

Amoéba announces the publication of an article in the recognized scientific journal, Pathogens, which reconfirms the direct effect of predation and elimination of legionella by the amoeba *Willaertia magna* C2c Maky.

Chassieu (France), February 7, 2020 - AMOÉBA (FR0011051598 - AMEBA), producer of a biological biocide, capable of eliminating bacterial risk in water and human wounds, and a biocontrol product for plant protection, still in the testing phase, announces the publication of scientific results reaffirming the direct effect of predation and elimination of legionella by the amoeba *Willaertia magna* C2c Maky.

This work, carried out jointly by the Institut Hospitalo-Universitaire Méditerranée Infection in Marseille and Amoeba in Chassieu has been published in the special issue "Legionella Contamination in Water Environment" of Pathogens, a peer-reviewed, high-impact international scientific journal dealing with topics related to pathogens and pathogen-host interactions. The published article reports on the efficacy of the amoeba *Willaertia magna* C2c Maky in ingesting and eliminating several strains of Legionella pneumophila (<https://www.mdpi.com/2076-0817/9/2/105>).

Some amoebae, widely distributed in the environment- such as *Acanthamoeba castellanii*- are known to multiply legionella. It was therefore essential to understand whether *Willaertia magna* C2c Maky produced the same effect.

This publication shows that *Willaertia magna* C2c Maky has the opposite behaviour: **its results confirm the ability of *Willaertia magna* C2c Maky to ingest and eliminate legionella.** In parallel, this study corroborate the multiplying effect of legionellae by *Acanthamoeba castellanii* and by an amoeba of the same species as *Willaertia magna* C2c Maky, the amoeba *Willaertia magna* Z503.

The authors focused on 3 strains of *Legionella pneumophila* (Lens, Paris and Philadelphia) isolated during major epidemics.

Tests were carried out at two distant temperatures (22°C and 37°C) which can be encountered in cooling water from cooling towers and which may influence amoeba behaviour.

It was thus possible to observe :

- Intracellular growth of the Lens strain in *W. magna* Z503 and *A. castellanii* at 22°C and 37°C.
- A multiplication of the Paris strain in *A. castellanii* at 22°C and 37°C and in *W. magna* Z503 at 22°C.
- Proliferation of Philadelphia strain only in *A. castellanii* at 37°C.
- **In *W. magna* C2c Maky, none of the three legionella strains showed intracellular growth at any temperature. In contrast to the other amoebae, the legionella internalized in *W. magna* C2c Maky are fully digested.**

The unique behaviour of the amoeba *Willaertia magna* C2c Maky towards pathogens is therefore well confirmed. These results consolidate the effect that had already been demonstrated in a 2009 scientific paper (Dey et al. Free-living freshwater amoebae differ in their susceptibility to the pathogenic



bacterium *Legionella pneumophila*. FEMS Microbiology Letters. Vol 290. pp 43009), which formed the basis of the patent on which the amoeba biocidal technology was developed.

These results also question the supposed 'Trojan Horse' effect of *Willaertia magna* C2c Maky, an effect known on other amoebas that allows them to select and amplify microbial strains.

These results support that *W. magna* C2c Maky is a safe and effective candidate for the control of legionella in cooling towers and an alternative solution to chemical biocides.

"The direct effect of predation and elimination of legionella by Willaertia magna C2c Maky is supported by these results. Moreover, knowing that the amoeba Acanthamoeba castellanii is present in more than 80% of cooling towers, the use of Willaertia magna C2c Maky can limit this harmful amoeba population through competition, which can further reduce the risk of legionella proliferation" explains Sandrine DEMANECHÉ, scientific manager at Amoéba.

As a reminder, the evaluation of the regulatory dossier for the application for approval of the biocidal active substance *Willaertia magna* C2c Maky for use in cooling towers in Europe is currently being reviewed by the rapporteur Member State, with the end of the evaluation scheduled for the end of 2020.



About AMOEBA:

Amoéba's ambition is to become a major player in the treatment of bacterial risk in the fields of water, healthcare and plant protection. Our biological solution is an alternative to chemical products widely used today. Amoéba is currently focusing on the market of industrial cooling towers estimated at €1.7Bn ⁽¹⁾ on a global chemical biocide market for water treatment, evaluated at €21Bn ⁽²⁾ and on the biocontrol market for plant protection estimated globally at €1.6Bn ⁽⁴⁾. In the future, the Company is looking at developing new applications such as chronic wound care, estimated at € 751 million ⁽³⁾ in the USA. Sales of associated products with healthcare, biocides and crop protection are subject to the Company being granted local regulatory market authorizations. The Company is currently in a trial phase for biocidal and plant protection applications and does not market any products.

Created in 2010, based in Chassieu (Lyon, France) with a subsidiary in Canada and in the United States, Amoéba is quoted on the compartment C of Euronext Paris. The Company is a member of the BPIfrance Excellence network and is eligible for the PEA-PME SME equity savings plan setup. More information on www.amoeba-biocide.com.

(1): Amoéba data combined from sources: DRIRE 2013, Eurostat, ARHIA 2013

(2): Sources combined by Amoéba from water treaters, Freedomia, Eurostat et MarketsandMarkets

(3): BCC Research, "Markets for Advanced Wound Management Technologies," Wellesley, MA, 2017

(4): Biopesticides Worldwide Market 2013, CPL, Wallingford, UK



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