cues depends on a complex network of signal transduction mechanisms. G-proteins constitute one class of molecular switches that regulate a wide variety of processes. Heterotrimeric G-proteins mediate extracellular signals at the plasma membrane. While vertebrates contain a large number of heterotrimeric G-proteins, higher plants contain only very few of these complexes. The genome of the model plant Arabidopsis encodes only single alpha and beta subunits, making it an excellent system to study heterotrimeric G-protein signaling.