deCYPher: Decipher CYPs by digital tools to functionalise plant metabolites

Description

Microbial production of plant metabolites has economic & environmental benefits over traditional extraction and chemical methods. Despite initial progress & the successful market introduction of some molecules, the microbial production of oxygenated plant metabolites (OPMs) mediated by cytochrome P450 enzymes (CYPs) is still lagging, making them almost inaccessible to society. In contrast, artificial intelligence (AI) & machine learning (ML) tools are evolving rapidly, but their use for engineering biology is still underexplored.

deCYPher applies these groundbreaking AI/ML techniques to unlock the OPM molecules to society. deCYPher develops a standardised AI/ML pipeline to implement AI/ML in each step of the Design-Build-Test-Learn cycle, and across all steps in the biotech value chain. Combined with smart databases & synthetic biology (SynBio) tools, this AI/ML pipeline will generate opportunities for the whole biotechsector. Specifically, applied to OPMs, we (1) bioprospect & select specific CYPs, (2) correctly localise & express CYPs and (3) optimisethe microbial cells & bioprocess. deCYPher involves stakeholders (industry, regulators, NGOs) and engages European citizens acrossseveral countries. This allows to reflect on the societal ramifications of the convergence of AI & SynBio. The consortium brings togethercomplementary expertise from 5 top RTOs, 3 SMEs, 1 LE & 1 bio-art association from 6 EU countries to unlock the full potential ofOPMs.

In parallel, deCYPher will enable the AI/ML sector to apply their tools in the biotech sector, by creating new production toolsfor industrial biotech and specifically impact industry (flavours & fragrances, phytonutrient) and society with novel products. deCYPher contributes to the EU green deal, supports the transition to a circular bioeconomy, increases resource efficiency, strengthens European competitiveness, innovates in a responsible and reflective manner & boosts sustainability of biobased value chains./

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