For a Poster presentation.

Submission for : Ricard Kévin and Alizade Nigar

Title : A directed evolution plateau for plate experiment to help the scientific community

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Part of the PEPR MoleculArXiv project involves exploring DNA data storage. This requires conducting directed evolution of polymerases to identify an enzyme feating the selection criteria. To this end, we have built a technical platform at the Gulliver laboratory to conduct these experiments. This technical platform is also intended to offer services to the scientific community, to benefit from our expertise and equipment in directed evolution. We offer several services: • Construction of enzyme and protein libraries, as well as individual mutants. • Isolation and identification of the generated variants. • High-throughput DNA Nanopore sequencing service (Flongle to Promethion). • Enzyme activity measurements (depending on the enzyme type). Using a plate-based experiment system, we can easily construct multiple enzyme libraries simultaneously and identify the generated variants. Our current limit is between 2,000 and 10,000 variants for identification, and around 10^10 variants for library generation. Our platform range goes from directed evolution reactions in tubes to high-throughput sequencing to identify mutants created by transforming our DNA into bacteria and amplification of DNA by PCR from them. Our activity measurements are performed in vitro, by producing enzymes in our plates, using the PURE system. Since 2024, we have completed several projects to construct enzyme and protein libraries, and we have provided several high-throughput sequencing services for various partners near Paris. In 2026 we want to develop more the plateau around the world and be involved in different directed evolution projects.