THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Working Seminar

How René Thom changed Molecular Biology

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Date:	November 20, 2023 (Monday)
Time:	3:00 – 4:00pm
Venue:	Room 210, Run Run Shaw Bldg., HKU

Abstract

As we celebrate the anniversary of René Thom's birth, it is revealing to review how his thought influenced molecular biology, whose presuppositions he was so critical of. The prophetic nature of his vision is revealed in a letter exchange with Antoine Danchin, following a discussion on determinism that began in the magazine Le Débat. What Thom understood by life was not the collection of organisms or the objects that make them up, but their form and the "animate" character of life. This question triggered a research program that motivated my exploration of an authentic link between information and the biological objects of metabolism. This has led me to identify agents that behave like Maxwell's demons, and which, by discriminating between classes of objects, will generate he "animation" factor that René Thom was looking for. More precisely, in the smallest genomes, at least one tenth of the genes encode functions of this type, and these are functions which, because they involve hitherto unknown behavior, have long remained "unknowns". These agents dissipate energy to manipulate information such as in the sorting process that allows only young proteins to occupy the bud of a new cell in yeast, while aged or damaged proteins end up in the mother cell. The dynamics that lead to the identification of entities in a class are slow, whereas the dissipation of energy to reset them to zero is rapid, exactly as proposed for the definition of a "catastrophe".

All are welcome