

## Tailoring Carlactone

Salim Al-Babili<sup>1</sup>

<sup>1</sup>KAUST

Strigolactones (SLs) are carotenoid-derivatives with a complex structure consisting of a tricyclic lactone (ABC ring) linked an enol ether bridge to a further lactone (D-ring). SL biosynthesis is initiated by a 9-*cis*/all-*trans*-isomerase (DWARF27) that produces 9-*cis*- $\beta$ -carotene, followed by the two carotenoid cleavage dioxygenases 7 and 8 the first of which, CCD7, is stereo-selective while the second one, CCD8, is an unusual enzyme that supposedly catalyzes repeated oxygenation, intramolecular rearrangements and C,C bond cleavage reactions simultaneously. This CCD8 activity leads to carlactone, a compound that already shows typical structural features of SLs. Carlactone is supposed to be the precursor of other SLs. It is converted by the Arabidopsis CYP711 (MAX1) and a rice homolog into carlactonoate and 4-deoxyorobanchol (*ent*-2'-*epi*-5-deoxystrigol), respectively. To understand carlactone formation, we determined the stereo-configuration of its precursor. We also incubated CCD8 with <sup>13</sup>C-labelled precursor and localized the <sup>13</sup>C in the produced carlactone by NMR. Furthermore, we determined the origin of the three oxygens of carlactone by using <sup>18</sup>O labelling. Results obtained allowed us to develop a proposal for the CCD8 reaction mechanism. We also studied the substrate specificity of carlactone forming enzymes, which indicate the presence of modified carlactone(s) originating from other carotenoids.