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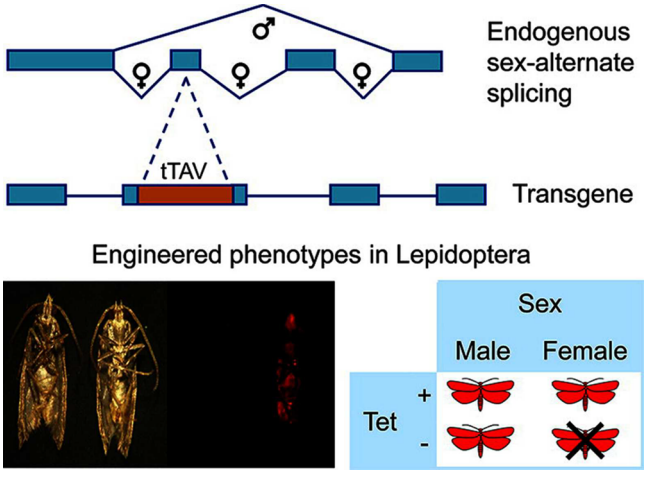
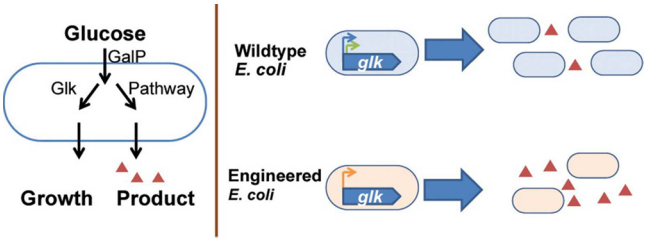
ENGINEERED FEMALE-SPECIFIC LETHALITY



The sterile insect technique (SIT) is a pest control strategy where a mass of radiation-sterilized insects is used to reduce a target population of insects via non-viable matings. Currently, Lepidoptera is primarily controlled via synthetic insecticides. SIT could be more broadly applicable if sterilization by irradiation could be avoided and male-only release could be accomplished.

Here, Jin et al. (DOI: 10.1021/sb300123m) describe the characterization of the sex-alternate splicing region of pink bollworm doublesex, and its use in developing transgenic sexing strains of the lepidopterans pink bollworm and diamondback moth, two major agricultural pests. Such strains confer repressible, female-specific lethality, which is a potentially valuable trait for SIT-like control of pests. This is the first description of the development of such a system in the Lepidoptera.

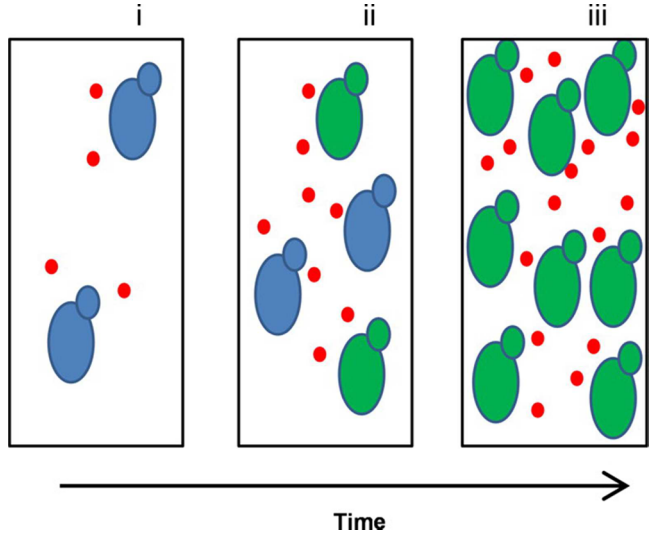
TUNING PRIMARY METABOLISM FOR PATHWAY PRODUCTIVITY



Engineered metabolic pathways for microbial production of small molecules typically results in competition between endogenous metabolism and the heterologous pathway at metabolite branch-points. While a simple knockout can usually alleviate the competition, other approaches are required to maximize productivity of the desired compound when the competing pathway is essential for survival. Here, Solomon et al. (DOI: 10.1021/sb300055e) address this problem in the context of glucose utilization in *Escherichia coli*.

In this work, the authors demonstrate the ability to construct engineered systems to control global phenotypes such as growth rate while simultaneously designing a strategy for regulating metabolic flux.

ENGINEERED QUORUM SENSING IN YEAST



S. cerevisiae is an industrial microorganism that is responsible for the production of a multitude of fuels, chemicals, and pharmaceuticals. The integration of synthetic genetic circuits with industrial host organisms holds great potential for facilitating the autonomous and dynamic control of gene expression. However, there is a distinct lack of such synthetic genetic circuits in *S. cerevisiae* that are suitable for application to metabolic engineering problems. Here, Williams et al. (DOI: 10.1021/sb300110b) engineer quorum sensing modules in *S. cerevisiae* by rewiring the native pheromone-mediated cell-to-cell communication system.

Quorum sensing is a widely distributed genetic program that allows autonomous population density dependent coordination of gene expression using intercellular signaling molecules. The quorum sensing modules described here allow the autonomous control of gene expression throughout space and time and are

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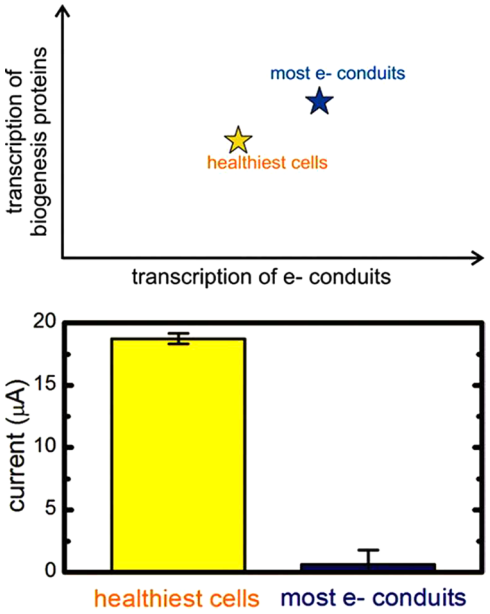
tunable according to both circuit topology and environmental conditions.

TUNING PROMOTER STRENGTHS FOR IMPROVED ELECTRON CONDUITS



The ability to facilitate electronic communication between living cells and electrodes would create new opportunities in energy conversion, biosensing and biocomputing. In a previous paper, the authors described a novel synthetic biology approach to establish an electronic conduit in *E. coli* using a heterologous extracellular electron transport pathway. Here, Goldbeck et al. (DOI: 10.1021/sb300119v) improve extracellular electron transfer using an *E. coli* host with a more tunable induction system and a panel of constitutive promoters.

Using these promoters, the authors created a library of strains that transcribe the two operons required to make the electron transfer complex (MtrCAB) at different levels. They identified one strain, with fewer MtrCAB complexes but a less perturbed morphology, which generates greater peak current than its control strain. This work highlights the importance of system-level optimization for achieving improved synthesis and function of artificial genetic circuits and shows that it is possible to genetically engineer molecularly defined extracellular electron transfer into an organism.

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