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1.1 Introduction

Any exponents of classical organic chemistry might probably hesitate to consider a biochemical solution for one of their synthetic problems. This would be due to the fact, that biological systems would have to be handled. Where the growth and maintenance of whole microorganisms is concerned, such hesitation is probably justified. In order to save endless frustrations, close collaboration with a microbiologist or a biochemist is highly recommended to set up and use fermentation systems [1, 2]. On the other hand, isolated enzymes (which may be obtained increasingly easily from commercial sources either in a crude or partially purified form) can be handled like any other chemical catalyst.¹ Due to the enormous complexity of biochemical reactions compared to the repertoire of classical organic reactions, it follows that most of the methods described will have a strong empirical aspect. This 'black box' approach may not entirely satisfy the scientific pursuit, but as organic chemists are rather prone to be pragmatists, they may accept that the understanding of a biochemical reaction mechanism is not a condition sine qua non for the success of a biotransformation.² In other words, a lack of detailed understanding of a biochemical reaction should never deter us from using it, if its usefulness has been established. Notwithstanding, it is undoubtedly an advantage to have an acquaintance with basic biochemistry and enzymology and with molecular biology in particular.

Worldwide, about 80% of all chemical processes are performed catalytic leading to an annual product value of around 400 billion €. In this context, biocatalytic methods represent the main pillar of applied technology, which has been coined

¹ The majority of commonly used enzymes preparations are available through chemical suppliers. Nevertheless, for economic reasons, it may be worth contacting an enzyme producer directly, in particular if bulk quantities are required. For a list of enzyme suppliers see the appendix (Chap. 5).

² After all, the exact structure of a Gilman reagent is still unknown.