Mining for Novel Tryptophanase A: extremophilic organisms *Ardenticatena maritima* and *Haloarcula japonica* as alternative to *E. Coli* in the synthesis of tryptophan analogues

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L-Tryptophan is a key amino acid with significant roles in both biological systems and pharmaceutical industries. Beyond its natural role in cellular metabolism, L-tryptophan derivatives and other non-canonical amino acids (ncAAs) are increasingly valued in medicinal chemistry and synthetic biology, contributing to the design of chemical probes and pharmaceutical scaffolds [1,2].
The biosynthesis of L-tryptophan is classically mediated by the heterodimeric tryptophan synthase (TrpS) [3], however, in *Escherichia coli* strains, it has also been well-documented that L-tryptophan can be synthesized under high concentrations of L-serine via tryptophanase A (*Ec*TnaA), an enzyme typically involved in L-tryptophan catabolism (Figure 1) [4].

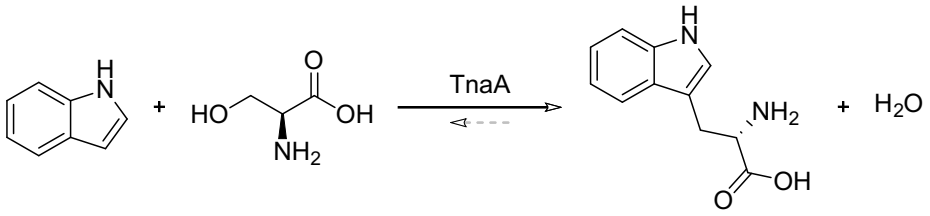

Figure 1. Biosynthesis of L-tryptophan from indole and L-serine.

This research focuses on the characterization of two novel TnaA enzymes: *Am*TnaA from the thermophilic organism *Ardenticatena maritima* [5] and *Hj*TnaA from the halophilic organism *Haloarcula japonica* [6]. Owing to their resilience under harsh physicochemical conditions, these enzymes represent promising biocatalytic tools for challenging synthetic applications, and the exploration of their substrate scope further highlights their potential for sustainable production of tryptophan derivatives and pharmaceuticals.

References

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