Can several Nobel Prizes be wrong?

New insights into Heterotrimeric G proteins signaling

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Heterotrimeric G proteins (G-proteins), composed of α, β and γ subunits, are essential signaling molecules in most living organism. In humans, G-proteins control vision, smell, taste, and dysfunctions on their signaling cause diseases such as cholera and cancer. In animals and fungi, G-protein-coupled receptors activate signaling by binding GTP to the Gα subunit and signaling stops when the GTPase activity in Gα hydrolyzes GTP to GDP. This mode of action has been universally accepted since Alfred Gilman and Martin Rodbell were awarded the Nobel Prize in 1994. Our work on plant G-proteins has produced numerous surprises and proven that pant G-proteins evolved much faster than their animal counterparts [1], developing new and atypical subunits [2, 3], and adopting novel functions controlling important agricultural traits [4]. Our new results have added the greatest surprise so far: Plant G-proteins do not necessarily use GTP (or any other nucleotide) to exert their functions in plants [5]. We will present evidence showing the plant G-proteins can mediate signaling in a nucleotide independent manner. Point mutations in the Arabidopsis thaliana Gα subunit were produced in order to abolish nucleotide binding without affecting their 3D structure. These mutations were used to complement Gα-deficient mutants with full restoration of many, but not all, mutant phenotypes. In addition, our CRISPR generated G-protein mutations in tomato have shown that G-proteins have a much important role in plant defense than previously thought.

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