

## The lipase – initiated chemoenzymatic cascade reaction leading to the C=C double bond cleavage

A. Brodzka, R. Ostaszewski

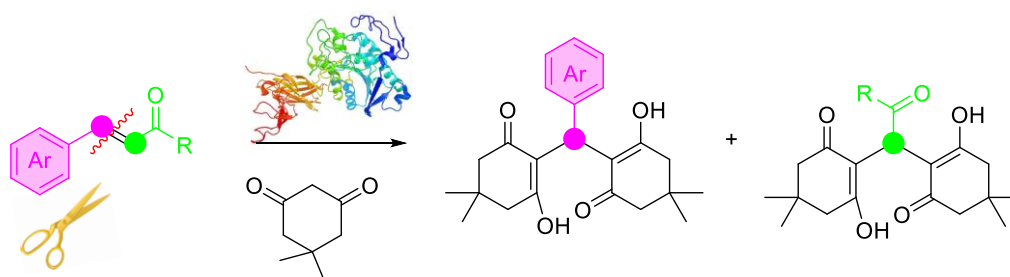
Institute of Organic Chemistry Polish Academy of Sciences, Kasprzaka 44/52, 01-224 Warsaw, Poland

anna.brodzka@icho.edu.pl

Biocatalysis plays an important role in modern organic synthesis. Among others, lipases are the most widely used enzymes as they catalyze “natural” reactions such as hydrolysis, esterification, and transesterification, often in a stereoselective or chemoselective way [1]. However, lipases also catalyze non-natural reactions, what makes these enzymes even more attractive. This ability of enzymes is known as a promiscuity [2].

Recently, we have focused our attention on enzymatic Michael addition reaction. However, when we studied the reaction of cinnamic acid esters with dimedone in the presence of lipase we did not obtain Michael adduct, but discovered a new activity of these enzymes as xanthendione derivatives products were obtained (Figure 1).

The unprecedented lipase activity towards the Michael addition leading to the C=C double bond cleavage was discovered. Various esters of cinnamic acid derivatives were converted to valuable xanthendiones in the reaction with dimedone. It is worth to note, that under special conditions, two various tetraketones were obtained from one ester molecule.



**First example of lipase mediated alkene cleavage**

**Figure 1.** Chemoenzymatic cascade reaction leading to alkene cleavage.

### References

- [1] P.-Y. Stergiou, et. al. *Biotechnol. Adv.*, 31 (2013), 1846-1859.  
[2] K. Hult, P. Berglund, *Trends Biotechnol.* 25 (2007), 231-238.

### Acknowledgments

The work was supported by the National Science Centre, Poland, under research project Opus no 2019/33/B/ST4/01118.