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## Abstract

Biofilms are communities of microorganisms, which develop on surfaces in natural and artificial environments. In medical settings, biofilms are found in association with catheters and prosthetic devices and may constitute an important source of nosocomial infections. Bacterial biofilms display specific biological properties that distinguish them from their planktonic counterparts. Our work focuses on the genetic identification of the bacterial factors necessary for the formation and the maintenance of mature *E. coli* biofilms. These approaches may lead to a better understanding of the biofilm lifestyle as well as to strategies to control pathogenic biofilms.

## Annual Report

### Bacterial biofilm formation

#### I- Study of gene function in physiological conditions: application to the identification of new adhesins in *Escherichia coli*

We developed a plasmid-free approach that combines the lambda-red linear DNA recombination method with the site-directed insertion of a repression/expression (RExBAD) cassette, which places a functional pBAD promoter upstream of a target gene. We showed that this method permits both the inactivation and modulation of most *Escherichia coli* gene expression, including toxin and essential genes. We applied this strategy to study putative adhesion and bacterial biofilm functions of 10 previously uncharacterized genes sharing homology with the autotransporter adhesin Ag43. These genes were good candidate as putative adhesins in *E. coli*. We demonstrated that the induction of the expression of four of these candidate genes (*yfaL*, *yeeJ*, *ypjA* and *ycgV*) leads to adhesion to abiotic surfaces. The RExBAD approach can be used in several enterobacteria to study the function of cryptic or uncharacterized genes in large-scale post-genomic functional analyses.

• Roux, A, Beloin, C. and Ghigo, J.M. A combined inactivation/expression strategy to study gene function in physiological conditions: application to the identification of new adhesins in *E. coli*. *J. Bacteriol.* *In press*

#### II- Molecular analysis of biofilm formation by pathogenic yeast *Candida glabrata*

In a Pasteur collaborative project (Programme Transversal de Recherche- PTR) with Guilhem Janbon, Françoise Dromer (Unité Postulante de Mycologie Moléculaire) and Christophe d'Enfert (Unité Postulante Biologie et Pathogénicité Fongique) a genetic screen for *Candida glabrata* Biofilm mutants was performed. We identified a new protein (Epa6p) which is the principal adhesin involved in biofilm formation in this yeast. We demonstrated that the expression of *EPA6* is regulated both by the Yak1p kinase and a biofilm signal which involves a pathway dependent on the sub-telomeric silencing machinery.

• Iraqui, I.; Aubert, S.; Dromer, F.; Ghigo, J.M. D'enfert, C. And G. Janbon Epa6p Is A Major Adhesin Responsible For Biofilm Formation In *Candida Glabrata* *Mol Microbiol.* *In press*

**Keywords:** Biofilm, *Escherichia coli*, *candida glabrata*

## Publications

> [Publications 2004 of the unit on Pasteur's references database](#)

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