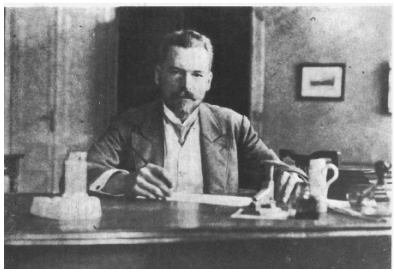

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On the scaling properties of spontaneous cell motility

Monday, 19 September 2022 16:20 (25 minutes)

Motility is one of the most salient aspects of cellular behavior. From the functional point of view, it is essential for many tasks cells perform, from forming tissues and organs during development to deploying the immune response during an infection. In addition, cell movements are usually easy to record, therefore allowing to perform quantitative studies of cell behavior.
Despite the advances in imaging and cell culture techniques of the last decades, there is still no agreement on the general laws that describe spontaneous cell movement. Moreover, the lack of a mechanistic model linking the activity of intracellular signaling cascades with spontaneous cell motility hinders our capacity to understand how cells integrate internal states and external cues into behavioral outputs.
Here we propose that cell behavior is the result of critical dynamics. To demonstrate this, we are required to show at least three types of evidence: i) scale-freeness and long-range correlations in the activity of intracellular signaling networks, ii) scaling behavior in spontaneous cell motility, and iii) collective phenomena emerging in the motility of groups of cells.
We will provide evidence from experiments and simulations to support this hypothesis, focusing on the scaling behavior of cells' spontaneous motility in different cell types and conditions. Furthermore, our results provide a framework for proposing new experiments and interpreting seemingly contradictory results from the literature.

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