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「遊走細胞集団の動的自己組織化と走化性」
Dynamic Self-Organization and Collective Response of Migrating Cells

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場所：理学部E館 1階 E131号室

Dynamic self-organization (DSO), or emergence of dynamic structures and coherent dynamics, may be one of the key processes for living systems to acquire complex structures and functions. A representative example of DSO in a living system is coordinated behavior of migrating cells. Migratory behavior is a ubiquitous kind of eukaryotic cell dynamics. Some cells migrate on a substrate according to intracellular signals that localize at their front or back, even without extracellular cues. When migrating cells communicate with each other and act in union, they can exhibit varieties of dynamic patterns and coherent motion. We are working on theoretical modeling and computational simulations of such single cellular migration [1,2] and multi-cellular behavior [3-6]. In this presentation, we will mainly discuss what forms of DSO of migrating cells are caused through contact communication between cells theoretically [5] and how such DSO could play functional roles. Firstly, our theoretical model based on an individual-cell dynamics is extend to the multi-cellular situation in which migrating cells perform two ubiquitous types of contact communication, called contact following and contact inhibition of locomotion [5], and the simulation results of this model regarding DSO will be explained [5]. Comparisons of some simulation results with the experimental observations of social amoeba are also provided [4]. Lastly, how such DSO can play roles for functional behaviors, like accurate directional migration under directional cue, is discussed based on simulations of the variant model [5,6].

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[5] T. Hiraiwa, Physical Review Letters 125, 268104 (2020).
[6] T. Hiraiwa, Euro. Phys. J. E 45, 1 (2022).

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