

Patuxent Wildlife Research Center

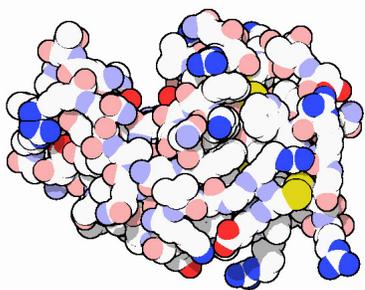
Using Wildlife Species to Understand Immune Adaptations of Biomedical Significance



The Challenge: In an era when emerging infectious diseases are steadily increasing due to changes in global transportation and climate, wildlife species are demonstrating notable differences in susceptibility and resistance to disease. We study immunity in cowbirds because they are unusually disease-resistant for insight into how they successfully control disease with the ultimate goal of applying insights to protect human populations. Cowbirds are obligate brood parasites, species that lay their eggs in other birds' nests, exploiting their parental care but increasing their exposure to disease by this physical intimacy with other species.



The Science: A model group of songbirds, which we discovered are unusually resistant to West Nile virus, serve as our study organisms for investigations of effective immunity. We are profiling the immune adaptations of the New World cowbirds for insight into the design and function of their immune system. We have shown that cowbirds are also unusually resistant to virulent endemic arboviruses like Western equine encephalomyelitis virus (WEEV) and St. Louis encephalitis virus (SLEV). We have discovered that cowbirds have more effective innate immune mechanisms. These are immune defenses that act quickly and serve as the first line of defense against infection. Recently, we characterized the immune components of cowbird eggs and discovered significantly greater levels of antibacterial (lysozyme and immunoglobulin) substances. We are currently assessing how widespread among cowbird species is this immune trait of elevated antibacterial substances and how broad a range of pathogens lysozymes and immunoglobulins are effective against.



The Future: Understanding how the immune system evolves is a cutting edge topic uniquely suited to research on animal species by wildlife biologists. As we profile enhanced immune defenses in selected wildlife species, we document immune adaptations that are useful for biomedical applications to human health. Our next projects address the development, diversity and nature of gut microbes in cowbirds, and how these may contribute to more effective disease resistance in cowbirds.