# RhoCrt

A Synthetic Biology Approach to Carotenoid Pathway Design using *Rhodospirillum rubrum* as a Production Host

Institute for Applied Biotechnology (IAB)

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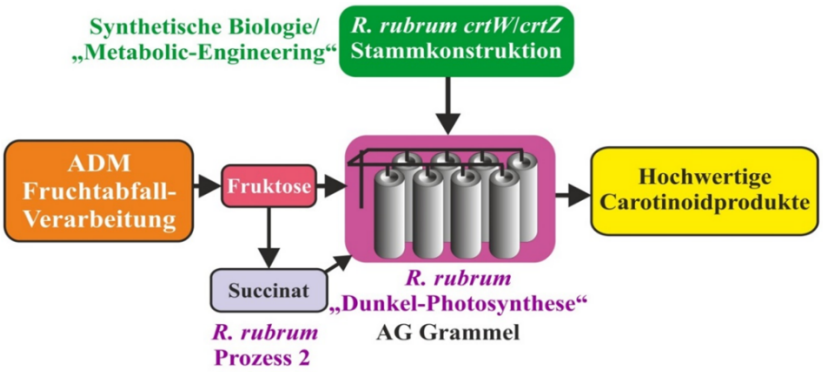
| **Researcher** | Beryl Cancro, Andreas Witt |
| **Financing** | Bundesministerium für Bildung und Forschung |
| **Program** | Maßgeschneiderte biobasierte Inhaltsstoffe für eine wettbewerbsfähige Bioökonomie |
| **Partners** | Institut für Biomaterialien und biomolekulare Systeme (IBBS), Abt. Bioenergetik, Universität Stuttgart |
| **Duration** | 01.02.2020 - 31.01.2023 |
| **Project description** | At present, most carotenoids of nutraceutical and medical interest, are either synthesized chemically, or are extracted from plant or algal sources. The *R. rubrum* system presents a new, cheap, and upscalable process, where the major medium component, fructose, is available from industrial fruit and maize wastes at very low cost. The fact that *R. rubrum* is a natural superproducer of carotenoids, as well as the fact that very high cell densities of cells containing very high levels of photosynthetic membranes under dark, semi-aerobic conditions can now be obtained, predestines its use as a carotenoid production host for pathway design.<br>Our working hypothesis is that potentially, many carotenoid biosynthesis enzymes can be genetically modified so as to catalyze asymmetric carotenoid biosynthesis in the *R. rubrum* host background.<br>Within the RhoCrt project a *R. rubrum* strain (SWGK46Y) was recently produced where the physiological carotenoid spirilloxanthin, which is bound exclusively to the photosynthetic complexes, has been replaced by the non-physiological plant carotenoid β-carotene. SWGK46Y is an ideal host for |

the production of industrially interesting plant or marine carotenoids. In a preliminary study, the *crtW* and *crtZ* genes from *Agrobacterium auranticus*, which encode β-carotene ketolase and β-carotene hydroxylase, respectively, were transferred to SWGK46Y, and it could be demonstrated that the recombinant strain can produce carotenoids, including astaxanthin.

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| INSTITUT | IAB |
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