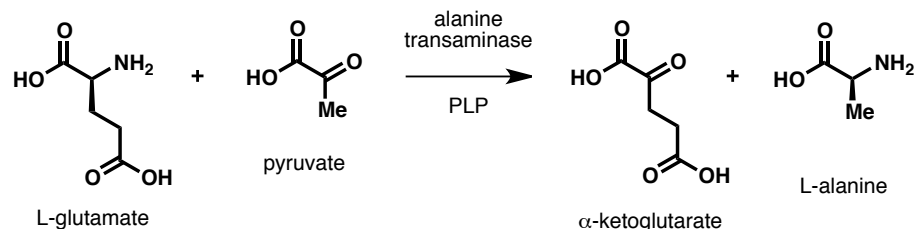


## References:

Clouthier, C. M.; Pelletier, J. N. *Chem. Soc. Rev.* **2012**, *41*, 1585

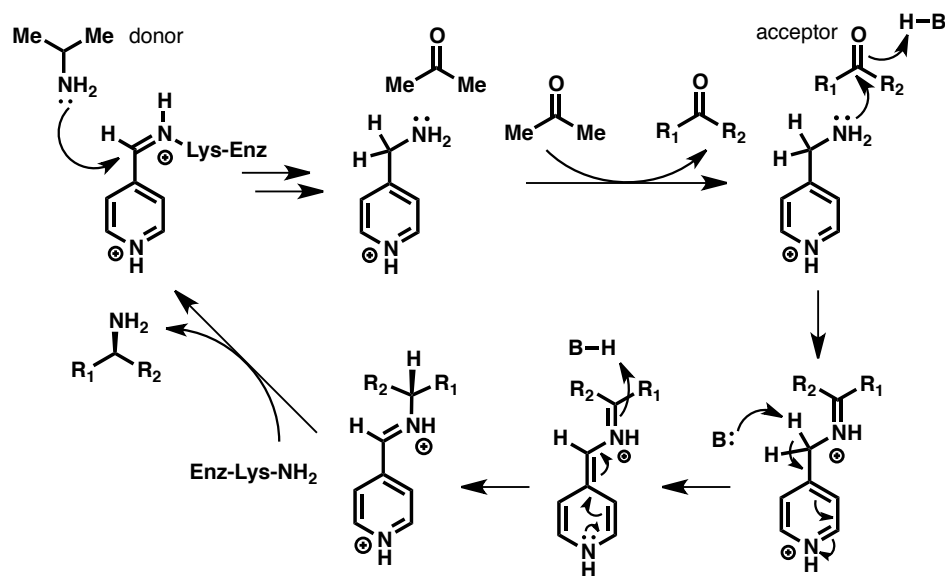
## Natural reaction:

Transaminases catalyze the transfer of an amino group from an amino acid (donor) to an  $\alpha$ -keto acid, producing a different amino acid /  $\alpha$ -keto acid pair.

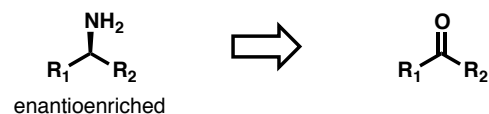


## Mechanism:

In this abbreviated mechanism, only part of the PLP cofactor is drawn out. Note that these steps are in principle reversible and that isopropylamine was selected as the amine donor for clarity.

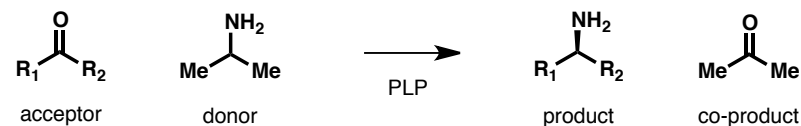


## Disconnection:



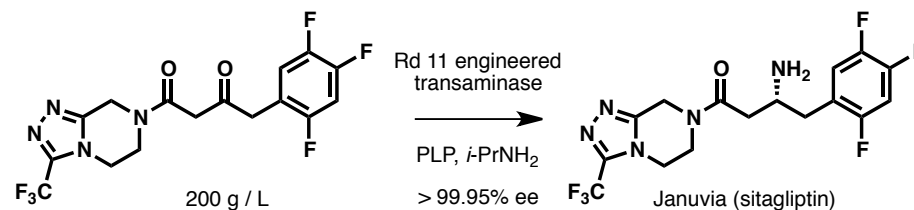
## Application in biocatalysis:

Chiral amines are common in industrial processes, and the ability to engineer transaminases has greatly increased their use in delivering chiral amines from prochiral ketones.

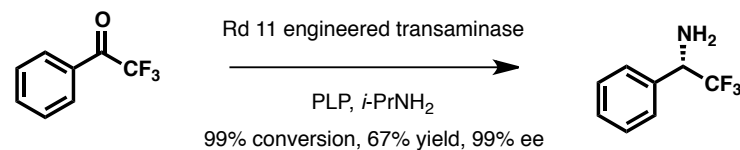


## Examples:

Multiple rounds of enzyme engineering led to a transaminase currently used in the industrial scale process that produces sitagliptin, a diabetes medication; this route improved upon one featuring an asymmetric hydrogenation, one of the most useful chemical reactions for setting stereochemistry.

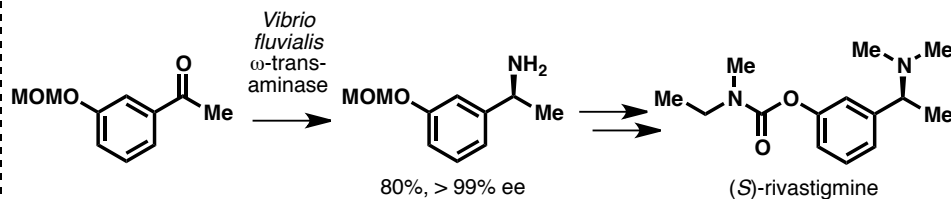


The transaminase engineered for sitagliptin production can also make chiral amines through transaminations that were previously not achievable.



Savile, C. K., Janey, J. M., and co-workers *Science* **2010**, *329*, 305

A growing number of transaminases are commercially available, such as the one used in a laboratory scale chemo-enzymatic synthesis of (*S*)-rivastigmine, a drug that treats dementias.



Faber, K. and co-workers *Chem. Commun.* **2010**, *46*, 5500