



HAL
open science

Egg white kills [*Bacillus cereus*] group bacteria through a mechanism involving ovotransferrin

Sophie Jan, Fabienne Gonnet, Maryvonne Pasco, Julien Jardin, Michel Gautier, Catherine Guérin-Dubiard, Françoise Nau, Florence Baron

► To cite this version:

Sophie Jan, Fabienne Gonnet, Maryvonne Pasco, Julien Jardin, Michel Gautier, et al.. Egg white kills [*Bacillus cereus*] group bacteria through a mechanism involving ovotransferrin. bactéries sporulantes pathogènes ou d'intérêt technologique, Jul 2015, Paris, France. 2015. hal-01173074

HAL Id: hal-01173074

<https://hal.science/hal-01173074>

Submitted on 7 Jul 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.

« Bactéries sporulantes pathogènes ou d'intérêt technologique » (BSPIT), organisé sous l'égide de la Société Française de Microbiologie (SFM)



Egg white kills Bacillus cereus group bacteria through a mechanism involving ovotransferrin
Jan, S.¹, Gonnet, F.¹, Pasco, M.¹, Jardin, J.², Gautier, M.¹, Guérin-Dubiard, C.¹, Nau, F.¹ and Baron, F.¹

¹ Agrocampus Ouest and Institut national de la recherche agronomique (INRA), UMR1253 Science et Technologie du Lait et de l'Œuf, F-35042 Rennes, France

² Institut national de la recherche agronomique (INRA) and Agrocampus Ouest, UMR1253 Science et Technologie du Lait et de l'Œuf, F-35042 Rennes, France

Egg white antimicrobial activities are widely investigated regarding the resistance of *Salmonella enterica* serovar Enteritidis. This resistance is considered as one of the main factors explaining the high prevalence of this serovar in egg-product-related food-borne disease. The behavior of Gram-positive bacteria has been poorly investigated in egg white whereas it can provide additional insight into the bacterial response to this iron-deprived harsh medium. Investigating the behavior of Gram-positive bacteria in egg white may then provide new insights into the mechanisms of bacterial pathogenesis and adaptation in the host iron-deprived environment. *Bacillus cereus* is a Gram-positive spore-forming opportunistic human bacterium frequently associated with foodborne infections due to the production of diarrheal and emetic toxins. Psychrotrophic *B. cereus* group strains are recognized as being involved in spoilage events of chilled pasteurized liquid whole egg products due to their ability to secrete hydrolytic enzymes, even at low temperature. Their behavior in an egg product such as egg white warranted further consideration since this ingredient is widely used in the production of food particularly sensitive from a microbiological perspective, such as chilled lightly cooked desserts comprising egg white foams (chocolate mousse, floating island, etc.). These facts led us to investigate the behavior of *B. cereus* group bacteria in egg white. Our results highlighted a strong bactericidal effect at permissive temperature (30°C) and under the natural alkaline (natural pH of 9.3 a few days after laying) and iron-deprived conditions of egg white. This bactericidal effect could be ascribed to a well-known egg white protein, ovotransferrin, which to date had exclusively been described as responsible for bacteriostasis due to iron chelation. The addition of iron reversed this bactericidal effect only under neutral incubation conditions. A perturbation of the electrochemical potential of the cytoplasmic membrane suggested that an ovotransferrin-mediated membrane disturbance mechanism could be involved in bacterial death in egg white.

Keywords: Egg white, *Bacillus cereus* group, bactericidal effect, ovotransferrin, alkaline pH