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# Pathogens as Evolving Entities: Taking the ‘Microbe’s View of Infection’ Seriously

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## Abstract

Session: Reconceptions: Life at the Frontiers of Health and Disease (Pierre-Olivier Méthot, Neeraja Sankaran, Bartłomiej Swiatczak) Biological associations between living organisms typically fall into three broad (continuous) categories: mutualism, commensalism, and parasitism. While the first two usually result in the organism maintaining a delicate balance, the last one induces changes in the host and often leads to detrimental effects on health. Unsurprisingly, instances of parasitism resulting in host damage have been one of the most researched areas of the medical sciences. And as a consequence, pathogens are often defined from a strictly medical point of view, namely as organisms capable to cause disease in hosts. The frontier between health and disease states in biological associations is fluid, however, and both mutualistic and commensal organisms, long assumed to be harmless, can produce disease phenotypes under specific ecological circumstances. Furthermore, a number of pathogens cause disease only in immunocompromised hosts, not in otherwise healthy individuals – a finding that prompted some to distinguish ‘primary’ and ‘opportunistic’ pathogens. Finally, it emerges that not only host properties determine, to some extent, whether some microorganisms are pathogenic, but in some cases levels of virulence result from the immune system’s over-response itself. So what is the distinguishing feature of pathogens and commensal species? Going beyond the restricted medical concept of a pathogen, this paper takes the ‘microbe’s view of infection’ seriously and argues that looking at pathogens as evolving biological entities could lead to a more interactionist perspective of virulence and pathogenicity and furthermore, to a better understanding of the selective pressures favouring the transition from harmless commensals to infectious agents.

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