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FACULTY: Faculty of Mathematics and Natural Sciences
DEPARTMENT: Department of Biosciences
AREA OF EXPERTISE: Disease ecology and epidemiology
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DISSERTATION TITLE: *The epidemiology of plague in Europe: inferring transmission dynamics from historical data*

Plague is a vector-borne zoonotic disease caused by *Yersinia pestis* that produces serious and potentially fatal infections in humans. The transmission of plague to humans can occur through contact with animals, fleas, or aerosols. While human cases of plague today are relatively rare, the disease is infamous as the cause of three historical pandemics. The spread of plague during these large-scale epidemics remains poorly understood.

Katharine R. Dean, a PhD candidate at the University of Oslo, has studied the epidemiology of plague in Europe during the Second (14th-19th centuries) and Third (beginning in the 19th century) Pandemics. Her research utilizes historical mortality records and infectious disease modeling to investigate the human-mediated transmission of plague.

Several researchers have argued that plague spread in Europe by human ectoparasites, such as body lice or human fleas. In her thesis, Dean presents a model for human ectoparasite transmission of plague that could explain the spread of plague during the Second Pandemic, as compared to models for rat-borne and pneumonic transmission. Using a more recent outbreak of plague in Glasgow in 1900 as a case study, Dean reconstructs the spread of plague between individuals during an outbreak where investigators did not find plague in the rat population. In both studies, she estimates key epidemiological parameters for plague and highlights the importance of household transmission as an important characteristic of outbreaks in Europe. Lastly, Dean compiles outbreak records from the Third Pandemic that reveal the decline in plague cases in Europe up until the 1950s, when plague eventually disappeared from the continent.

Overall, this thesis improves our understanding of historical plague outbreaks in Europe, whilst recognizing the limitations of modeling historical plague data and the controversies surrounding plague in Europe with particular reference to rats and human ectoparasites.