GEORGE MERCER AWARD

The Mercer Award is the oldest of the awards granted by the ESA. It is given in memory of a young British ecologist who was killed in action in World War I. The award is given to an author under 40 years of age in recognition of a single outstanding paper in ecology published during the past two years. The winners of this year's Mercer Award are P. T. J. Johnson and J. T. Hoverman, for their paper published in 2012, "Parasite diversity and coinfection determine pathogen infection success and host fitness" published in the Proceedings of the National Academy of Sciences USA 109:9006–9011.

This study addresses the nexus between the critical topics of biodiversity–ecosystem functioning; the dilution effect (biodiversity–disease transmission); and coinfection with multiple pathogens. The authors ask the question, "How does parasite biodiversity affect epidemiological responses such as pathogen transmission and host fitness?" They transcend the dominant approach in epidemiology of isolating the effects of single pathogens on single hosts to understand disease dynamics. They embrace the ecological reality that hosts are exposed to and affected by multiple pathogens, such that disease and transmission might depend on interactions between the host and the community of pathogens. The study raises the profile of ecological approaches to biomedical questions and solidifies the importance of our discipline to the health sciences.

To address their research question, the authors combined field infection data from 2191 amphibian hosts representing 158 parasite assemblages with elegant, well-replicated, mechanistic experiments to evaluate the influence of parasite diversity on host fitness and parasite transmission. Building from research on biodiversity–ecosystem functioning, the experiments contrasted species richness vs. composition, observed vs. randomized assemblages, and additive vs. replacement designs. The critical results were that: (1) higher parasite diversity consistently reduced the overall persistence of parasites within hosts, including those that cause morbidity and mortality; (2) higher parasite diversity increased host pathology when parasites were administered additively; and (3) higher parasite diversity decreased host pathology when added parasites replaced or reduced basally present parasites. Results were as strong or stronger when experimental assemblages were weighted by their observed frequency in nature.

The approach was novel because most prior studies focus on a single pathogen, with the emerging focus on coinfection generally increasing this to two pathogens. But in this study Johnson and Hoverman used six different parasite species in 25 treatments of 365 replicate hosts. They contrasted parasite richness vs. composition, randomized vs. realistic assemblages, and additive vs. substitutive designs. Moreover, they directly compared laboratory findings with extensive field data from >2100 hosts in >150 assemblages. Their experiments were profoundly informed by companion field studies.