



HAL
open science

Paenibacillus, a novel pathogen of *Biomphalaria glabrata*, an intermediate host for schistosomiasis

David Duval, Richard Galinier, Gabriel Mouahid, Eve Toulza, Anne Rognon, Nathalie Arancibia, Jean-François Allienne, Guillaume Mitta, André Théron, Benjamin Gourbal

► To cite this version:

David Duval, Richard Galinier, Gabriel Mouahid, Eve Toulza, Anne Rognon, et al.. Paenibacillus, a novel pathogen of *Biomphalaria glabrata*, an intermediate host for schistosomiasis. *ImmunInv* 2014 (Colloque Immunité des Invertébrés), May 2014, Dijon, France. . hal-01134490

HAL Id: hal-01134490

<https://hal.science/hal-01134490>

Submitted on 23 Mar 2015

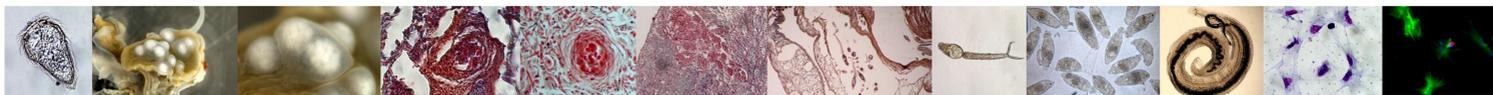
HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Paenibacillus, a novel pathogen of *Biomphalaria glabrata*, an intermediate host for schistosomiasis.

David Duval^{1,2}, Richard Galinier^{1,2}, Gabriel Mouahid^{1,2}, Eve Toulza^{1,2}, Anne Rognon^{1,2}, Nathalie Arancibia^{1,2}, Jean Francois Allienne^{1,2}, Guillaume Mitta^{1,2}, André Théron^{1,2}, Benjamin Gourbal^{1,2}.

¹ Université Perpignan Via Domitia, Ecologie et Evolution des Interactions, UMR 5244, F-66860, Perpignan, France .
² CNRS, Ecologie et Evolution des Interactions, UMR 5244, F-66860, Perpignan, France.



Introduction

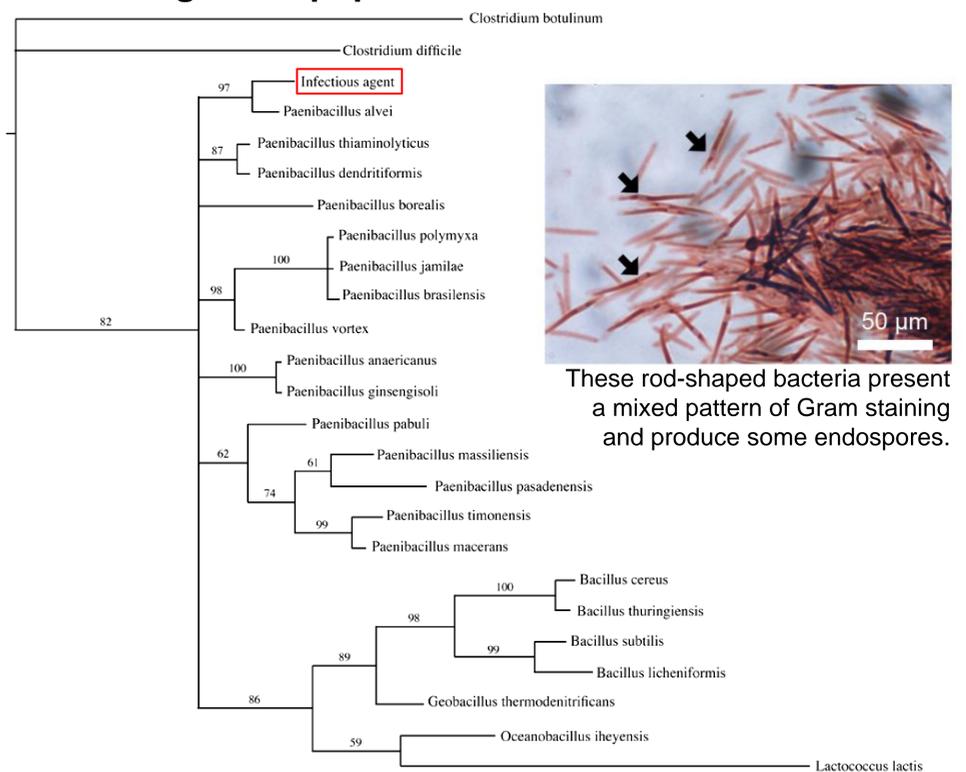
Schistosomiasis is the second most widespread tropical parasitic disease after malaria. To achieve the objective of schistosomiasis eradication in a decade, various research strategies and treatment programs were recommended and supported by WHO. One of these applicable approaches is based on the control of snail vectors in endemic area. Previous field studies have shown that competitor or predator introduction could be effective but no systemic investigation has ever been conducted to identify snail microbial pathogen and evaluate its molluscicide effect. In this work, our aim is to provide a characterization of a novel infectious agent isolated from unhealthy *Biomphalaria* snails in our laboratory.

Unhealthy snails exhibits white nodules.



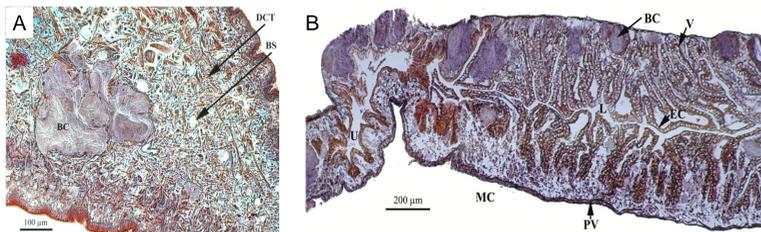
Dissected snail presents nodules on mantle (Mt), hepato-pancreas (Hp) and ovotestis (Ov) region.

An exophytic nodule contains a homogenous population of bacillus-like bacteria.



These rod-shaped bacteria present a mixed pattern of Gram staining and produce some endospores.

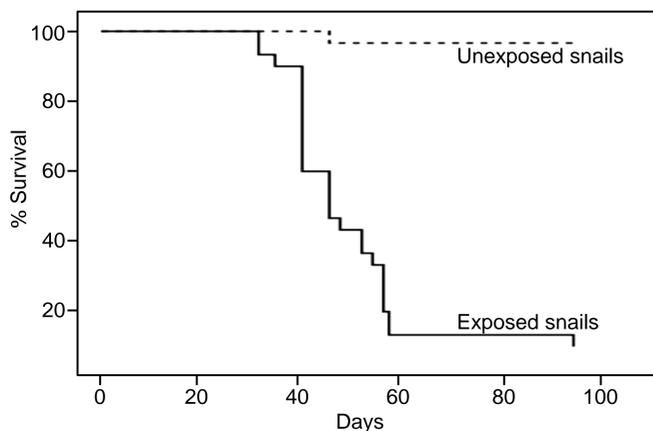
Massive bacterial infiltration in snail tissues



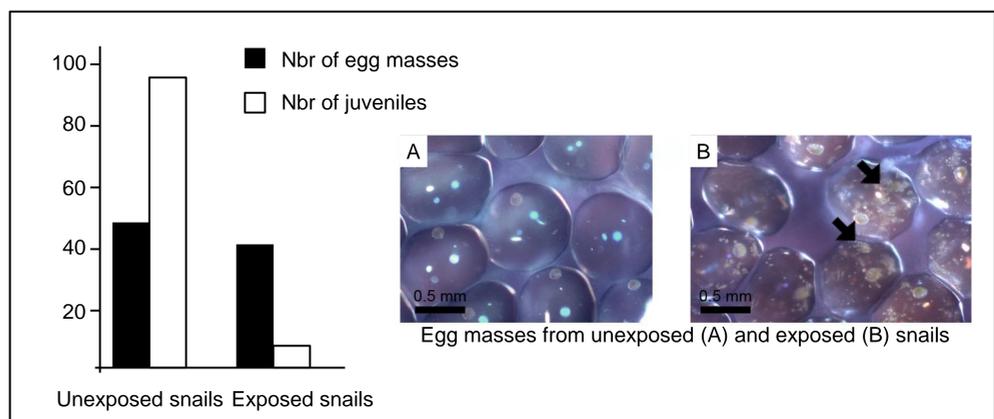
Histological section of the headfoot (A) and the kidney (B) regions of infected snails.

BC: Bacterial colonies; BS: Blood space; DCT: Dense connective tissue ; EC: Epithelial cells; L: Lumen; MC: Mantle cavity; PV: Pulmonary vein; U: Ureter; V: Vacuole

Paenibacillus induces a massive mortality.



Survival rate of *B. glabrata* after exposure to *Paenibacillus* infection or unexposed.



Effect of *Paenibacillus* exposure on egg masses production and offspring number.

Discussion

Paenibacillus sp closely related to *P. alvei* has been isolated from unhealthy *Biomphalaria* snails. Histopathological examination has shown massive bacterial infiltration leading to an overall disorganization of snail tissues. Exposure of healthy snails to *Paenibacillus* infected snails led to a massive mortality. Moreover, egg hatching was significantly lower in exposed snails than in control whereas the spawning appeared to be unaffected. Embryonic lethality is correlated with the presence of this pathogenic bacteria in eggs. This study reports the first description of a novel *Paenibacillus* strain as snail microbial pathogen by affecting both adult and embryonic stages of *Biomphalaria*, the vector snail of schistosomiasis.