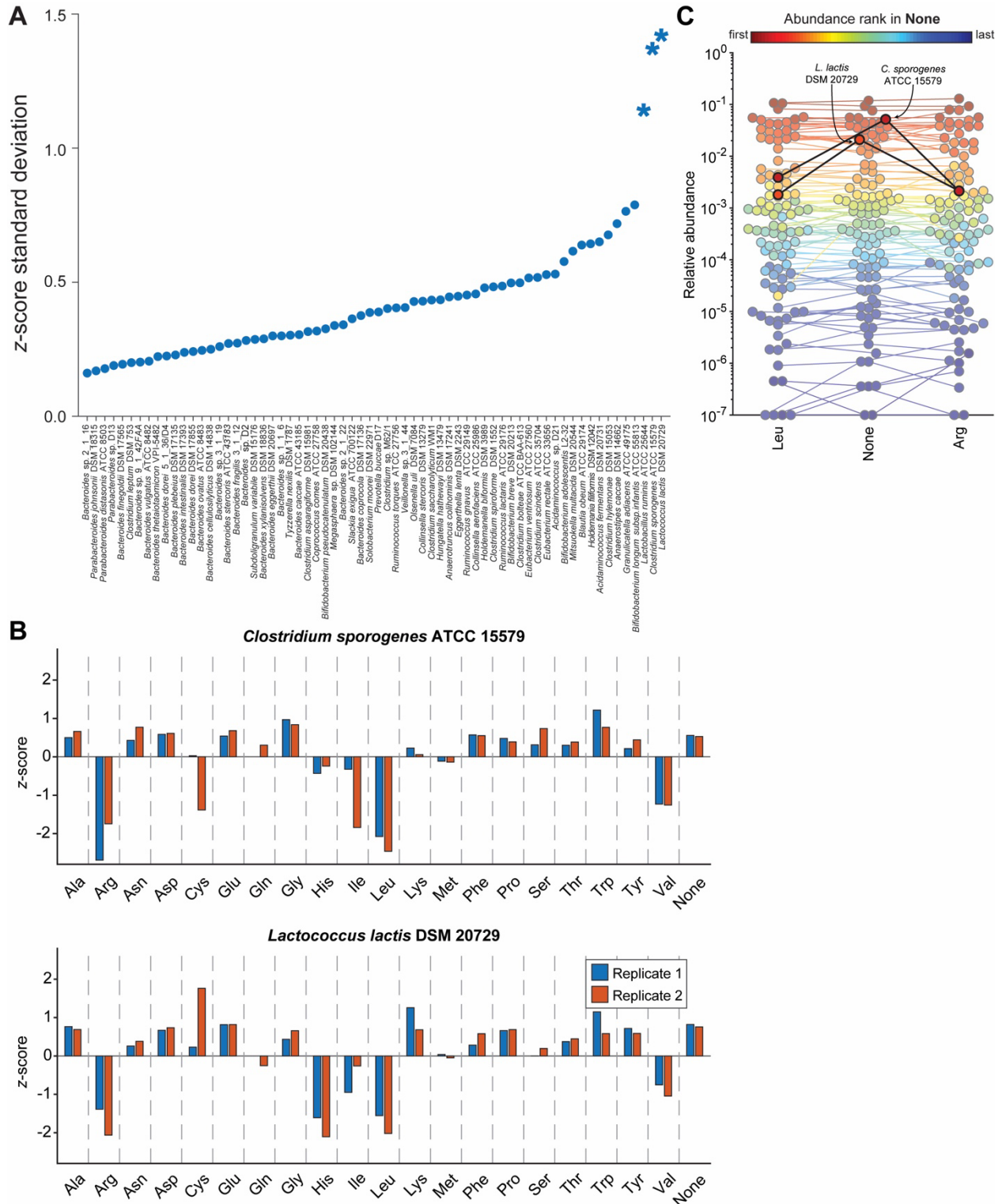


Data S3: Discovery and elucidation of a strain-amino acid interaction and its molecular mechanism, related to Figure 2.

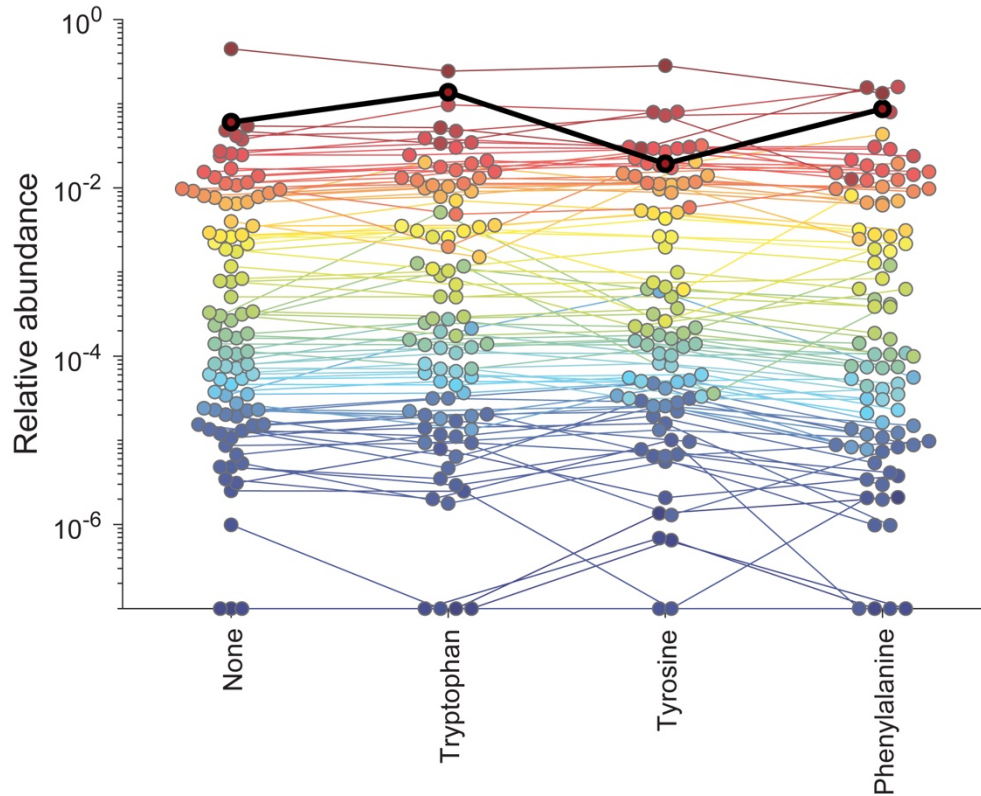
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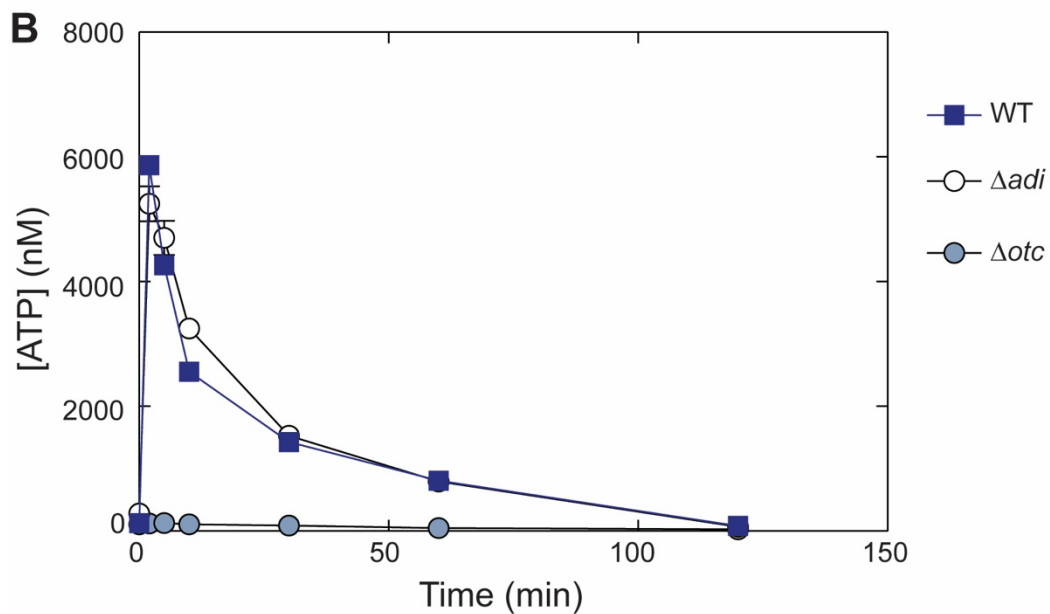
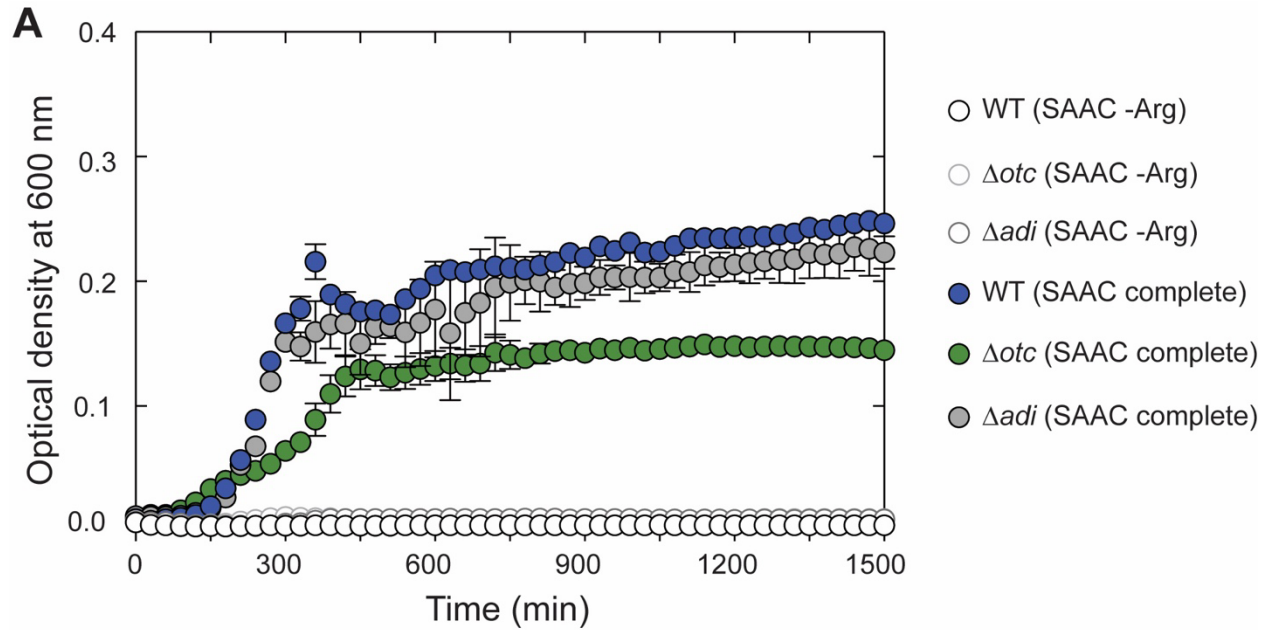


C. sporogenes, L. lactis, and L. ruminis are highly sensitive to amino acid perturbation. (A) The standard deviation of the z-scores of *C. sporogenes*, *L. lactis*, and *L. ruminis* (asterisks) was substantially higher than of all other strains. **(B)** The effect of amino acid removal on *C.*

sporogenes and *L. lactis* is reproducible. A z-score was calculated for two independent replicates based on the standard deviation of strain abundance across all samples. (C) The absence of leucine or arginine leads to a large decrease in the relative abundance of *C. sporogenes* and *L. lactis*. Strains are colored according to their rank-order abundance in the community grown in complete defined medium.



The relative abundance of *C. sporogenes* was not affected significantly by the removal of phenylalanine, tyrosine, or tryptophan. Each circle is an individual strain, and the collection of circles in a column represents the community at 48 h. Strains are colored according to their rank-order abundance in the community grown in complete defined medium. Undetected strains were set to 10^{-7} for visualization. The thick black line shows the relative abundance of *C. sporogenes*.



Deletion of ornithine transcarbamoylase (*otc*), but not arginine deiminase (*adi*), impairs arginine-dependent *C. sporogenes* growth in minimal medium and ATP production. (A) Intracellular ATP levels in wild-type *C. sporogenes* and Δadi and Δotc mutants incubated in PBS containing 2 mM arginine. Wild-type *C. sporogenes* and Δadi generated ATP in SAAC, whereas Δotc did not. (B) Wild-type *C. sporogenes* and Δadi and Δotc mutants were grown in complete defined medium (SAAC) +/- arginine. Growth curves depict the mean of 3 replicates. Error bars represent 1 standard deviation. *C. sporogenes* was unable to grow in SAAC without arginine

(white circles). The growth of wild-type *C. sporogenes* (blue) in SAAC was similar to that of an Δadi mutant (gray), but growth was substantially impaired by deletion of *otc* (green).