Abstract

Spore formation, or sporulation, is one of the earliest forms of cellular development on Earth. It is the most well-understood example of bacterial development. Its study often generates fundamental insights that are broadly applicable to our understanding of prokaryotic and eukaryotic biology.

Spores are dormant cells produced as a survival strategy in response to starvation stress. They are intrinsically resistant to various other stresses including: antibiotics, detergents, UV radiation and high temperatures, all of which are used to exterminate the vegetative forms of bacteria. These stress-resisting properties allow spores to persist in the environment for extended periods of time. When nutrients become available again, spores emerge from dormancy to generate fast-growing populations of bacteria. Since many disease-causing bacteria form spores that constitute a source of new and recurring infections in humans, animals and insects, a mechanistic understanding of sporulation is indispensable to the creation of strategies targeting spore-forming bacteria.

Five decades of research have led to the identification and characterization of over 100 genes that are required for successful completion of this developmental process. Some of these genes are absolutely required for spore formation, while most play important but nonessential roles, with mutant sporulation phenotypes ranging over eight orders of magnitude. Advances in the identification and characterization of sporulation genes have been punctuated by the introduction of new technologies. In this presentation, I will share our published and unpublished work that describes exciting new biology underlying sporulation, using approaches in genetics, structural biology and microscopy.

Biography

Chris Rodrigues is a molecular microbiologist interested in bacterial molecular biology and genetics. His research is focused on gene discovery and function and how proteins come together in space and time to organise and regulate the biology of the bacterial cell. His research explores these problems using the developmental process of sporulation.

He obtained his undergraduate degree in 2006 from the University of Minho (Portugal) with Honours in fungal molecular genetics from the University of Amsterdam. He then obtained his PhD at UTS (2007-2011), where his thesis explored the problem of how bacterial cells define the position of the division site. He then completed his postdoctoral training at the Harvard
Medical School (2011-2017), where he developed his expertise in bacterial sporulation. He returned to Australia in 2017 as a Chancellor’s Research Fellow at UTS where he started his laboratory (www.rodrigueslab.com) focused on multiple aspects of spore development. He is currently a Senior Lecturer and funded by the Australian Research Council.

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