

Study reveals new ways deadly squirrelpox is transmitted to red squirrels

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Native red squirrels have declined throughout Britain and Ireland for the last century due to a combination of habitat loss and the introduction of the North American eastern grey squirrel. But more recently its few remaining populations have been devastated by an insidious pox virus passed to them by the alien invaders.

A study by the biodiversity and conservation research centre *Quercus* at Queen's University Belfast, and published in the journal *PLOS ONE*, found the situation may be worse than previously thought as the disease appears to have multiple modes of potential transmission.

Invading grey squirrels, which harbour the disease but typically do not suffer symptoms, may pass the [virus](#) in their urine. The research team conducted experiments to examine the survival of the virus outside the body in the wider environment, showing that it persists best in warm dry conditions. This raises the possibility that infected grey squirrels could pass on the disease by uninfected squirrels coming into contact with their dried urine during spring and summer.

The virus was also found in the parasites of pox positive squirrels including fleas, mites and ticks, which are capable of carrying the disease between individuals or between the species.

The study also examined the numbers of virus particles circulating in the systems of infected red squirrels which was some 50,000 times higher than those in infected grey squirrels. Red squirrels get so sick from the disease that they may exhibit diarrhoea which was also shown to contain high levels of virus potentially facilitating transmission between red squirrels once the disease has successfully jumped the species barrier.

Dr Neil Reid from the School of Biological Sciences at Queen's, one of the lead authors on the paper, said "We already know that squirrelpox is fatal to red squirrels and their replacement by the invading [grey squirrels](#) is up to 25 times faster where the virus is present."

"Our work suggests that the devastating effect of the disease may be down to the apparent ease with which it spreads via urine, parasites and faeces. Moreover, unlike many viruses which peak in winter our experiments suggest squirrelpox persists best in spring and summer when

squirrels are more active and likely to encounter the disease."

The study also looked at past levels of exposure, by testing squirrels for antibodies to the virus, and current levels of active infection by testing squirrels for the presence of the squirrelpox viral DNA.

"Most populations possessed both antibodies and active virus but levels varied considerably between forests. More importantly from a conservation perspective, some populations did not possess antibodies, so had not been exposed previously, but had high levels of active virus suggesting that disease had arrived only recently. Such populations were typically at interfaces between the species where the invading grey had only just colonised. This has allowed us to highlight specific populations of native red squirrels that are currently under threat and in need of protection." Dr Reid added.

Limiting the contact between the species may provide a means by which to slow or prevent the spread of the disease to remaining isolated populations of [red squirrels](#). In areas where the ranges of the two species overlap, measures to reduce encounter rates are considered essential.

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