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Does climate change drive immunological memory in lower marine invertebrates?

All vertebrates possess adaptive immunity-a system that allows new responses to pathogens on the basis of past interactions. Adaptive immune systems are considered superior to other immune responses because of "immunological memory" which allows the system to learn. Invertebrates, however, are considered simple in structure and function, relying on a less advanced system called innate immunity. Herein lies a conundrum-how can simple invertebrates comprising >96% of all animal species, be similarly challenged by the microbial world, and yet remain healthy? The answer is that innate immunity preceded adaptive immunity in the evolution of immune recognition, and it provides the common thread that ties together immune recognition in invertebrates and vertebrates. Describing the repertoire of the innate immune system of extant cnidarians (i.e. coral) has both fundamental and applied applications - not only does it provide insight into the "basic immunological tool kit" of the common ancestor of all animals, but it may also be important in understanding the global decline of particular invertebrates and the survival of others facing climate change. In this study, we discuss the effects climate change is having in corals and their symbionts, comparative cell death processes, phagocytic-like cell responses to dysfunctional cells and/or disease, and the mechanisms they use to identify foreign bodies. We also explore whether coral have immunological specificity and mechanisms for adaptive protective immunity. This has far reaching evolutionary consequences because evidence may exist showing immunological specificity and perhaps, even memory.

Biography

Kevin B Strychar received his Bachelor and Master degrees in Biology and Microbiology from the University of New Brunswick in Canada. His Doctorate degree in 2002 is from Central Queensland University in Australia, where he studied conservation science with an emphasis on global warming and climate change. He has done Post-doctorate fellowships at the University of Connecticut, where he studied pollution and organisms in Long Island Sound, and at Dalhousie University in Nova Scotia, Canada, where he studied genetics and deep-sea organisms. From 2005 to 2012, he was teaching and doing research at Texas A&M University, where his focus was marine microbiology with a specialty in climate science and coral reef ecosystems. In 2012, he moved to a research position at the Annis Water Resources Institute, Grand Valley State University (Michigan), where he continues to study climate change on marine ecosystems but has expanded his focus to include the freshwater habitats of the Great Lakes. He also holds an adjunct position at Michigan State University, Department of Zoology. Over his short academic career (~10 years), he has secured more than $3 million dollars in research, published more than 35 papers, attended, spoke, and chaired at more than 100 national and international conferences including most recently, Israel, and helped supervise more than 50 students.

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