

Lipase/Transaminase reaction cascade for the synthesis of β -amino acids

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The aim of this study is to hydrolyze the β -keto acid esters with a lipase to β -keto acids (Fig. 2), acting as precursors for the synthesis of the corresponding β -amino acids catalyzed by an (*S*)-selective ω -transaminase [1] [3] (Fig. 1 + 3). The problem we have to face here is the spontaneously decarboxylation of β -keto acids. On this occasion we have to freshly prepare the precursors for the following transamination.

β -amino acids are of growing importance as building blocks for peptidomimetics or other bioactive compounds (e.g. the antitumor agent Taxol™). Possessing the ability to form secondary structures which are highly stable against cleavage of proteolytic enzymes [4].

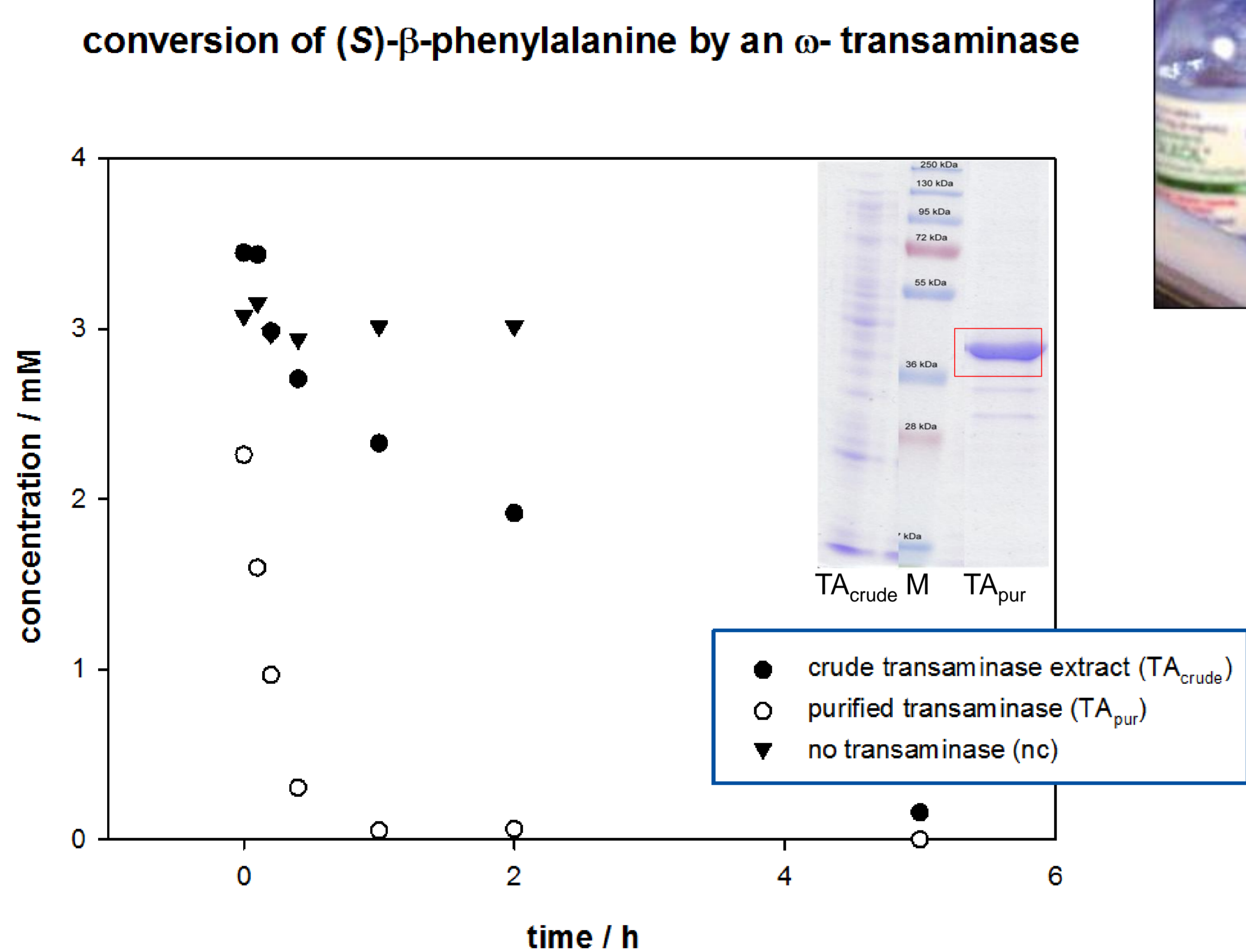


Fig. 1: Kinetic resolution of *rac* β -phenylalanine catalyzed by crude cell extract and purified (*S*)-selective ω -transaminase respectively.

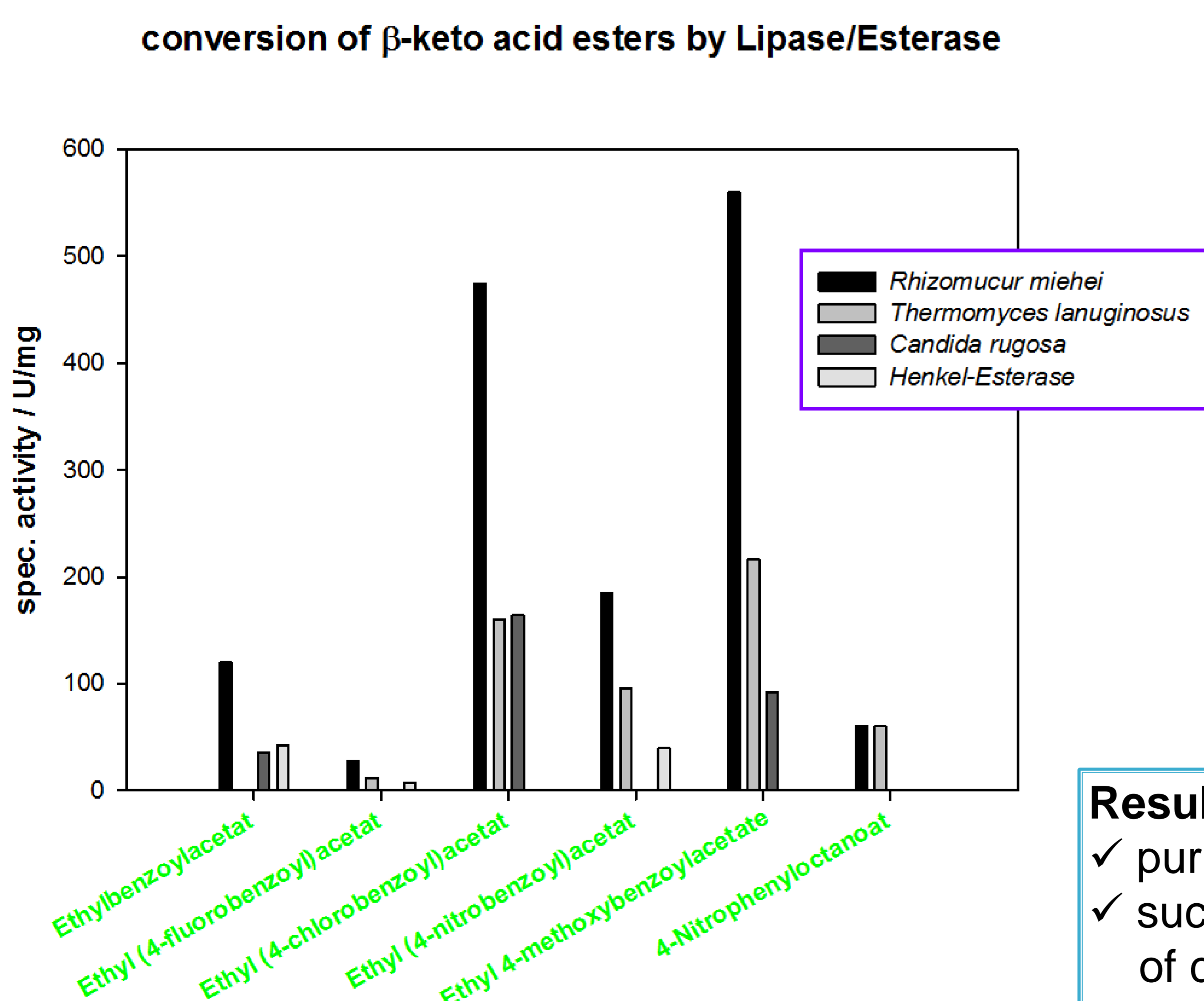


Fig.2: Specific activity of lipase/esterase with different β -keto acid esters as substrate.

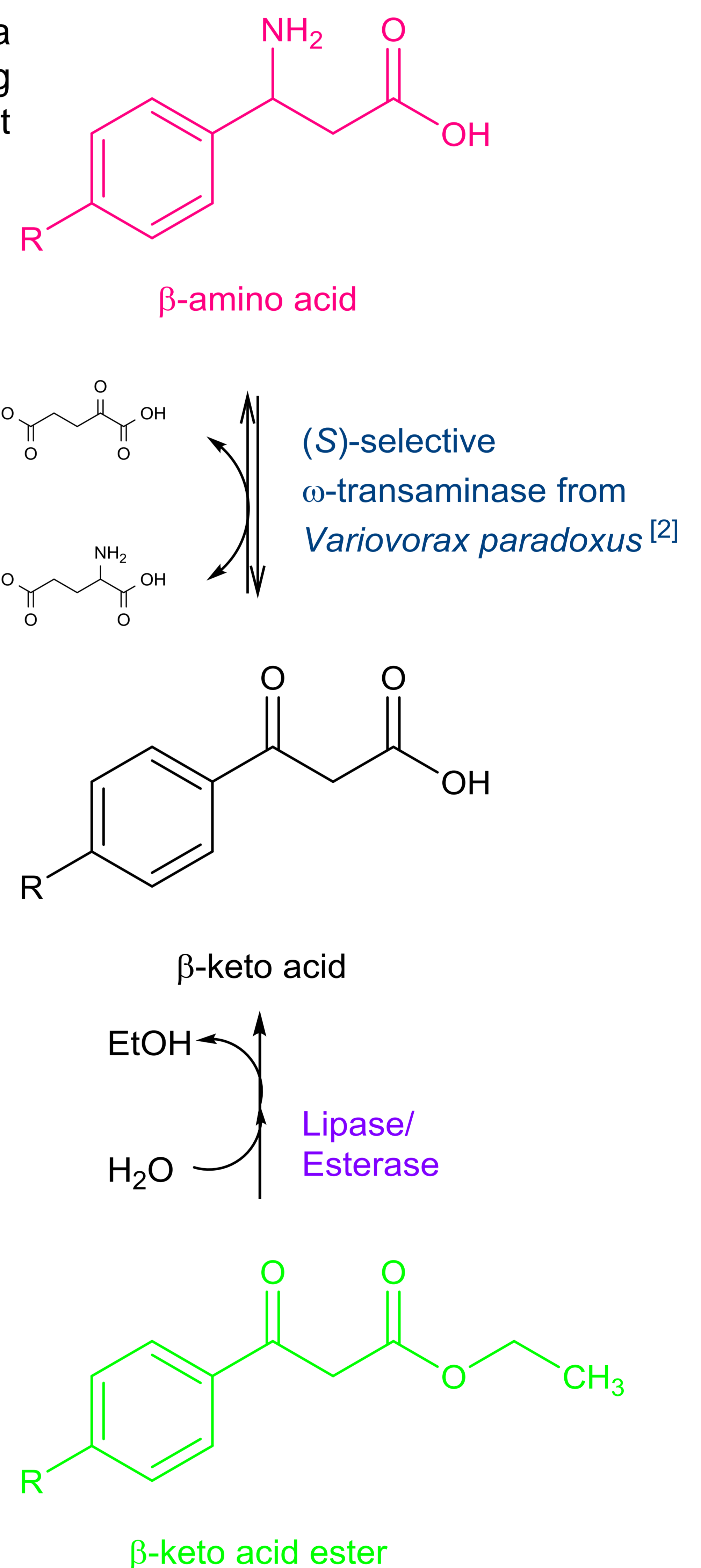


Fig. 3: Reaction scheme for the synthesis of β -amino acids, starting with a β -keto acid ester.

Result

- ✓ purified and active (*S*)-selective ω -transaminase (Fig. 1)
- ✓ successful screening of active Lipases and an Esterase capable of converting β -keto acid esters (Fig. 2)
- ✓ establishing of High Throughput Assays for the detection of enzyme activity

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[2] C. Crismaru, G. Wybenga, Biochemical properties and crystal structure of a beta-phenylalanine aminotransferase from *Variovorax paradoxus*, *Appl. Environ. Microbiol.*, 79, p. 185-195 (2013)
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[4] D. Seebach, K. Gademann, Mixed β -peptides: A Unique Helical Secondary Structure in Solution, *Helv. Chim. Acta*, 80, p. 2033-2038 (1997)