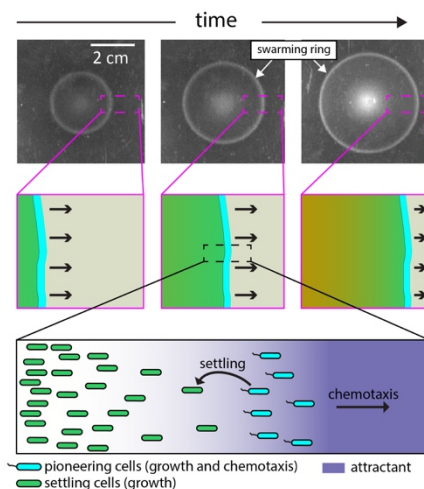


Bacterial chemotaxis and the fitness advantage of navigated range expansion

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Many bacteria are capable to sense and actively follow chemical gradients. Much is known about the swimming machinery and the molecular signaling involved in this process called chemotaxis. Much less is known about its physiological role to boost bacterial fitness. In this talk I will present a systematic investigation of bacterial chemotaxis and its dependence on different growth conditions for the model organism *Escherichia coli*. In contrast to previous reports, experiments show that cells swim in nutrient-replete conditions. Considering the collective motion of cells along self-generated gradients I show how swimming under such conditions increases the expansion dynamics into new territories and thus optimizes population growth. This navigated form of range expansion outcompetes the canonical form of range expansion not considering chemotaxis (Fisher-Kolmogorov dynamics) and is particularly fast when cells use low-abundant substrates as chemotactic cues to guide movement. Navigated range expansion might be a very general principle shaping the growth and evolution of expanding populations.

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**MPIDS, Prandtl lecture hall,
Am Faßberg 17, Göttingen**

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