

# Statement about recent study claiming hedgehogs to be future hosts of coronaviruses

By Dr Sophie Lund Rasmussen, hedgehog researcher

A study recently published in [Nature Communications](#) used a similarity-based machine-learning pipeline approach to predict associations between coronaviruses and their potential mammalian hosts. The authors concluded that several native, British wildlife species, including the hedgehog, have the potential to become hosts for future outbreaks of coronaviruses. Such a conclusion, if correct, would have obvious epizootiological consequences, but could also impact public fears and perceptions in ways that could have unintended consequences that undermine the conservation efforts for hedgehogs.

As the ongoing current pandemic has made clear, genetic mutations in viruses can occur very fast and may lead to new variants with the potential to elude preventive measures, such as vaccines. Therefore, there is a need for research predicting the likelihood of new strains of coronaviruses and their hosts.

However, the recent study omits discussion of previous [research](#) that, importantly in the context of both risk and public perception, indicates that the evolutionary jump required for hedgehogs to become hosts of SARS-CoV-2 (COVID-19) would be so substantial that the risk is highly unlikely. The main receptor of SARS-CoV-2, called angiotensin I converting enzyme 2 (ACE2) is needed for the virus to infect an individual. But the hedgehogs' ACE2 differs extensively from that of humans, having only 13 out of the 25 residues tested identical to the human SARS-CoV-2 S-binding hot spots. Another [study](#) used different approaches to analyse the ACE2 genes (orthologs) from a range of animal species, one being the European hedgehog, and the interactions with the SARS-CoV-2 receptor binding domain (RBD). These researchers concluded that European hedgehogs seem to be unsusceptible to SARS-CoV-2. Both studies indicated that humans and hedgehogs appear to differ considerably at key points of the molecular structures required for SARS-CoV-2 to infect, rendering the risk for cross-specific infection of SARS-CoV-2 highly unlikely at the present time.

The situation is that many species of wildlife, hedgehogs amongst them, carry host-specific genetically distinct strains of coronaviruses which cannot infect humans. The coronavirus previously detected in hedgehogs, but harmless to humans, is called EriCoV. To date SARS-CoV-2 has not been detected in hedgehogs.

The recent study argues that one of the greatest risks from new variants of coronaviruses lies in co-infections with SARS-CoV-2 and another coronavirus. In the case of the hedgehog, this would necessitate the simultaneous infection in hedgehogs or humans with SARS-CoV-2, which *cannot* infect hedgehogs, and EriCoV, which belongs to a different genetic clade than SARS-CoV-2 and *cannot* infect humans, making such co-infection very unlikely at the present time, given the substantial genetic differences between humans and hedgehogs at key points of the molecular structures required for SARS-CoV-2 to infect.

While the machine-learning study suggests *potential* mammalian hosts of *future* coronaviruses, it did not consider in detail the several larger evolutionary jumps necessary to fulfil this potential.

The recent study may therefore unintentionally raise concern about a role for hedgehogs that is actually very remote, and thus inadvertently runs the risk of undermining conservation efforts of a species that is already in worrying decline. Currently, there is no reason for citizens to fear that wildlife species such as the hedgehog visiting their gardens will transfer coronavirus to them.

## Quotations:

“I acknowledge the need for research investigating new potential risks in an attempt to be one step ahead of future pandemics. But the recent study unfortunately contributes to the landscape of fear developing in the wake of the horrific pandemic we are now experiencing, especially when naming and thereby shaming wildlife species, with a mere theoretical potential to becoming future hosts of coronavirus outbreaks. This may unfortunately compromise the extensive conservation efforts to protect the declining populations of hedgehogs in the wild.”

“As we cannot predict the future, it is impossible to rule out the potential risk of native wildlife species becoming hosts of new strains coronaviruses with the potential to infect humans. But at the present time, based on the knowledge gathered through research, there is no reason for citizens to fear that wildlife species such as the hedgehog visiting their gardens will transfer coronavirus to them.”

## Contact information:

Dr Sophie Lund Rasmussen

PhD, MSc, BSc in biology,  
Hedgehog ecology and conservation

Postdoctoral research fellow

Department of Chemistry and Bioscience  
Aalborg University  
&  
WildCRU, University of Oxford

UK mobile phone: 07871837510 or  
+44 7871837510  
Danish mobile phone: +45 22117268

Mail: [sophielundrasmussen@gmail.com](mailto:sophielundrasmussen@gmail.com)

Skype: sophie.lund.rasmussen

Twitter: @Dr\_Pindsvin

Facebook: [www.facebook.com/Pindsvineforskning/](https://www.facebook.com/Pindsvineforskning/)

Research profile: <https://www.wildcru.org/members/dr-sophie-lund-rasmussen/>



Photo by Pia Burmøller Hansen