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## Detecting ice nucleating bacteria in environmental samples using PCR of the gene conferring ice nucleation activity. Abstract

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### ► To cite this version:

Cindy E. Morris, Caroline Guilbaud, Helen Ahern, H el ene Dominguez, Catherine Glaux, et al.. Detecting ice nucleating bacteria in environmental samples using PCR of the gene conferring ice nucleation activity. Abstract. 24. IUGG General Assembly, Jul 2007, Perugia, Italy. hal-02756459

**HAL Id: hal-02756459**

**<https://hal.inrae.fr/hal-02756459v1>**

Submitted on 3 Jun 2020

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(M) - IAMAS - *International Association of Meteorology and Atmospheric Sciences*

MS005

Oral Presentation

5150

**Detecting ice nucleating bacteria in environmental samples using PCR of the gene conferring ice nucleation activity**

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Fewer than 10 species of bacteria are known to be ice nucleation-active. Furthermore, this property is conferred by a single gene and the overall gene sequence is rather well conserved among the 5 or 6 variants of the gene whose sequences have been reported. Nevertheless, there have been no methods reported for detecting ice nucleation-active bacteria in environmental samples via PCR (Polymerase Chain Reaction for amplification of the nucleic acid sequence) that take into account the full range of known variability of the bacterial gene. We have designed sets of primers for PCR based on reported sequences of the core and C-terminal regions of the *inaW*, *inaY* and *inaZ*, *inaK* and *inaV* alleles and sequences of strains from our culture collections. The sensitivity and specificity of these primers were determined in PCR conducted on about 100 pure cultures of ice nucleation active (and some inactive) strains of *Pseudomonas syringae*, *P. viridiflava*, *P. fluorescens*, *P. putida*, *Pantoea agglomerans* and *Xanthomonas campestris* collected from plants, rain, snow, clouds, aquatic habitats, frogs and insects in North American, Europe, China and Antarctica. The sensitivity of these primers was tested with environmental samples (rain, snow, aquatic habitats) from which previous isolations revealed the presence of ice nucleation active bacteria, and in environmental samples (rain, snow, aerosol samples) seeded with the test strains from our collection. This tool will be used to detect and quantify ice nucleation active bacteria in environmental samples and can be a means of collecting corroborative evidence of the role of these bacteria in atmospheric processes.

**Keywords:** ice nucleation gene, pcr

