

The threat of tick-borne disease pathogens is the subject of study conducted by many research centres around the world. There are two aspects to the risk - the threat from the ticks and the risk from pathogens transmitted by ticks. Most of study focuses on one of these two issues usually, or a combination of both, and estimates the risk of disease transmission to humans or pets. Study are carried out in various environments - natural, anthropogenic, or these environments are compared with each other. One of the environmental aspects that make up the processes take place in zoonotic foci - the seasonality of infections - is usually ignored.

The seasonality of the tick activity is a well-known phenomenon and widely studied for decades. This phenomenon concerns also other bloodsucking arthropods - fleas and bloodsucking flies. The seasonality of the occurrence of vectors is closely related to the seasonality of infection of mammals with transmitted pathogens. The seasonality of the number of patients affected by TBE virus, or with Lyme disease is well known. Similar relationships are described for pathogens of wild mammals transmitted by arthropods. However, there is no data to the opposite impact – there are few information about seasonal variability in the infection of the arthropods with pathogens, depending on the season.

The aim of the project is to show the presence of a seasonal dynamic of the common ticks *Ixodes ricinus* infection with *Borrelia burgdorferi* spirochetes and bacteria *Anaplasma phagocytophilum*. The study will be carried out on park areas in Warsaw, in Las Bielański. The choice of research plots was dictated by the previously demonstrated abundant occurrence of common ticks and their infection with the above-mentioned pathogens. The study will be conducted in 2022, 2023 and 2024, in four selected periods - in early spring, shortly after the ticks resume activity (March), the end of the spring activity period (beginning of June), at the beginning of the autumn activity peak (second half of August), the finish of autumn peak of activity (end of October). Ticks will be collected by flagging method on selected areas. Each time 200 female ticks will be collected, which is the minimum number necessary to detect the presence of the pathogen in the environment and to compare the prevalence of infection of the tick population with others, as well as the potential seasonal differences. The study conducted for three following seasons will allow to justify whether the differences in the prevalence of infection once detected are a manifestation of a constant pattern, including seasonal changes, or whether other causes should be searched for.

The diagnosis of tick infestation by pathogens will be carried out using the PCR and nested-PCR methods, with the use of specific primers. Identification of pathogens will be carried out by sequencing of positive PCR reaction products and sequence analysis using BLAST software.

The working hypothesis is that the infection of ticks by the selected pathogens is subject to seasonal variability, likewise the infection of mammals. At present it is not possible to confirm the hypothesis, or even estimate the months in which ticks should be most intensively infected. The confirmation of the working hypothesis - that the seasonal dynamic has place, demonstrating that ticks are more frequently infected in some months - will allow for a more accurate estimation of the risk of tick-borne disease infection for people visiting endemic areas of tick-borne diseases and inhabited by ticks. If the hypothesis will not be confirmed, the risk estimation could be further based on the number of ticks and their extensiveness of infection at any given time.