## Laboratory of Environmental Hygiene

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There are countless different kinds of microorganisms around us. Some of these infect various animals, plants, and humans and cause disease, while others do not. There are also some that help digest food in the intestines of animals, such as intestinal bacteria and virus, and some that probably play an important role in the evolution of animals and plants. In this way, the microorganisms that exist around us interact with animals and plants to form ecological microcosms and macrocosms.

In this research field, we are conducting basic research on pathogenic microorganisms that cause zoonotic diseases (animal-borne disease, or zoonosis), which are transmitted from animals to humans or humans to animals, to clarify the pathogenicity expression mechanism and the mode of existence in the natural environment, as well as public health measures. Specific research subjects are zoonotic diseases transmitted by arthropods such as mosquitoes and ticks (Figure 1). There are concerns that the habitat range of vector mosquitoes and ticks has expanded due to global warming in recent years, and that this will lead to an expansion of the epidemic areas of various arthropod-borne infectious diseases. In Japan, there is an urgent need to prevent the invasion of pathogens such as viruses and bacteria that are prevalent overseas and to prevent their domestic epidemics. Therefore, we are conducting research on the following research themes.

(1) Epidemiological analysis of mosquito- and tick-borne zoonotic diseases in Kyoto City and development of new testing methods and vaccines

(2) Etiological and molecular biological analysis of pathogenic microorganisms causing mosquito- and tick-borne zoonotic diseases

Figure 1. Infection cycle of mosquito-borne zoonotic diseases As an example of an arthropodborne zoonotic disease. the infection cycle of mosquito-borne West Nile virus infection is shown below. In nature, the life cycle is maintained among birds, with mosquitoes acting as vectors.



However, it can suddenly infect horses, pigs, and humans, causing severe symptoms such as encephalitis.