
Tuesday, April 7, 2020**10h00, AI 1153**

GHI Floor Seminars

Special seminar by invited speaker

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Cooperation, competition and warfare in bacteria: from model systems to the microbiome

Since Darwin, evolutionary biologists have been fascinated by social behaviours. Honeybee workers labour their whole life without reproducing, birds make alarm calls, and humans are capable of extreme cooperation and conflict. Less attention was paid to the microbes, but it is now clear that they commonly live in densely interacting communities that have major effects on animals and plants. Here, microbes display a dizzying array of social traits, from enzymes released to break down food and antibiotics, through slimy secretions that protect and disperse, to draconian molecular machines that stab, rupture and poison their competitors. But what determines whether microbes cooperate or compete with each other, and how does this affect their hosts? To answer these questions, we combine theory and experiments with pathogenic bacteria and the mammalian microbiome. This has revealed that clonemate patches naturally emerge in microbial communities, which favours strong cooperation by kin selection. But interactions between strains and species are often competitive. We find that bacteria are often at war and are even capable of reciprocation, detecting incoming attacks and responding collectively in devastating counterattacks. Microbial interactions follow the same evolutionary principles that were first understood through the study of animal behavior. However, one fascinating property of microbes is that their entire ecosystem can lie within another evolving organism – a host - that is trying to control them and their interactions. The result appears to be a complex coevolutionary dance with the host and its immune system on one side, and the whole microbiota on the other.

Host: Melanie Blokesch