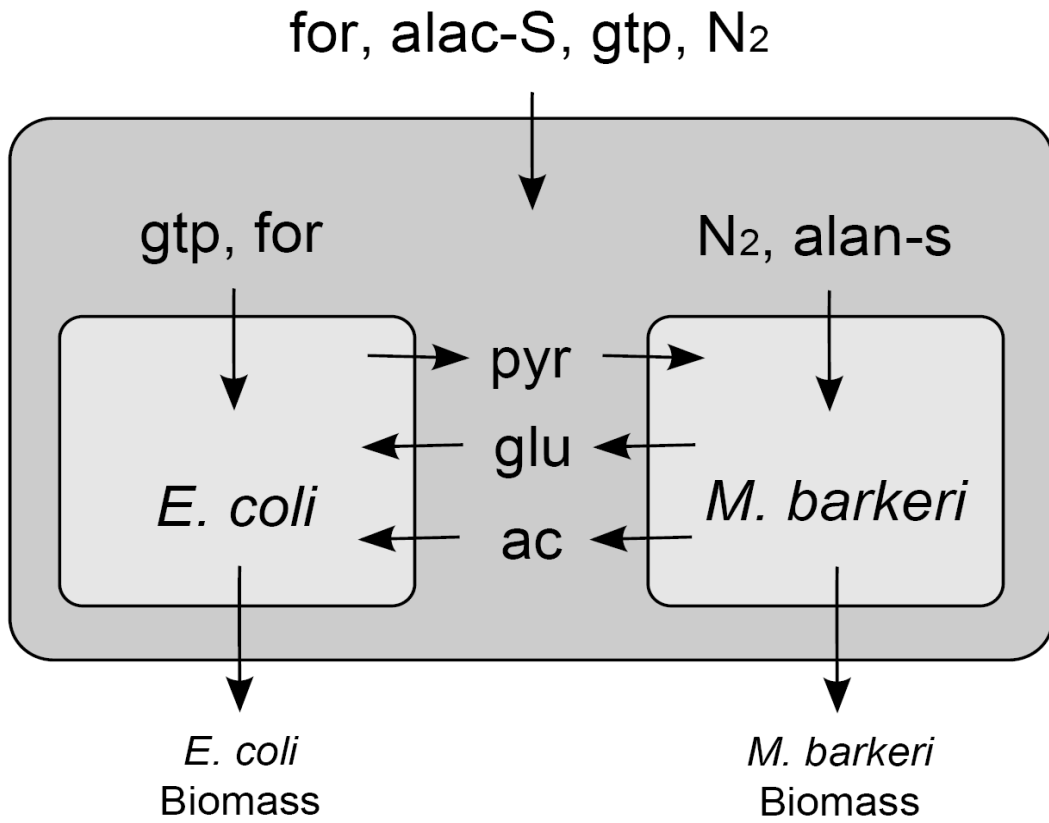


A



B

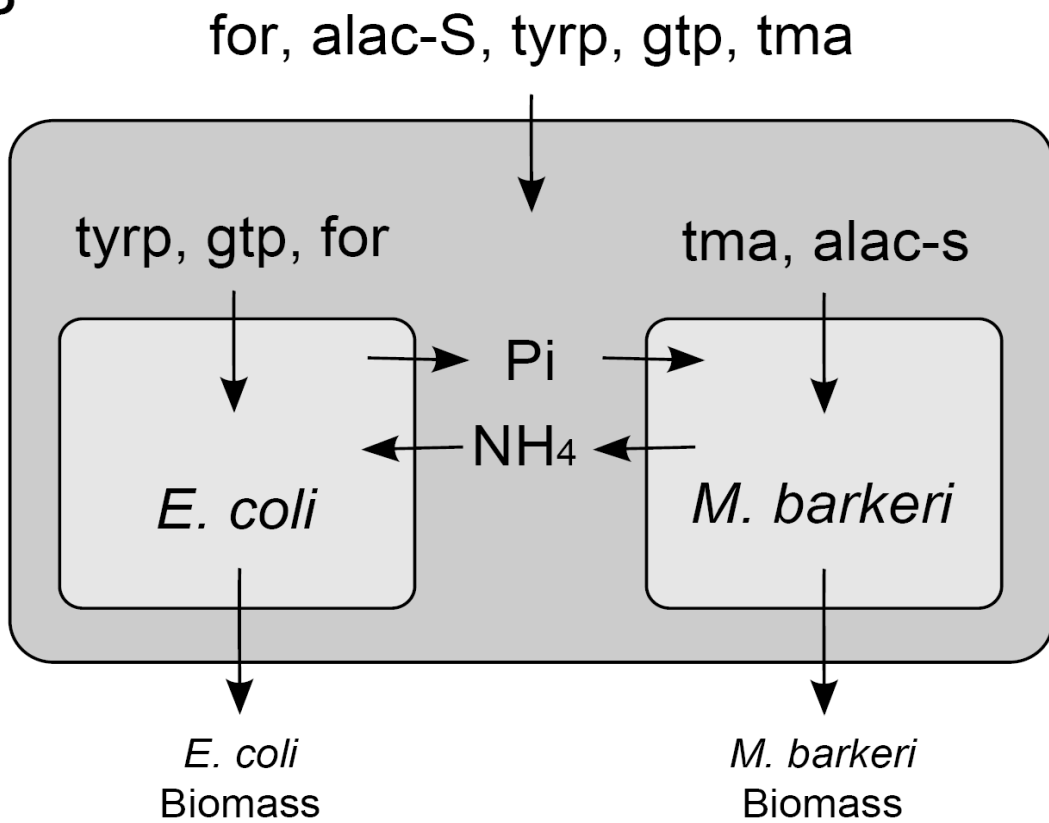


Figure S5

Two examples depicting the details of environment-induced mutualistic interactions identified through the SIM algorithm for the *E. coli* - *M. barkeri* pair. The two media, selected here based on high *F* score ranking (see Supplementary Methods), are among the ones that give rise to mutualistic interactions.

A In the first example *M. barkeri* appears to be responsible for fixing nitrogen into a form *E. coli* can use, glutamate in this case. Curiously, even though *M. barkeri* is able to access the acetyl-lactate in the medium, this appears to be insufficient to support its growth. An energy rich carbon, in the form of pyruvate, is provided to *M. barkeri* by *E. coli*.

B In our second example, while the medium is more complex, the exchange of metabolites is more straightforward. *E. coli* utilizes a number of phosphorus containing metabolites and creates inorganic phosphate that *M. barkeri* can use. In a complementary fashion, *M. barkeri* metabolizes a number of nitrogen containing compounds and release excess ammonium that *E. coli* can use.