

AMOÉBA announces the results of a safety & efficacy study assessing the fate of *Legionella pneumophila* in *Willaertia magna* C2c Maky.

Lyon (France), November 7, 2018 - AMOÉBA (FR0011051598 - AMEBA), producer of a biological biocide capable of eliminating bacterial risk in water, plant protection and wound care applications, announces the results of a laboratory safety & efficacy study.

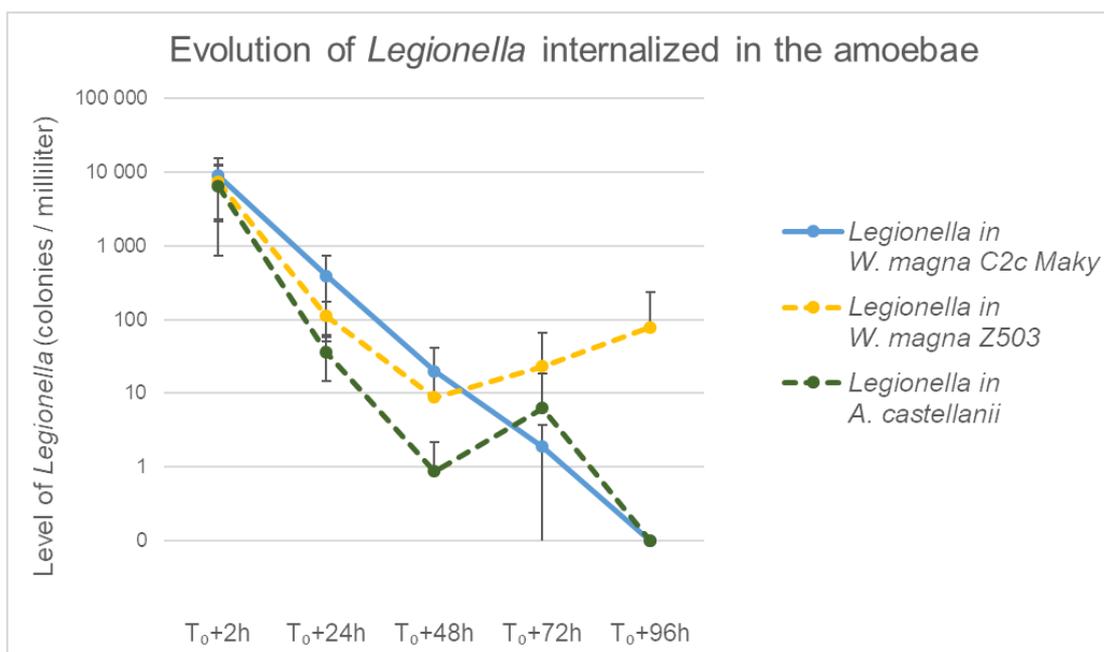
The objectives of the study were to assess the fate of *Legionella pneumophila* when internalized in the free-living amoebae *Willaertia magna* C2c Maky (the biocidal active substance) and to compare the results with two other free-living amoebae behavior.

Briefly, the clinical strain *Legionella pneumophila Philadelphia* (ATCC® 33152™) and *Willaertia magna* C2c Maky (ATCC® PTA-7824) were put in contact at the same ratio during two hours to allow the internalization of *Legionella* within *Willaertia magna* C2c Maky (process of phagocytosis). Then, the internal *Legionella* level was monitored during 4 days using the gold-standard method of culture.

In parallel, the same protocol was performed using *Willaertia magna* Z503 (ATCC® 50035™) and *Acanthamoeba castellanii* (Douglas) Page (ATCC® 30010) as positive controls, as those two other free-living amoebae are known to multiply *Legionella pneumophila* and strongly represented in cooling towers.

Each condition was performed in duplicate and was repeated at least 3 times over time.

The following figure present the evolution of internal *Legionella* level over the 4 days, monitored in the three free-living amoebae:





The study results demonstrate, in the experimental conditions:

- A strong efficacy of *Willaertia magna C2c Maky* to eliminate the *Legionella*: at least 90% *Legionella* are destroyed within 24 hours and more than 99,9% within 72 hours.
- After 4 days, a complete absence of culturable bacteria in *Willaertia magna C2c Maky* infected with *Legionella*, showing the absence of legionella survival.
- An absence of *Legionella* multiplication in *Willaertia magna C2c Maky*, at any time.
- On the contrary, a multiplication of *Legionella* in *Willaertia magna Z503* and in *Acanthamoeba castellanii* results in accordance with published scientific literature*.

These study results hence demonstrate that, in experimental conditions, any *Legionella pneumophila Philadelphia* ingested by *Willaertia magna C2c Maky* will *in fine* be digested. This digestion proceeds without any multiplication nor survival of the pathogenic bacteria within the amoeba.

* Refer to Holden *et al.* (1984). Intracellular growth of *Legionella pneumophila* within *Acanthamoeba castellanii* Neff. Infect. Immun. 45, 18–24. Refer to Dey *et al.* (2009). Free-living freshwater amoebae differ in their susceptibility to the pathogenic bacterium *Legionella pneumophila*. FEMS Microbiol Lett 290, 10–17.

“This study required more than 3 months of works to validate the laboratory conditions, the purification methods and the reaction media to be used. The results of this study complement our knowledge on Willaertia magna C2c Maky and demonstrate not only the efficacy of the active substance, destroying the Legionella, but also a safety aspect of the substance with the absence of Legionella multiplication and survival. This absence of survival and multiplication is to be put in perspective with other amoeba behavior like Acanthamoeba castellanii that are widely found in cooling towers and multiply the Legionella.” declares Fabrice PLASSON, Chairman of AMOEBA.



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. 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, Freedonia, Eurostat et MarketsandMarkets*

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

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

Contacts :

Amoéba

Valérie FILIATRE

Directeur administratif et Financier

04 26 69 16 00

valerie.filiatre@amoeba-biocide.com

Actifin

Ghislaine GASPARETTO

Communication financière

01 56 88 11 11

ggasparetto@actifin.fr

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