



Establishment of the Tick Biobank and its application to vector biology research*

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In the past decades, omics data including genomes, transcriptomes, and proteomes of ticks of medical and veterinary importance have become available worldwide as web-based resources. Additionally, laboratory colonies and cell lines of these ticks have been established and now become essential tools for the research advancement of ticks and tick-borne diseases. Nevertheless, such research resources on the ticks distributed in Japan are limited to *Haemaphysalis longicornis*, a major hard tick species in Japan and a vector of various microorganisms that are harmful to humans and animals. *H. longicornis* has long been used as an “experimental model of hard tick” for biological and physiological studies and for validation of the effectiveness of insecticides or acaricides in research institutions. The parthenogenetic tick is a suitable research tool because of its ease of stable supply. In 2017, the National Research Center for Protozoan Diseases, Obihiro University of Agriculture and Veterinary Medicine started a project titled “Establishment of the Tick Biobank and its application to vector biology research”, supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan. The goal of this project is the establishment of the ‘Tick Biobank’ which includes the construction, maintenance, and supply of colonies of globally important tick species and the compilation of multi-omics data. In addition to the accumulation of omics data, physiological events such as blood feeding and reproduction need to be standardized at cell/tissue/whole-body levels. For example, to date, we reported the developmental process of oocytes from the unfed period through the oviposition period and proposed the classification criteria for oocyte development in parthenogenetic *H. longicornis*. *Babesia*-tick and *Theileria*-tick experimental models were established to understand the interaction of molecules between pathogens and ticks. Although our current priority of tick species for the establishment of the tick biobank is *H. longicornis*, we are also attempting to establish laboratory colonies of other important tick species in order to expand tick research in our center. A comprehensive understanding of ticks at the genome, transcript, protein, cell/tissue, and whole-body levels will be an indispensable concept for the progress of tick studies. Offering and sharing the research resources (i.e., tick colonies) and omics data to the tick-research community will lead to efficient progress of tick research. Here, the multifaceted activities in our ‘Tick Biobank’ project will be introduced.

Keywords: tick, *Haemaphysalis longicornis*, research resource, laboratory colony, tick-pathogen interaction