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Expanding the reaction space of aldolases using hydroxypyruvate as a nucleophilic substrate

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Aldolases are key biocatalysts for stereoselective C–C bond formation allowing access to polyoxygenated chiral units through direct, efficient, and sustainable synthetic processes. The aldol reaction involving unprotected hydroxypyruvate and an aldehyde offers access to valuable polyhydroxy-α-ketoacids. However, this undescribed aldolisation is highly challenging, especially regarding stereoselectivity. This reaction was explored using biocatalysts, a collection of aldolases selected from biodiversity. Several enzymes were found to produce the desired hexulosonic acids from hydroxypyruvate and D-glyceraldehyde with complementary stereoselectivities. One of them was selected for the proof of concept as a biocatalytic tool to prepare five (3S, 4S) aldol adducts through an eco-friendly process.

Biography

Virgil Helaine has completed his PhD from Clermont-Ferrand University, France. He has left for Darmstadt (Germany) where he has joined Prof. W D Fessner's group. Since 2000, he is an Assistant Professor in the Institute for Chemistry of Clermont-Ferrand (France) and his field of interest is focused on biocatalysis especially the development of tools for eco-compatible synthesis: discovery and study of new enzymes, and their orchestration in multienzymatic cascade processes towards compounds of biological interests.

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