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Testimony of
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On
Fiscal Year 2018 Appropriations for the National Institutes of Health and Centers for Disease Control and Prevention
Submitted to the
Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies
United States House of Representatives

March 8, 2017

The Entomological Society of America (ESA) respectfully submits this statement for the official record in support of funding for arthropod-borne disease research at the U.S. Department of Health and Human Services (HHS).

ESA requests a robust fiscal year (FY) 2018 appropriation for the National Institutes of Health (NIH) at $2 billion above the final FY 2017 enacted levels. This should include increased support for arthropod-borne disease research at the National Institute of Allergy and Infectious Diseases (NIAID). The Society also supports increased investment in the core infectious diseases budget and the global health budget within the Centers for Disease Control and Prevention (CDC) to fund scientific activities related to vector-borne diseases.

Cutting-edge research in the biological sciences, including the field of entomology, is essential for addressing societal needs related to environmental and human health. Many species of insects and their arachnid relatives (including ticks and mites) serve as vectors of a diversity of infectious diseases that threaten the health and well-being of people across the globe, including populations in every state and territory of the United States and U.S. military personnel serving abroad. Vector-borne diseases can be particularly challenging to control; effective vaccines are not available for many of these diseases, and controlling the vectors is complicated by their mobility and their propensity for developing pesticide resistance.

The risk of emerging infectious diseases grows as global travel increases in speed and frequency and as environmental conditions conducive to vector population growth continue to expand globally. The exponential rise of the Zika virus in the Americas is an example of the astonishing rapidity with which an insect-borne disease can become pandemic. Entomological research aimed at elucidating the relationships between arthropod vectors and the diseases they transmit–including, in the case of mosquitoes, dengue, Zika virus, and chikungunya, and, in the case of ticks, Lyme disease, human anaplasmosis and ehrlichiosis –is essential for reliable monitoring and prediction of outbreaks, effective prevention of disease transmission, and rapid diagnosis and treatment of diseases. The magnitude of the challenges presented by vector-borne diseases

cannot be overstated; mosquitoes alone are considered responsible for the deaths of more people than all other animal species together (including humans).

Given the enormous impact of arthropod vectors on human health, ESA urges the subcommittee to support vector-borne disease research programs that incorporate the entomological sciences as part of a comprehensive approach to addressing infectious diseases.

NIH, the nation's premier medical research agency, advances human health by support of research on basic human and pathogen biology and by development of prevention and treatment strategies. More than 80 percent of NIH funding is competitively awarded to scientists at approximately 2,500 universities, medical schools, and other research institutions across the nation. As one of NIH's 27 institutes and centers, NIAID conducts and supports fundamental and applied research related to the understanding, prevention, and treatment of infectious, immunologic, and allergic diseases.

One example of NIAID-funded research on infectious diseases is a study examining the mechanism by which DEET, a widely used synthetic mosquito repellent discovered more than 60 years ago, is perceived by the southern house mosquito, a vector of St. Louis encephalitis and West Nile virus. DEET was shown to bind to and activate a specific odorant receptor on the antennae of female mosquitoes; moreover, inactivating the gene that codes for the receptor protein dramatically reduced the repellency of DEET. These investigators also showed that methyl jasmonate, a plant-derived mosquito repellent, activates the same receptor, opening up the possibility that this specific odorant receptor may be a useful target for developing new, safe and affordable repellents.[1]

Another example of infectious disease research supported by NIAID is an ongoing study aimed at understanding the molecular mechanisms underlying the feeding behavior of the black-legged tick and the lone star tick; these two species are principal vectors for multiple human tick-borne diseases in the United States, including Lyme disease and human ehrlichiosis, respectively. These ticks, which must feed for several days, remain attached to their hosts by producing an adhesive secretion known as tick cement. In this study, investigators are working to identify the proteins in tick cement that are injected first into the feeding site, before transmission of disease-causing pathogens, including the Lyme disease agent. Identifying these proteins and disabling them can provide an entirely new strategy for disrupting the transmission cycle of Lyme disease and other tick-borne human illnesses.[2]

To ensure funding for future groundbreaking projects of great utility for public health, ESA supports increased funding for NIAID and encourages the committee to support vector-borne disease research at NIH.

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[1] Xu, P et al. 2014. Mosquito odorant receptor for DEET and methyl jasmonate. Proc. Natl. Acad. Sci. USA 111: 16593-16597 (NIAID NIH Award R01AI095514).

[2] Mulenga, A. 2016. *Ixodes scapularis* and *Ambylomma americanum* tick cement proteome. (NIAID NIH Award 1R21AI119873-01A1

CDC, serving as the nation's leading health protection agency, conducts science and provides health information to prevent and respond to infectious diseases and other global health threats, irrespective of whether they arise naturally or via acts of bioterrorism. Within the core infectious diseases budget of CDC, the Division of Vector-Borne Diseases (DVBD) aims to protect the nation from the threat of viruses and bacteria transmitted primarily by mosquitoes, ticks, and fleas. DVBD's mission is carried out by a staff of experts in several scientific disciplines, including entomology.

Among the activities supported by DVBD are the ArboNET surveillance system for mosquito-borne diseases and the TickNET system for tick-borne diseases. ArboNET is a nationwide network managed by CDC and state health departments that monitors West Nile virus, Zika virus and other arthropod-borne diseases through a variety of activities, including the collection and testing of mosquitoes. TickNET is a partnership between state and local health departments and the CDC's Division of Vector-Borne Diseases and Division of Parasitic diseases that tracks tick-borne diseases such as Lyme disease and funds applied research aimed at prevention and pathogen discovery. As well, a component of CDC's global health budget supports activities on malaria and other parasitic diseases, which include maintaining a global reference insectary that houses colonies of mosquitoes from around the world to be used by the agency for studies on malaria transmission.

Given that the contributions of the CDC are vital for the health security of the nation, ESA requests that the committee provide robust support for CDC programs addressing vector-borne diseases.

ESA, headquartered in Annapolis, Maryland, is the largest organization in the world serving the professional and scientific needs of entomologists and individuals in related disciplines. Founded in 1889, ESA has over 6,500 members affiliated with educational institutions, health agencies, private industry, and government. Members are researchers, teachers, extension service personnel, administrators, marketing representatives, research technicians, consultants, students, pest management professionals, and hobbyists.

Thank you for the opportunity to offer the Entomological Society of America's support for HHS research programs. For more information about the Entomological Society of America, please see http://www.entsoc.org/.