Community interactions promote *Legionella pneumophila* survival in drinking water biofilms

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Legionella pneumophila is a waterborne pathogen that can cause Pontiac Fever or Legionnaires' disease, a type of pneumonia that can be fatal. Although *L. pneumophila* is not able to replicate in low nutrient environments, such as drinking water, it is known that heterotrophic biofilms have a crucial role in the survival of this pathogen in drinking water distribution systems. The aim of this work is to study the community interactions that influence the survival of *L. pneumophila* in biofilms. For that, mono and dual-species biofilms of *L. pneumophila* and the predominant biofilm isolates *Variovorax paradoxus*, *Mycobacterium chelonae*, *Acidovorax* spp., *Sphingomonas* spp., were formed on PVC surfaces and sessile cells quantified for total cells, viable and cultivable *L. pneumophila* and cultivable non-*Legionellae*. Results demonstrated that *Acidovorax* spp. and *Sphingomonas* spp. appear to have an antagonistic effect on *L. pneumophila* cultivability but not in the viability, leading to the formation of viable but noncultivable (VBNC) cells, while *M. chelonae* increased the cultivability of this pathogen. *M. chelonae* is one of the microorganisms commonly found in drinking water and this work demonstrates that this strain is able to promote *L. pneumophila* survival in these systems. It is also demonstrated that other species might stimulate this pathogen to enter a VBNC state and consequently be underestimated in the drinking water quality control, as drinking water safety assessment still relies on standard culture techniques. It is essential for future work to study other biofilm community members to understand their ecological interactions with *L. pneumophila*.