New Rules of Inheritance in Ancient Animals

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ABSTRACT:
We humans reproduce sexually, with inheritance accomplished through a combination of DNA from our parents. However, not all lifeforms operate under this mode of inheritance. Many basal animals reproduce asexually; their progeny directly inherit unadulterated parental DNA. Mutations that accumulate in the parental somatic tissue can be passed down to its descendants. Because they are unable to eliminate undesirable mutations through genetic recombination like sexually reproducing animals can, asexual lifeforms are often considered an evolutionary dead end. Similar mechanisms also underlie important health-related problems, such as the emergence of drug resistance in tumors, the pathological evolution of the gut microbiome, and even the directed evolution of microbes for metabolic engineering. With the important observation that a small group of asexual animals have evolved cryptic strategies to outrun this dead end, we study an extraordinary system of such, the planarian, small invertebrates renowned for their incredible regenerative capacity. In this talk, I will introduce the biology underlying this poorly understood mode of inheritance, and specify areas in which mathematics is needed to make progress.

Host: Tom Chou, Ph.D.

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