

# Identifying *Borrelia* in the ticks of Dorset

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**Aim:** Students from the Thomas Hardy School have extracted and analysed the DNA of 47 ticks from Dorset using PCR and gel electrophoresis

## Background

Lyme disease is a bacterial infection caused by the spirochete *Borrelia burgdorferi*, which is passed on to humans and other animals by a tick bite. Of the 36 known species of *Borrelia*, 12 are known to cause Lyme disease. In the UK, Lyme disease is most commonly carried by sheep ticks, these typically reside in long grasses and woodland. To infect humans, a non-human host must first be infected so the bacteria can multiply and be passed on via the blood when a tick feeds. The infection can then be transmitted to humans via saliva from the tick when it attaches and feeds.



## Objectives

- Attain data on *Borrelia* distribution in Dorset
- Identify ticks in the sample positive for *Borrelia*
- Gain laboratory skills and knowledge of procedures used using specialist equipment

The ticks were collected by pet owners all around Dorset and stored in ethanol. Their locations and habitat were recorded

We documented the ticks by sample number, size, age and sex

We decapitated the ticks and extracted their DNA

We used PCR to prepare the tick DNA for gel electrophoresis

We cast the gels and then ran them testing for DNA in the ticks

We prepared another sample of tick DNA, cast another gel and then ran these against positive controls samples to test for *Borrelia*

Gel showing DNA ladder, positive *Borrelia* control, and 5 tick samples (all negative for *Borrelia*).

## Results:

| Number of ticks tested | Number of ticks positive for DNA | Number of ticks positive for <i>Borrelia</i> |
|------------------------|----------------------------------|--|
| 47                     | 47                               | 0  |

We did not find any positive results for *Borrelia*, however we did not use a very large sample size, and additionally many ticks came from the same area, so perhaps only ticks from areas without *Borrelia* were tested, which would explain the absence of positive samples



Overall, this was a really enjoyable experience and has been a great opportunity to learn new skills and practise scientific techniques.

The project will be continued next year, with more samples being analysed creating an even wider database of results.

This project was in collaboration with The Royal Society and Exeter University, who provided funding which enabled us to buy the equipment and materials needed for procedures.