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New approaches to synthetic and systems biology

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Synthetic biology is the design and construction of biological devices and systems for useful purposes. It is an area of biological research and technology that combines biology and engineering, thus often overlapping with bioengineering and biomedical engineering. It encompasses a variety of different approaches, methodologies, and disciplines with a focus on engineering biology and biotechnology. The advance of synthetic biology relies on several key enabling technologies provided at ever increasing speed and lower cost. DNA sequencing, fabrication of genes, modeling how synthetic genes behave, and precisely measuring gene behavior are essential tools in synthetic biology. Its popularity has grown as a result of increasing developments within DNA synthesis technologies; now it is more affordable to synthesize a gene as opposed to cloning it. Also, genome databases can be used as a template for creating viruses at minimal cost. Systems biology is an emerging approach applied to biomedical and biological scientific research. Systems biology is a biology-based inter-disciplinary field of study that focuses on complex interactions within biological systems, using a more holistic perspective (holism instead of the more traditional reductionism) approach to biological and biomedical research. Particularly from year 2000 onwards, the concept has been used widely in the biosciences in a variety of contexts. One of the outreaching aims of systems biology is to model and discover emergent properties, properties of cells, tissues and organisms functioning as a system whose theoretical description is only possible using techniques which fall under the remit of systems biology. These typically involve metabolic networks or cell signaling networks.

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