Design principles of living membranes

Initiative: "Leben?" - Ein neuer Blick der Naturwissenschaften auf die grundlegenden Prinzipien des Lebens

(beendet)

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Life is a homeostatic microenvironment, defined in all extant life forms by a fluid lipid membrane that separates life from non-life. This membrane is not a passive barrier, but also constitutes the functional interface between life and its surroundings, which must adaptively respond to life's homeostatic demands. In living membranes, homeostasis is under constant challenge from physical and biochemical stressors, with dysfunctional responses leading to adverse outcomes. Despite the fundamental role of responsive membranes in defining and sustaining life, there is remarkably little understanding of the mechanisms by which cells sense and respond to changes in membrane properties. This project aims to define these sense-and-respond mechanisms from molecules to organisms across the tree of life, from the simplest living organism to multicellular animals. Converging insights across systems will define the basic principles of membrane homeostasis toward the goal of understanding, and extending, life. The ultimate vision of this work is a synthetic, responsive, self-maintaining, and growing membrane that will comprise an essential part of the first synthetic cell.

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