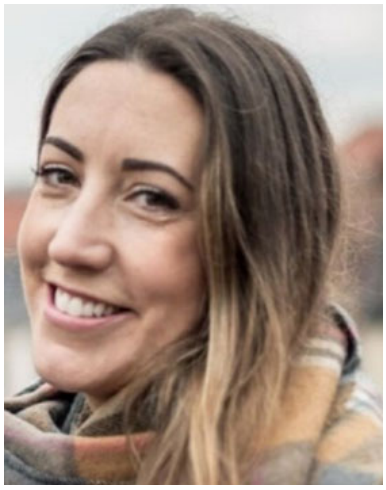

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Siobhán E. O'Brien, Ph.D.

Evolutionary Biology

ETH Zurich

Born in 1987 in Dublin

Studied Zoology at Trinity College Dublin and Evolutionary Biology at the University of Exeter

FELLOWSHIP

John Maynard Smith Prize-Fellow

PROJECT

Do Social Interactions Matter in Complex Communities of Microbes?

My research asks broad questions about how microbial communities evolve and function. In particular, I am interested in how intra- and interspecific interactions within these communities can shape environmentally and clinically important microbial traits, such as heavy metal bioremediation, adaptation to phage, antibiotic resistance, virulence and microbial motility. My research to date has shown that community context is crucial for understanding evolutionary trajectories of bacteria, and so by considering bacteria as single non-interacting cells we lose important information about the factors shaping bacterial evolution. To tackle these questions, I experimentally evolve microbes in complex environments that bridge the gap between the lab and the field - incorporating aspects such as spatial structure, interacting species and/or intraspecific variation. My ultimate goal is to link simple single-species in vitro evolution with field observations, allowing us to better understand the interplay between ecology and evolution in microbial communities.

Recommended Reading

O'Brien, S., E. Hesse, A. Lujan, D. J. Hodgson, and A. Buckling (2018). "No effect of intraspecific relatedness on public goods cooperation in a complex community". Evolution 72: 1165-1173.

O'Brien, S. and J. L. Fothergill (2017). "The role of multispecies social interactions in driving Pseudomonas aeruginosa pathogenicity in the cystic fibrosis lung." FEMS Microbiology Letters 364: 15.

O'Brien, S., D. J. Hodgson, and A. Buckling (2014). "Social evolution of toxic metal bioremediation in Pseudomonas aeruginosa." Proceedings of the Royal Society B: Biological Sciences 1787, 20140858.

COLLOQUIUM, 30.10.2018

Friend or Foe: The Importance of "Context" in Cystic Fibrosis Lung Infections

Cystic fibrosis is a fatal genetic disorder, where patients are predisposed to lifelong lung infections. The most common cause of mortality in cystic fibrosis patients is chronic infection with Pseudomonas aeruginosa, an antibiotic-resistant, virulent pathogen that is virtually impossible to eradicate once established. There is currently no cure for cystic fibrosis, and it remains the most common fatal genetic disease in Europe.

Our understanding of cystic fibrosis has changed dramatically from considering Pseudomonas aeruginosa infections as simple, non-interacting cells within a sterile lung, towards our current understanding that infections are dynamic, variable, embedded within multi-species environments, and rapidly evolving. This raises questions such as:

- What makes an infecting microbe turn from "good" to "bad"?
- What constitutes a "healthy" lung microbiome in cystic fibrosis?
- How variable are Pseudomonas aeruginosa infections in terms of virulence?
- Can we manipulate the microbiome to resist invasion by harmful microbes?

However, many of these questions have yet to be translated into experiments, and knowledge of how interactions between Pseudomonas aeruginosa and the microbiome within which it resides can shape patient health is lacking. I will discuss how our understanding of these infections can only be developed by moving away from clinical correlations and towards laboratory experiments, as well as the issues we are likely to face when making this transition.

PUBLICATIONS FROM THE FELLOW LIBRARY

O'Brien, Siobhán E. (London,2017)

High virulence sub-populations in Pseudomonas aeruginosa long-term cysticfibrosis airway infections

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1037099540

O'Brien, Siobhán E. (Malden, Mass.,2017)

The role of multispecies social interactions in shaping Pseudomonas aeruginosa pathogenicity in the cystic fibrosis lung

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1037098978

O'Brien, Siobhán E. (Cambridge, Mass.,2016)

Pseudomonas aeruginosa evolutionary adaptiation and diversification in cystic fibrosis chronic lung infections

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1037100972

O'Brien, Siobhán E. (Washington, DC,2016)

Temperate phages both mediate and drive adaptive evolution in pathogen biofilms

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1037100476