Dear editor,

Attached please find our manuscript “Predicting microbial relative growth in a mixed culture from growth curve data”.

In this manuscript we present a new computational method to infer microbial relative fitness from easy-to-obtain growth curves data. Microbial fitness is best inferred from pairwise competition experiments, but these experiments require distinct genotypic or phenotypic markers. In contrast, growth rates of individual isolates are easy to find – but constitute poor estimators of fitness.

We developed *Curveball*, a new computational approach for predicting relative growth in a mixed culture and inferring competitive fitness from growth curve data. We validated our new method using experiments with bacteria and implemented it in an open-source software package.

Our new method integrates several growth phases into fitness estimation, allowing a more holistic approach to fitness estimation compared to existing approaches that utilize growth curve data. Differently from competition experiments, *Curveball* doesn’t require distinct markers; therefore, it can be used with non-model organisms and is more cost-effective. Moreover, *Curveball* provides information on the specific growth traits that contribute to differences in relative fitness.

We hope you will find this manuscript worthy of publication in Nature Methods.

Sincerely,

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