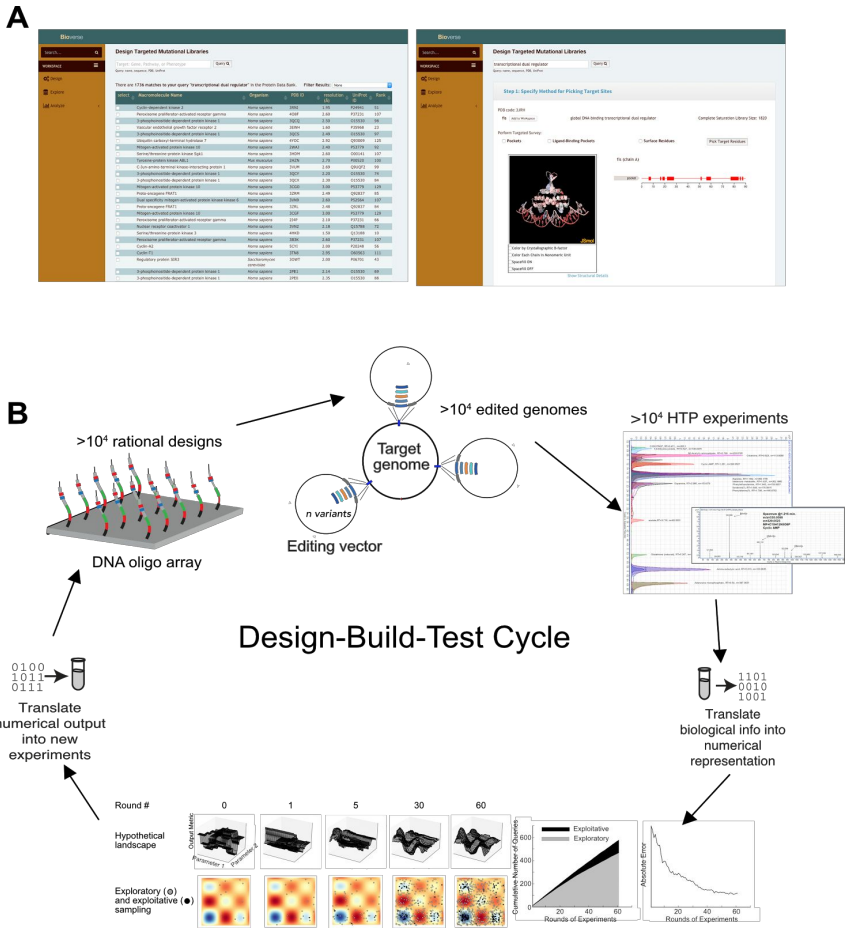

Figure 1. Synthesis Aided Design. Affordable synthetic DNA oligomers combined with high throughput genome editing and testing technologies allow engineers to rapidly generate informative datasets regarding genotype-phenotype relationships. **A)** The bioverse platform will allow researchers to rapidly design biological materials for testing a wide range of phenotypes including small molecule production and molecular adaptation. **B)** Bioverse aims to design libraries that include a sufficient range of hypotheses and controls, allowing application of active machine learning to improve the predictive power of genotype-phenotype models during iterative rounds of Design-Build-Test-Learn. In this example, mass spectrometry based methods are used to collect data on a library of >10,000 genetic variants, and classification and regression trees are used to inform the next round of experiments. Exploration and exploitation of experimental datasets allows efficient optimization of the mathematical model describing the relationship between genotype and phenotype.

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