

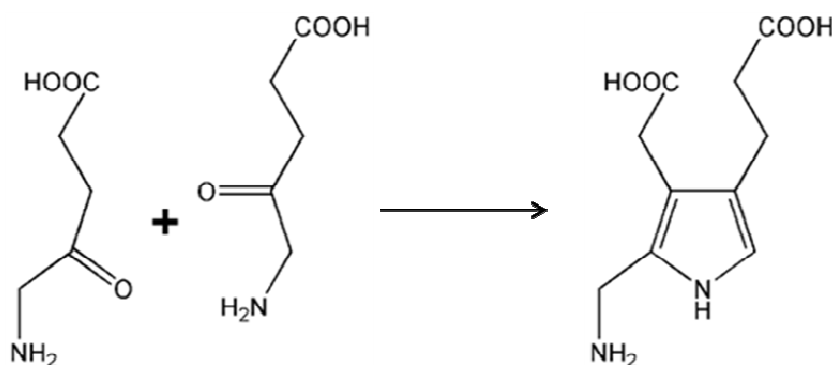
The chemistry-biology interface : The synthesis and biosynthesis of Porphobilinogen an example

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"Progress in understanding the reactivity of organic molecules is not only essential for organic chemistry itself, but for life science as a whole." (Albert Eschenmoser, 2008)

Applying the tools and the knowledge of organic chemistry to solve problems posed by life sciences is one of the major motivations of modern interdisciplinary research. The complexity of the processes of life is so huge, that the entire knowledge base has to be used. The lecture will illustrate the contributions of organic chemistry to the understanding of a central biosynthetic process: the biosynthesis of porphobilinogen, the second dedicated intermediate in the biosynthesis of the tetrapyrrolic «pigments of life» (Scheme).



Scheme: The biosynthesis of porphobilinogen (PBG) from δ -aminolevulinic acid (δ -ALA)

The analysis of the proposed mechanisms of the biosynthesis led to a project in organic synthesis of porphobilinogen. Based on the knowledge accumulated during the synthetic endeavor specially designed inhibitors were synthesized and tested, in order to shed light on the biochemical transformation. The biosynthetic transformation of δ -aminolevulinic acid to porphobilinogen could be elucidated by an iterative process, combining chemical knowledge with protein structure analysis. The combination of both approaches was necessary to obtain valid conclusions.