Modulations of the interactions between pacific cupped oyster *Crassostrea gigas* and *Vibrio* according to bacterial virulence and to genetic and physiological status of the host.

**Methodology and first results.**


Rearing of *Crassostrea gigas* is the most economically important aquaculture activity in France. If *Vibrio* are often documented as pathogenic of farmed marine species (Paillard, 2004), it represents about 30% of the oyster natural flora (Vasconcelos, 1972). Since several decades, two *Vibrio* species, *V. splendidus* and *V. aestuarinus*, were associated with many cases of mortality events in reared *C. gigas* spat and juvenile oysters, frequently during summer (Gay, 2004; Garnier, 2007). This summer mortality syndrome has been well documented as the result of complex interactions between pathogens, host and environmental conditions. This work aims to study the *Vibrio*-oyster interactions and their modulations according to the virulence of pathogens and the genetic and/or physiological parameters of the host.

**Vibrio**, broad collection of *V. splendidus* and *V. aestuarinus* strains:
- Wild strains: virulent & avirulent
- Mutated strains (Le Roux et al. 2007) on gene candidates to virulence and/or harboring marker genes

**Virulence Factors**

1. Searching for contrasted responses to experimental infection with virulent *Vibrio*, in different populations of oysters, which are genetically and/or physiologically characterized.

2. Characterization of pathogenesis to document the variability of virulence phenotype.

**In vivo, by experimental infection**

Obtention of a reproducible experimental co-infection model using a mix of *V. splendidus* and *V. aestuarinus* bacterial strains to get a large panel of responses:
- *V. aestuarinus*
- *V. splendidus*
- *V. spl. + V. aest.*

A synergic effect?

**Oysters**, produced by controlled crossing, resulting in:
- Half-sib families of diploid and triploid oysters
- Families presenting high level of inbreeding

**Technical tools**

- Hemocytes are the only known cells implied in defense mechanisms
- Great variation of phagocytic responses is observed in wild and genetically divergent oysters
- Of a possible cytopathogenic effect of virulent *Vibrio* strain to confirm

**Immunohistochemistry to localize pathogen in host tissues**

Targeting specifically mutated strain, using a polyclonal anti-CAT (resistance to chloramphenicol) antibody (Ab).

**First results and perspectives**

**Effect of gonadogenesis on oyster susceptibility to vibriosis**

- Half-sib populations (1F1 + 1MD) 1/1
- Experimental infections trials performed at different reproductive periods:
  - 1. Early gametogenesis
  - 2. Gametogenesis
  - 3. Mature stage
  - 4. Resting stage (winter)

Sample analysis: condition index, mortality rates, gametogenesis analysis by histology: ADN filiation allocation analysis

**First results**

- 16% of oysters are resistant to virulent strain
- 17% are susceptible

**Perspectives**

- A possible effect of gonadogenesis on oyster susceptibility as soon as the beginning of gonad development to confirm thanks to the 4th experimental infection
- Histological analysis of gametogenesis stage to find out this possible effect of gonadogenesis

**Effect of ploidy level on oyster susceptibility to vibriosis**

- Genetically controlled populations of oysters presenting different levels of ploidy supported in identical environmental conditions

**First results**

- Two different kinetics of infection?

**Perspectives**

- Intersect data about the effect of gonadogenesis with future ones from samples analysis and try to emerge patterns correlated to susceptibility to vibriosis

**Analysis of a genetic base in oyster susceptibility to vibriosis**

- High level of inbreeding families, obtained by divergent selection criteria based on summer survival

- 1. Screening of 6 groups of bi-parental families by several experimental infections and selection of families presenting contrasted and stable responses to vibriosis
- 2. Analysis of pathogenesis in these families and measurement of heritabilities of two characters: Resistant or Suscible on the next generation

References: