

Using directed evolution to simplify the production of tyrian purple in *E.coli*



Background

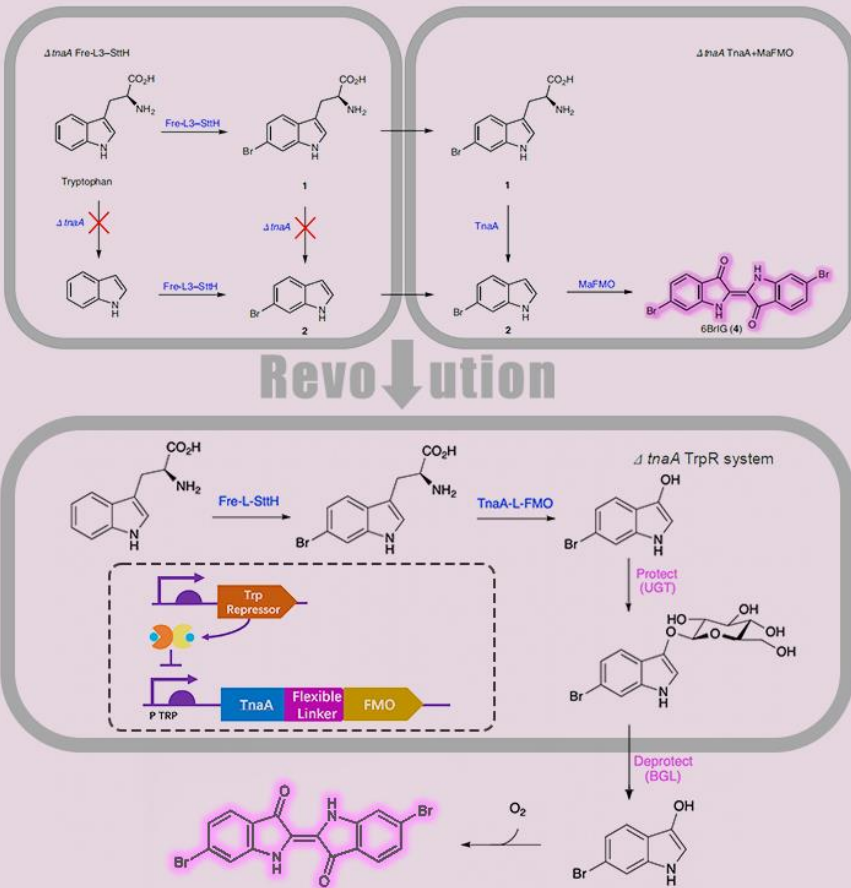
Tyrian purple is a dye extracted from the murex shellfish. The glands of thousands of putrefied crushed shellfish were left to bake in the sun, which could produce only a few grams of tyrian purple powder. The resulting liquid was used to dye cloth fibres in manipulated variations of colours ranging from pink to violet.



TYRIAN PURPLE DYE WAS LITERALLY WORTH MORE THAN ITS WEIGHT IN GOLD.

- Optimize the two-cell production system to **one-cell system**.
- Introduce a **reversible glucose protection** group to make the tyrian purple dye more convenient for industrial scale-up.

Purpose



- Incorporate the glycosyltransferase for a scalable production of halogenated indican and achieve a sustainable dyeing method using β -glucosidase.
- Develop a synthetic phylogeny of programmable Trp repressor with directed evolution to simplify the two-cell production system.
- Iterative rounds of positive and negative compartmentalized partnered replication (CPR) led to the exponential amplification of variants that responded with high affinity and specificity to halogenated tryptophan analogs and novel operator sites.

Design

Collaborations



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