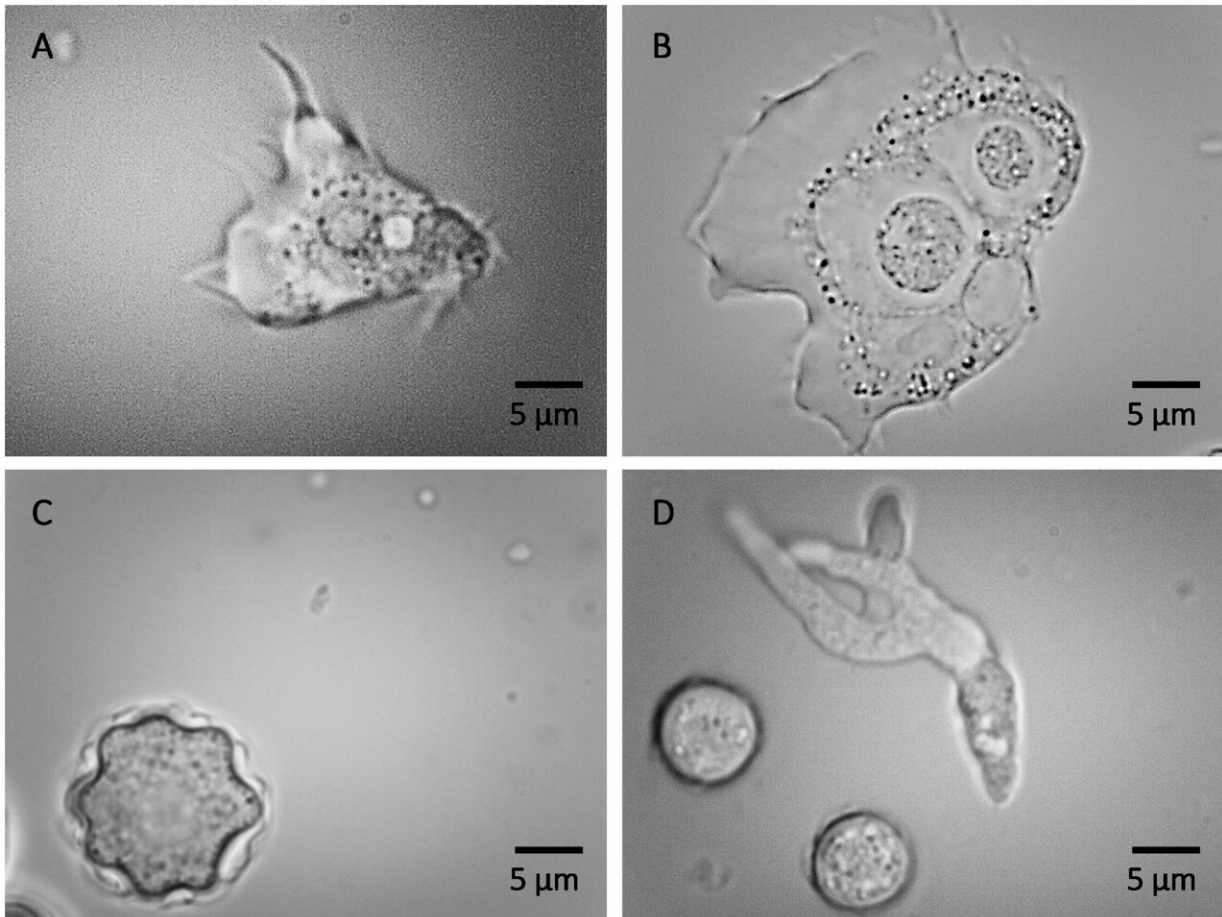


# Water systems study finds *Legionella* in 41% of samples

January 13 2023



Light microscopic images of trophozoites (active form; image A, B and D) and cysts (dormant form; image: C and D circular in shape) of *Acanthamoeba* (image A, B and C) and *Vermamoeba vermiformis* (image D) shown at 100 times magnification. Credit: Flinders University

A new study of domestic and hospital drinking water systems found *Legionella* in 41% of samples—with Flinders University researchers making a key connection between the pathogen's co-existence with a "host" microorganism in all samples tested.

The study found *Legionella* bacteria "infect the amoeba host and then once inside these hosts are protected from disinfection strategies," says Flinders University Associate Professor of Environmental Health Harriet Whiley, a co-author of the new journal article in *Water Research*.

Researchers tested for *Legionella* and its likely amoebae hosts in 140 samples of water or biofilm (the slime found on showerheads and end of faucets) to understand how the potentially dangerous bacterium colonizes and proliferates in both domestic and hospital plumbing and poses a threat to human health.

Legionnaires' disease is a severe pneumonia-like infection that can be fatal. Globally the number of Legionnaires' disease cases is increasing, with elderly and immunocompromised people at the highest risk.

"It is vital that we strive to improve the management of our water distribution systems, particularly in high risk setting such as hospitals, to protect vulnerable populations," says Associate Professor Whiley, from the Flinders College of Science and Engineering.

"Having a better understanding of the relationships between these amoebae and *Legionella* is an important step in improving future water treatment processes aimed at controlling *Legionella* and preventing Legionnaires disease."

*L. pneumophila* is the main cause of Legionnaires' disease and is not transmitted from person to person but caused by inhalation or aspiration of contaminated water.

Maintenance and monitoring of water systems is a common preventive step to reduce public risk.

"To our knowledge, this is the first time the amoebae *Allovahlkampfia* and *Stenamoeba* have been demonstrated as hosts of *L. pneumophila* in Australian drinking water," says Flinders University Ph.D. candidate Muhammad Atif Nisar, who conducted the study.

The findings support the need further research to investigate the prevalence of *Legionella* as well as free-living amoebae in domestic and commercial water systems and to improve guidelines to better control water systems and safeguard the public health.

"Free-living amoebae are ubiquitous in the environment and cause both opportunistic and non-opportunistic infections in humans. Some amoebae are the natural reservoirs of opportunistic plumbing pathogens, such as *Legionella pneumophila*," says Mr. Atif Nisar.

"There is a need for future research to improve disinfection strategies against amoeba to reduce their colonization within building drinking water systems."

Up to 75% of the [drinking water](#) or biofilm samples tested positive for free-living amoebae. This included *V. vermiformis* which was present in 55% of samples and *Acanthamoeba* was present in 11%.

As well as being hosts for *Legionella*, *Acanthamoeba* and *V. vermiformis* are pathogens that can cause severe eye infections, with contact lens users and immunocompromised individuals at greatest risk.

The water samples were collected from showers and hand basins located in domestic houses and hospitals across New South Wales and South Australia.

These results demonstrate the importance of amoebae in engineered [water systems](#), both as a pathogen and as a reservoir of Legionella.

"Future water management protocols should incorporate improved treatment strategies to control [amoebae](#) to reduce the risk to end-users," adds Mr. Atif Nisar.

**More information:** Muhammad Atif Nisar et al, Molecular screening and characterization of Legionella pneumophila associated free-living amoebae in domestic and hospital water systems, *Water Research* (2022). [DOI: 10.1016/j.watres.2022.119238](https://doi.org/10.1016/j.watres.2022.119238)

Provided by Flinders University

Citation: Water systems study finds Legionella in 41% of samples (2023, January 13) retrieved 6 May 2024 from <https://medicalxpress.com/news/2023-01-legionella-samples.html>

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