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Testimony of

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On

**Fiscal Year 2020 Appropriations for the National Institutes of Health, Centers for Disease Control and Prevention, and the Institute of Museum and Library Services**

Submitted to the

**Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies**

**United States House of Representatives**

April 4, 2019

The Entomological Society of America (ESA) respectfully submits this statement for the official record in support of funding for insect-borne disease research at the U.S. Department of Health and Human Services (HHS). **ESA requests \$41.6 billion in fiscal year (FY) 2020 for the National Institutes of Health (NIH), including increased support for insect-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 for a total of \$7.8 billion in FY 2020. ESA also requests Congress provide full funding for the Institute of Museum and Library Services (IMLS), including \$38.6 million in FY 2020 for the Office of Museum Services.**

NIH, the nation's premier medical research agency, advances human health by supporting research on basic human and pathogen biology and by developing prevention and treatment strategies. 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 arachnids (including ticks and mites) serve as carriers, or vectors, of an array of infectious diseases that threaten the health and well-being of people across the globe. This threat impacts citizens in every state and territory of the U.S. and military personnel serving at home and abroad. The mosquitoes that vector diseases are considered responsible for the deaths of more people than all other animal species combined, including humans.<sup>1</sup> Vector-borne diseases can be particularly challenging to control; controlling the insect and arachnid vectors is complicated by their mobility and their propensity for developing pesticide resistance. Further, effective vaccines are not available for many of these diseases.

Within NIH, NIAID conducts and supports fundamental and applied research related to the understanding, prevention, and treatment of infectious diseases. The risk of emerging infectious diseases grows as global travel increases in speed and frequency and as environmental conditions conducive to population growth of vectors, like mosquitoes and ticks, continue to expand globally. Entomological research aimed at understanding the relationships between insect vectors and the diseases they transmit is essential for reliable monitoring and prediction of outbreaks, effective prevention of disease transmission, and rapid diagnosis and treatment of diseases. For example, NIAID researchers at the NIH recently discovered that flaviviruses

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<sup>1</sup> <https://www.gatesnotes.com/Health/Most-Lethal-Animal-Mosquito-Week>

reproduce in tick salivary glands.<sup>2</sup> The most notorious of flaviviruses include the viruses that cause dengue fever, Zika, West Nile, yellow fever, and Powassan. The Powassan virus is the only disease-inducing flavivirus that is endemic to North America and is a re-emerging virus that is very rapidly transmitted by ticks. By identifying that these viruses reproduce in the salivary glands in ticks, scientists have identified a possible explanation for the high speed in which transmission of this virus between the vector and the host takes place. This breakthrough will aid in the identification of transmission pathways which can then be used to eliminate this tick-borne flavivirus disease as more information becomes available. **Given the enormous impact of insect carriers of disease 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.**

CDC, serving as the nation's leading health protection agency, conducts scientific research 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.

CDC plays a key role in tracking new and emerging diseases. Dengue fever, limited 50 years ago to a small region in Southeast Asia, has now spread across several continents and

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<sup>2</sup> <https://www.niaid.nih.gov/news-events/nih-scientists-explore-tick-salivary-glands-tool-study-virus-transmission-and-infection>

results in about 500,000 deaths per year.<sup>3</sup> Chikungunya fever, once constrained to eastern African, has now spread across the globe with Chikungunya infection rates surpassing that of dengue in the Caribbean.<sup>4</sup> Both diseases are spread by mosquito vectors that occur widely in the southern U.S. The first cases of Chikungunya locally acquired in Florida were reported in the last decade, and both viruses threaten to spread further into the U.S., especially in the face of changing climate conditions. Funding for research on what effects population dynamics of the primary vector, the yellow fever mosquito (*Aedes aegypti*), is critical to developing strategies for stemming the spread of these diseases and preventing a major public health crisis.

CDC has also awarded nearly \$50 million to five universities to establish regional centers of excellence (COE) that can help effectively address emerging and exotic vector-borne diseases. The five centers, for which current funding expires in 2021, help generate the necessary research, knowledge, and capacity to enable appropriate and timely local public health action for vector-borne diseases throughout the U.S. This is critical given significant regional differences in vector ecology, disease transmission dynamics and resources. One recent breakthrough, supported by the Southeastern COE in Vector Borne Diseases, used CRISPR gene-editing technologies to figure out what genes contribute to how mosquitoes are attracted to humans.<sup>5</sup> The goal is to use this knowledge to find new ways to use something more like a perfume and less like bug spray to help make humans “invisible” to mosquitoes. **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 and to continue to support the Centers of Excellence beyond 2021.**

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<sup>3</sup> <https://med.stanford.edu/news/all-news/2019/01/set-of-genes-predicts-severity-of-dengue.html>

<sup>4</sup> <https://www.ncbi.nlm.nih.gov/pubmed/26518229>

<sup>5</sup> <https://www.cell.com/action/showPdf?pii=S0960-9822%2819%2930215-5>

The services and funding provided by IMLS are critical in several areas – research infrastructure, workforce development and economic impact. The IMLS provides for the expansion of collections capabilities at American museums, which are key for the identification, documentation of locations, and classification of entomological species. Funding provides for the training and education of students and museum professionals. The 21<sup>st</sup> Century Museum Professionals Program provides opportunities for diverse and underrepresented populations to become museum professionals, expanding participation in an industry with an annual economic contribution of approximately \$21 billion. Museums are critical to the public understanding of emerging major scientific issues through exhibits and programs, and in so doing, support science education as an integral part of the nation’s educational infrastructure. Finally, they make significant long-term contributions to economic development in their local communities, which is why **the Society requests no less than \$38.6 million for the Office of Museum Services within IMLS in FY 2020.**

*ESA thanks the committee for the opportunity to provide input on these important priorities. 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. As the largest and one of the oldest insect science organizations in the world, ESA has over 7,000 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. For more information about the Entomological Society of America, please see <http://www.entsoc.org/>.*