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Application, genetic and process engineering of transaminases for chiral amine synthesis

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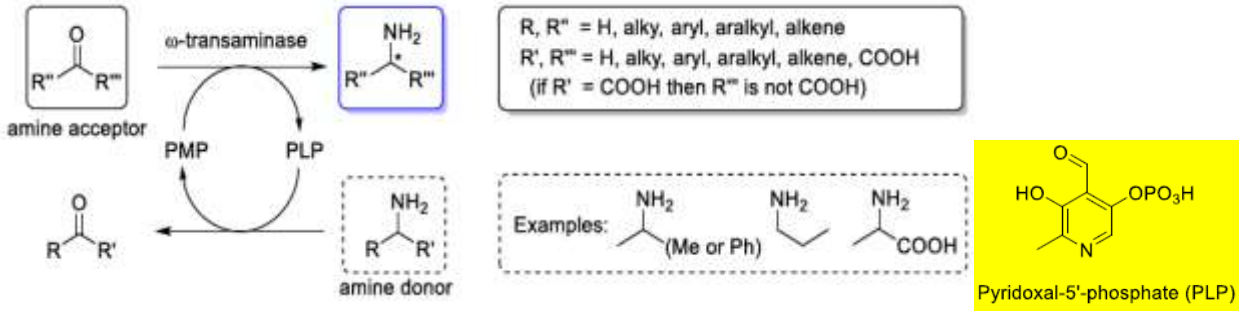
Many high-value active pharmaceutical ingredients (**APIs**) or agrochemical compounds are best administered in an **enantiopure** form, to avoid undesirable effects of inactive or toxic enantiomers on living organisms, especially humans. Many **chiral amines** either have high biological activity, or they are direct precursors to drug molecules. Although there are several biocatalytic methods available to produce enantiopure chiral amines, to date ***amine transaminases are the only natural enzymes that can directly synthesize enantiopure chiral amines by asymmetric amination of prochiral ketones.***



All aminotransferases (EC 2.6.1.X) reported to date require the same coenzyme, namely pyridoxal-5'-phosphate (PLP), which serves as a molecular shuttle for ammonia and electrons between the amino donor and the amino acceptor.

This lecture demonstrates the usefulness of transaminases (TAs) with different stereoselectivities for synthesis of valuable enantiopure chiral amines. The importance of bioinformatics and molecular genetics to improve catalytic properties or to identify novel TA biocatalysts is also highlighted. Examples explain the value of various immobilization techniques and process intensification by continuous flow systems.