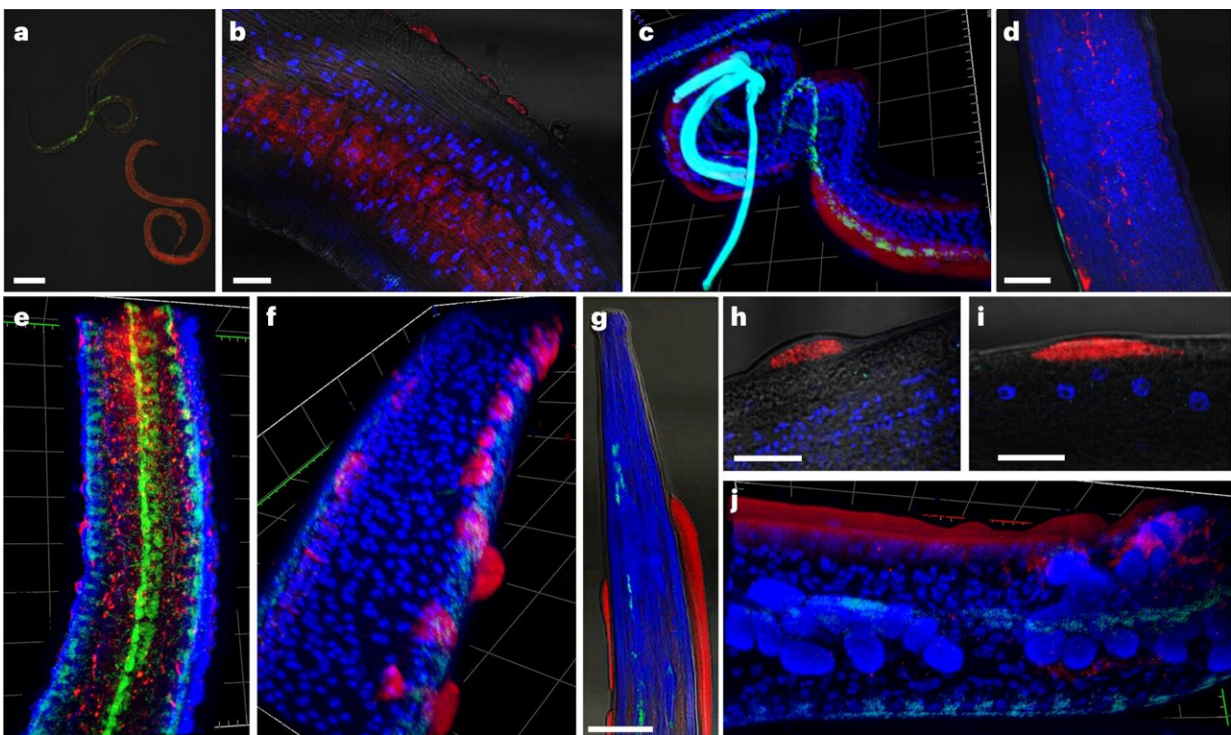


# Newly discovered viruses in parasitic nematodes could change our understanding of how they cause disease

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Representative FISH microscopy images of *B. malayi* showing localization of virus RNA within nematode tissues, alongside the *Wolbachia* endosymbiont as a technical control. Credit: *Nature Microbiology* (2024). DOI: 10.1038/s41564-024-01796-6

New research shows that parasitic nematodes, responsible for infecting

more than a billion people globally, carry viruses that may solve the puzzle of why some cause serious diseases.

A study led by Liverpool School of Tropical Medicine (LSTM) used cutting-edge bioinformatic data mining techniques to identify 91 RNA viruses in 28 species of [parasitic nematodes](#), representing 70% of those that infect people and animals. Often these are symptomless or not serious, but some can lead to severe, life-changing [disease](#).

Nematode worms are the most abundant animals on the planet, prevalent in all continents worldwide, with several species infecting humans as well as agriculturally and economically important animals and crops. And yet in several cases, scientists do not know how some nematodes cause certain diseases.

The new research, [published](#) in *Nature Microbiology*, opens the door to further study of whether these newly discovered viruses—only five of which were previously known to science—could contribute to many chronic, debilitating conditions. If a connection can be proven, it could pave the way for more effective treatments in the future.

Mark Taylor, Professor of Parasitology at LSTM, said, "This is a truly exciting discovery and could change our understanding of the millions of infections caused by parasitic nematodes. Finding an RNA virus in any organism is significant, because these types of viruses are well-known agents of disease. When these worms that live inside of us release these viruses, they spread throughout the blood and tissues and provoke an immune response.

"This raises the question of whether any of the diseases that these parasites are responsible for could be driven by the virus rather than directly by the parasitic nematode."

Parasitic nematodes including hookworms and whipworms can cause severe abdominal problems and bloody diarrhea, stunted development and anemia. Infection with filarial worms can lead to disfiguring conditions such as lymphedema or "elephantiasis," and onchocerciasis, or "river blindness," that leads to blindness and skin disease.

The study authors propose that these newly identified viruses may play a role in some of these conditions. For example, onchocerciasis-associated epilepsy (OAE) that occurs in children and adolescents in Sub-Saharan Africa has recently been associated with onchocerciasis, but it is not known why this causes [neurological symptoms](#) such as uncontrollable repeated head nodding, as well as severe stunting, delayed puberty and impaired mental health.

One of the viruses in the parasites that cause onchocerciasis identified in the new study is rhabdovirus—the type that causes rabies. The authors of the study suggest that if this virus is infecting or damaging human nerve or brain tissue, that could explain the symptoms of OAE.

The full extent and diversity of the viruses living in parasitic nematodes, how they impact nematode biology and whether they act as drivers of disease in people and animals now requires further study.

The illuminating discovery of these widespread yet previously hidden viruses was first made by Dr. Shannon Quek, a Postdoctoral Research Associate at LSTM and lead author of the new study, who had initially been using the same data mining method to screen for viruses within mosquitoes that spread disease, before deciding to investigate nematodes.

Dr. Quek, who is from Indonesia, a country burdened by many parasitic nematodes, said, "As a child, I saw a lot of people infected with these diseases and I suffered from the dengue virus on three occasions. That

got me interested in tropical diseases. Diseases caused by parasitic nematodes are very long-term, life-long illnesses that persistently affect people. It has a significant impact on people's quality of life, their economic output and mental health.

"There are a lot of studies about the microbiomes of mosquitoes, and how the bacteria that lives inside can block the spread of viruses, which might stop vector-borne diseases like dengue. This interplay between organisms in the same host led me to think—what else might be inside parasitic nematodes as well? Which, after my discovery, will now be the focus of our research."

The study also involved researchers from University of Antwerp and KU Leuven, Belgium, Brock University, Canada, University of Queensland, Australia, University of Buea, Cameroon and the University of Energy and Natural Resources, Ghana.

**More information:** Quek, S., et al. Diverse RNA viruses of parasitic nematodes can elicit antibody responses in vertebrate hosts, *Nature Microbiology* (2024). DOI: [10.1038/s41564-024-01796-6](https://doi.org/10.1038/s41564-024-01796-6).  
[www.nature.com/articles/s41564-024-01796-6](https://www.nature.com/articles/s41564-024-01796-6)

Provided by Liverpool School of Tropical Medicine

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