

Biology on sample size of more than one

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Abstract

All of biological research is done on a single sample: that of modern, terrestrial life. In the quest to engineer synthetic living systems, we seek to expand that sample size, enabling investigation of properties of lineage agnostic, synthetic organisms.

Synthetic minimal cells are liposomal bioreactors that have some, but not all properties of live cells. Creating artificial living systems allows us to diversify the chassis of biological studies and provide novel opportunities for bioengineering. We can begin to answer biggest questions about healthy and diseased natural cells and ask whole new set of questions about the nature of life. Engineering synthetic cells with fundamentally different physical and chemical properties, we can compare behaviors and begin drawing broad conclusions about basic rules of biological life.

Synthetic cells are fully definable, enabling studies of natural processes with level of detail previously unavailable. In synthetic system, there is less noise from underlying endogenous activity of the cell, and every interesting process can be isolated and studied independently. Synthetic cells provide new chassis for biological studies, for broadening understanding of our own type of biology, and for investigating alternatives to the single known life form.