



DISEASE PREVENTION IN KOREA

- BACTERIOPHAGE
- ANTIBIOTICS

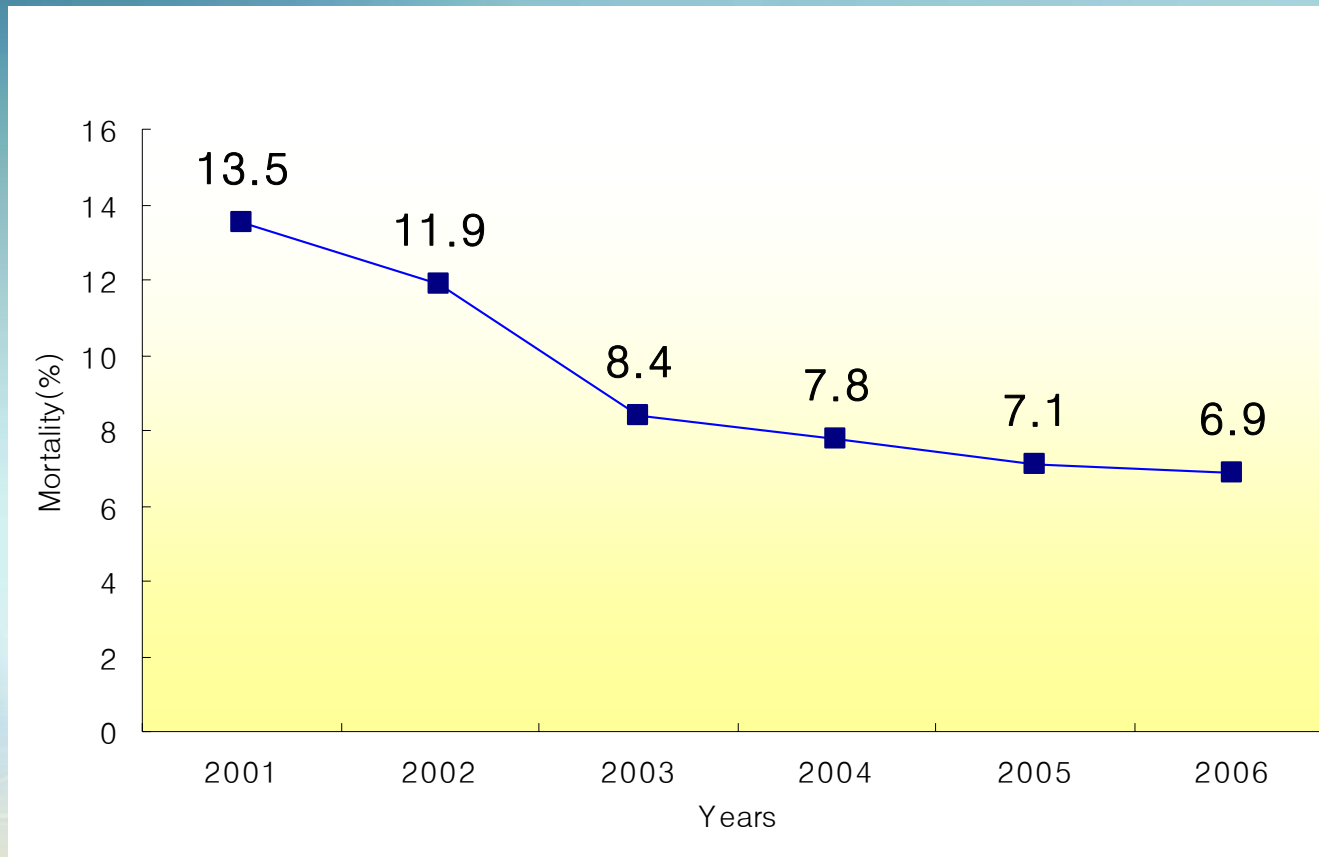
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**South Sea Fisheries Research Institute
National Fisheries Research & Development Institute**

I. Aquacultural Statistics

1

Annual fish disease mortality



I. Aquacultural Statistics

II Fish disease pathogen types

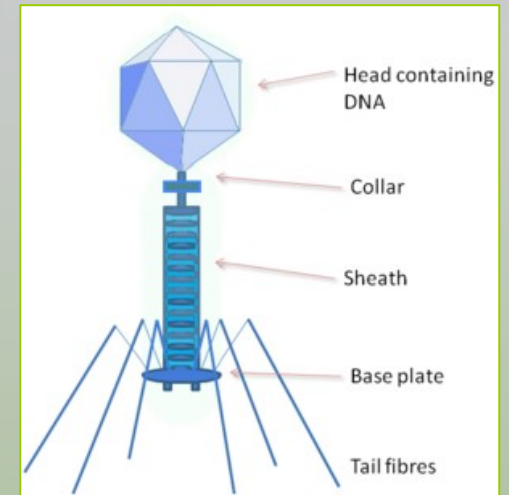
Type	2005	2006
	outbreak(%)	outbreak(%)
Bacterial Disease	28.3	15
Parasitic Disease	27.4	4
Mixed infection(B+B)	7.7	3
Mixed infection(B+P)	11.5	35
Viral Disease	12.6	12
The others	12.5	31

Type	Pathogen
Bacteria	Streptococcus, Edwardsiella, Vibrio , Flexibacter
Virus	Iridovirus, VHSV, MBV, HRV, VNNV, IPNV, IHNV, SVC
Parasite	Microcotyle, Scuticociliatida , Dactylogyrus, Bivagina, Cryptocaryon, Benedenia

II. Bacteriophage

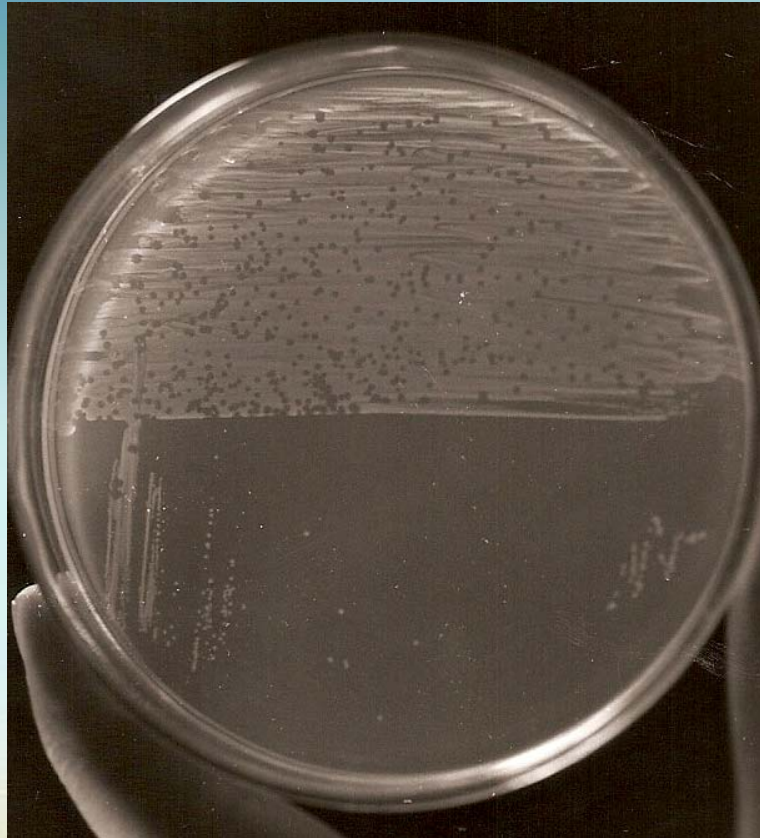
What's bacteriophage

- Bacteria + phage [means eating in Greek]
- Studies on bacteriophages of fish pathogen
 - *Aeromonas hydrophila* (Merino et al. 1990)
 - *Aeromonas salmonicida* (Rodger et al. 1981)
 - *Edwardsiella tarda* (Wu & Chao, 1982)
 - *Yersinia ruckeri* (Stevenson & Airdrie, 1984)



II. Bacteriophage

The isolated phage from *Lactococcus garvieae*



II. Bacteriophage

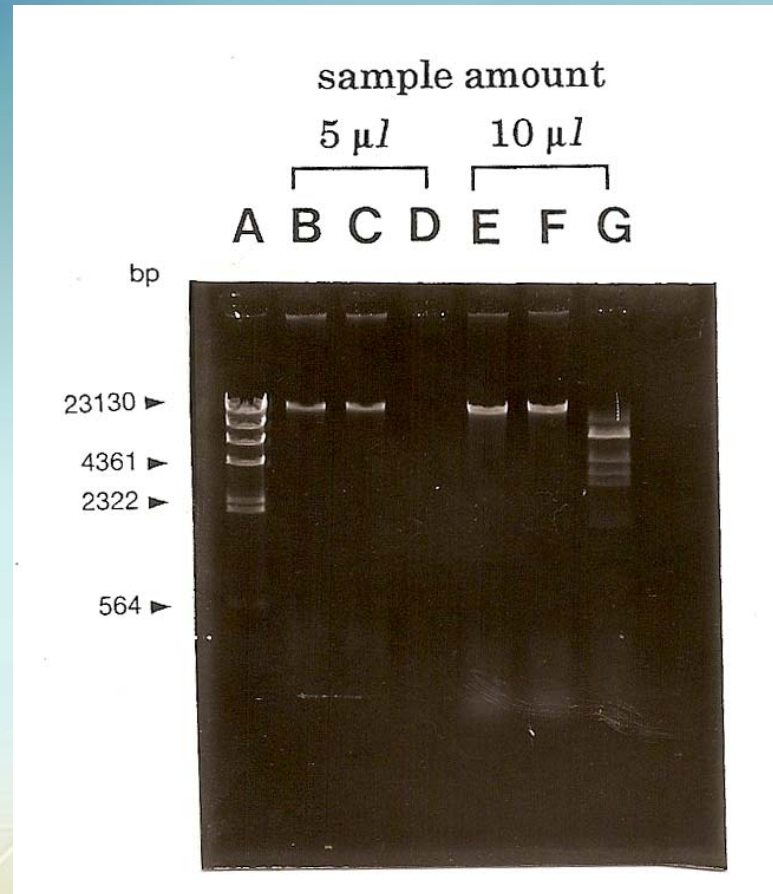
Electron micrograph of the phage



- **Head : 50~60nm**
- **Tail : 7× 140~180nm**

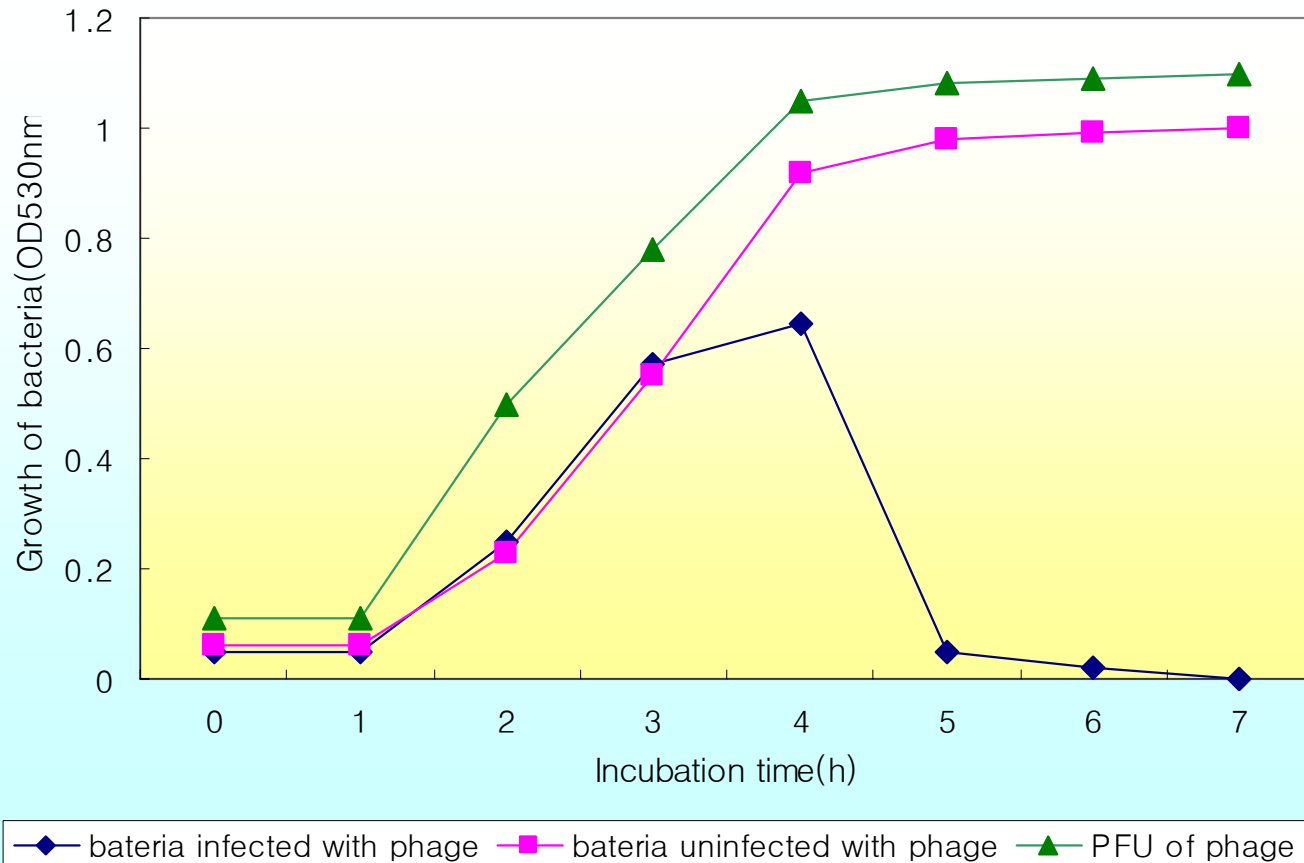
II. Bacteriophage

Nucleic acid analysis of the phage



II. Bacteriophage

Growth of *Lactococcus garviae* infected with the phage and extracellular phage titers



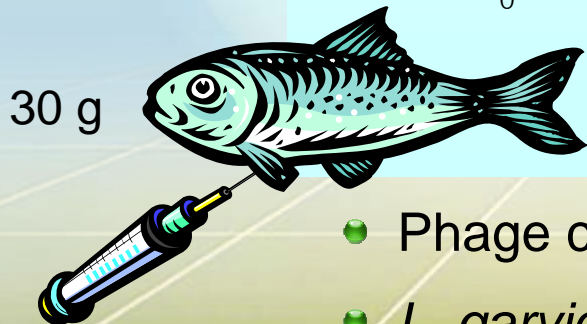
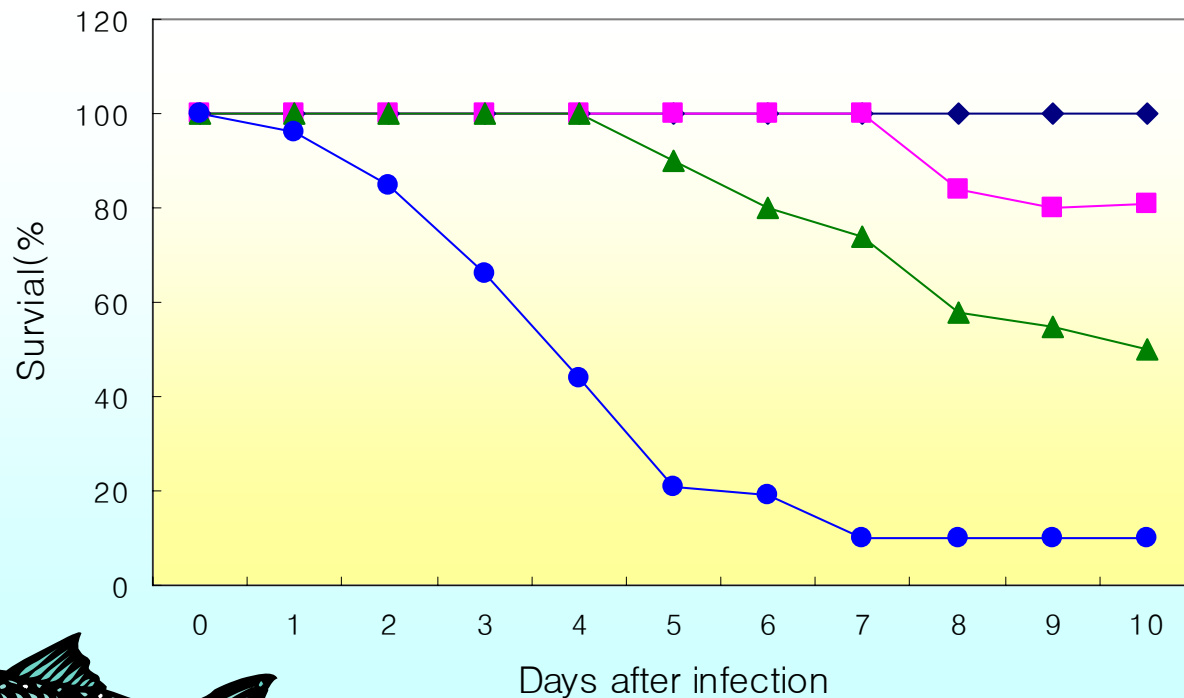
II. Bacteriophage

Effect of incubation temperature on the lytic activity of the phage

Incubation Temperature (°C)	Growth of bacteria (without phage)	Lysis of bacteria (with phage)
10 ~ 14	-	NA
17 ~ 29	+	+
32 ~ 41	+	-
44 ~ 48	-	NA

II. Bacteriophage

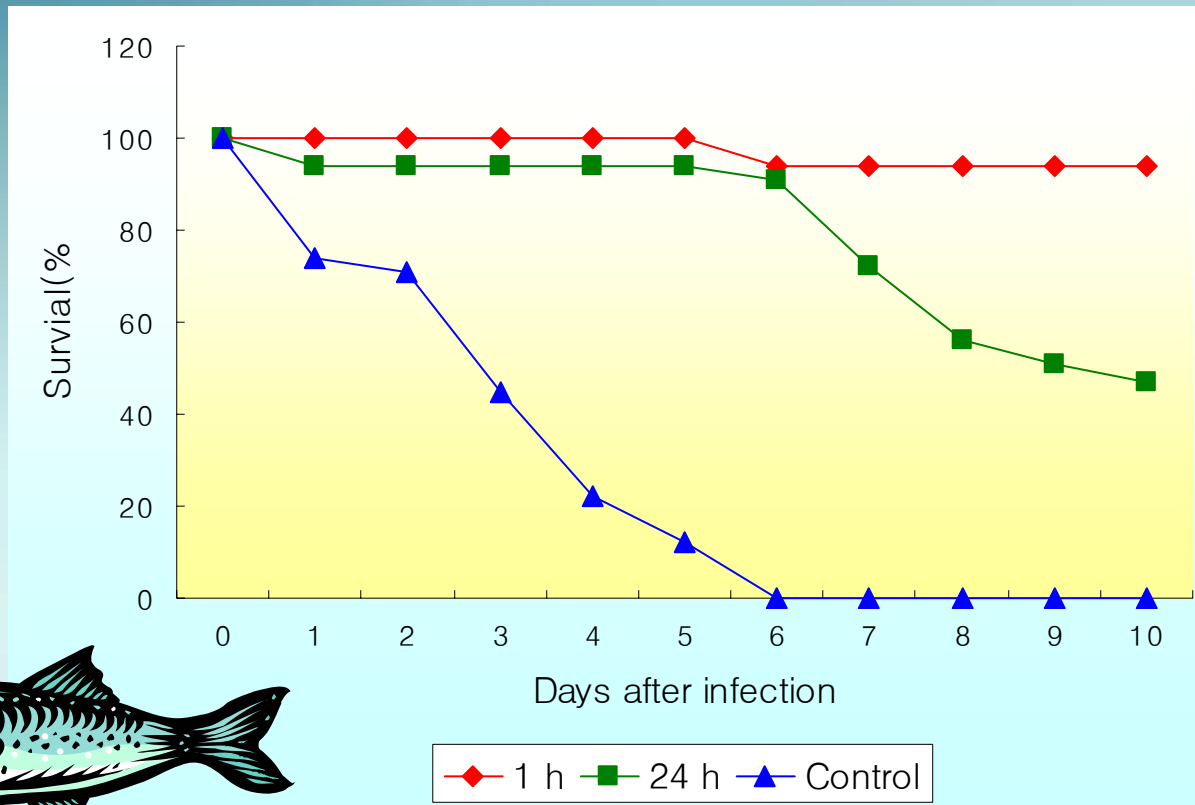
(Exp 1) Effect of intraperitoneal administration of the phage in yellowtail challenged with *L. garvieae* with different time lags



- Phage concentration ; 1.7×10^7 PFU/fish
- *L. garvieae* concentration ; 7.0×10^8 CFU/fish

II. Bacteriophage

(Exp. 2) Effect of intraperitoneal administration of the phage in yellowtail challenged with *L. garvieae* with different time lags



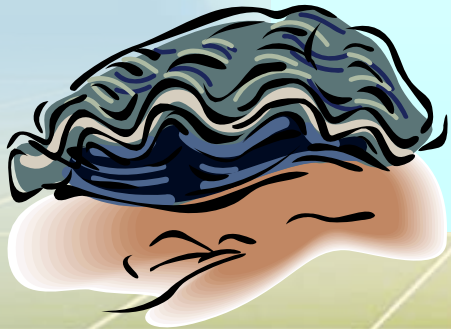
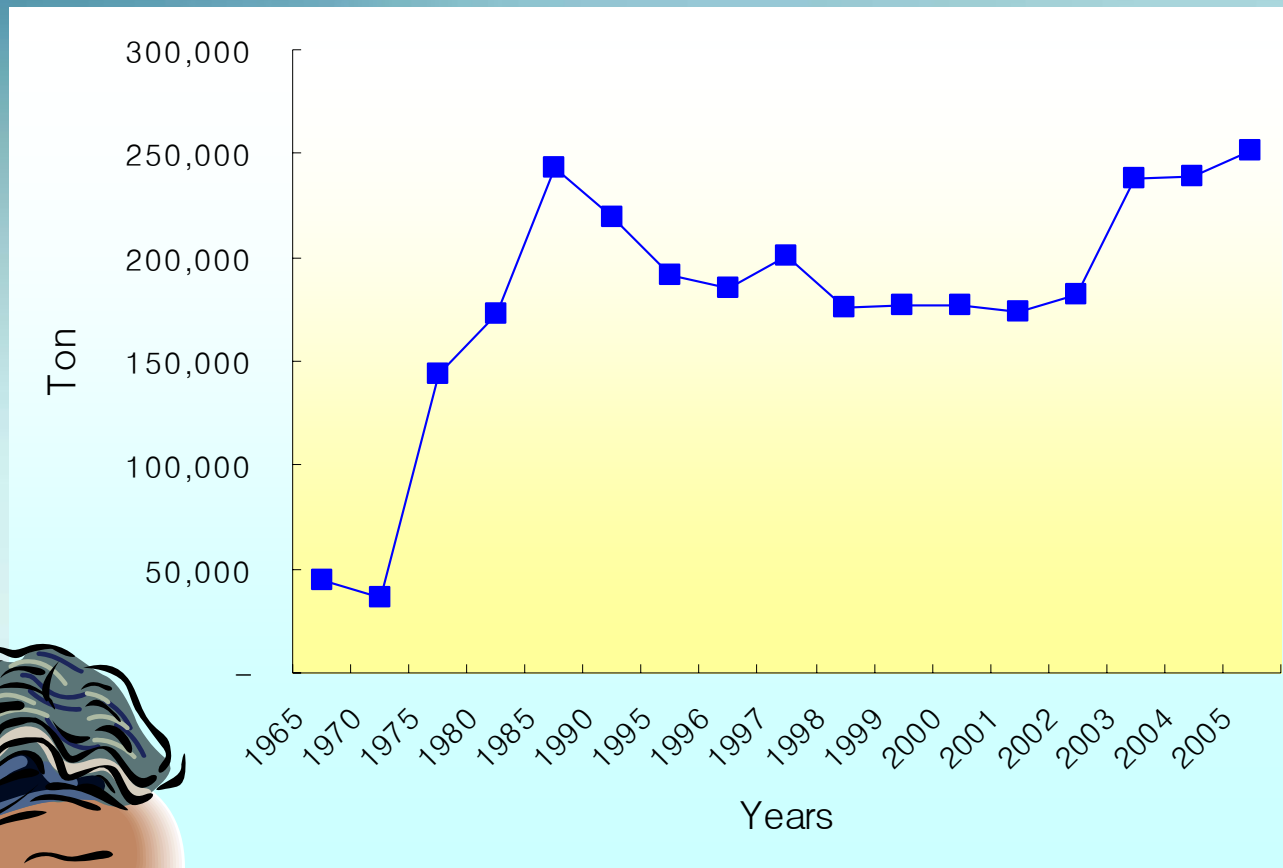
30 g



- Phage concentration ; 1.7×10^7 PFU/fish
- *L. garvieae* concentration ; 7.0×10^8 CFU/fish

I. Aquacultural Statistics

V Annual oyster production



I. Aquacultural Statistics

VI Regional oyster production

Region		1998	2005
Total		175,926	251,706
South sea	Total	169,407	243,371
	Busan	5,765	3,545
	Chonnam	9,127	45,052
	Gyeongnam	154,515	194,774
Yellow sea	Total	6,519	8,317
	Incheon	9	328
	Chungnam	6,510	7,989
	Chonbuk	-	-
East sea	Total	-	18
	Kangwon	-	18
	Gyeongbuk	-	-

(unit : ton)

Annual seeding need 15 millions
= natural seeding 12 millions + artificial seeding 3 millions

III. Antibiotics

Bacillary necrosis

- The causative agent
 - *Vibrio tubiashii*, *V. splendidus*, *V. alginolyticus*, *V. anguillarum*, *Vibrio* sp.
- Pathogenesis
 - More than 90% of oyster larvae were dead within 24 h
- Clinical signs
 - Necrosis of mantle epithelium due to production of exotoxin by the bacteria
- Host species
 - Oyster, clam, scallop, abalone

III. Antibiotics

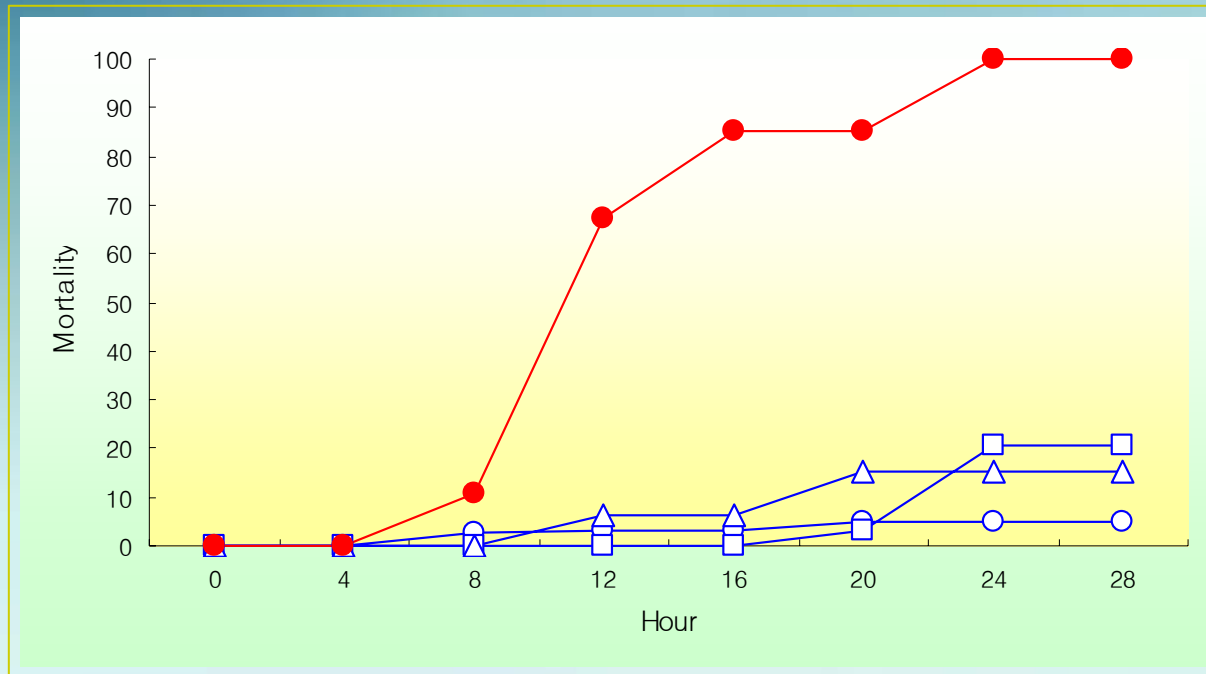
Characteristics of the isolated strain

Characteristics	The isolated strain	<i>V. splendidus</i>
Pigmentation yellow-orange	-	-
Oxidase	+	+
Arginine dihydrolase	-	-
Lysine decarboxylase	-	-
Omithine decarboxylase	-	-
Growth at 0% NaCl	-	-
Growth at 10% NaCl	-	-
Growth at 4°C	-	-
Growth at 20°C	+	+
Growth at 30°C	+	+
Growth at 35°C	+	-
Growth at 40°C	-	-
Aesculin hydrolysis	-	-
Amygdalin	-	-
Citrate	+	+

Characteristics	The isolated strain	<i>V. splendidus</i>
Indole	+	+
NO ₂	+	+
ONPG	-	-
Urease	+	-
Voges-Proskauer	+	+
D-glucosamine cs	+	+
D-glucose	+	+
Arabinose	+	+
Inositol	-	-
Mannitol	-	-
Salicin	+	-
Sorbitol	+	+
Sucrose	+	-
Mannose	+	+
Galactose	-	-

III. Antibiotics

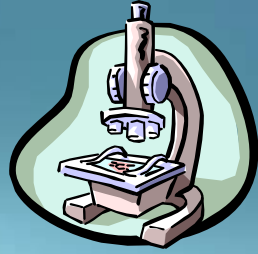
Pathogenicity test of *Vibrio* sp. Isolated in Korea



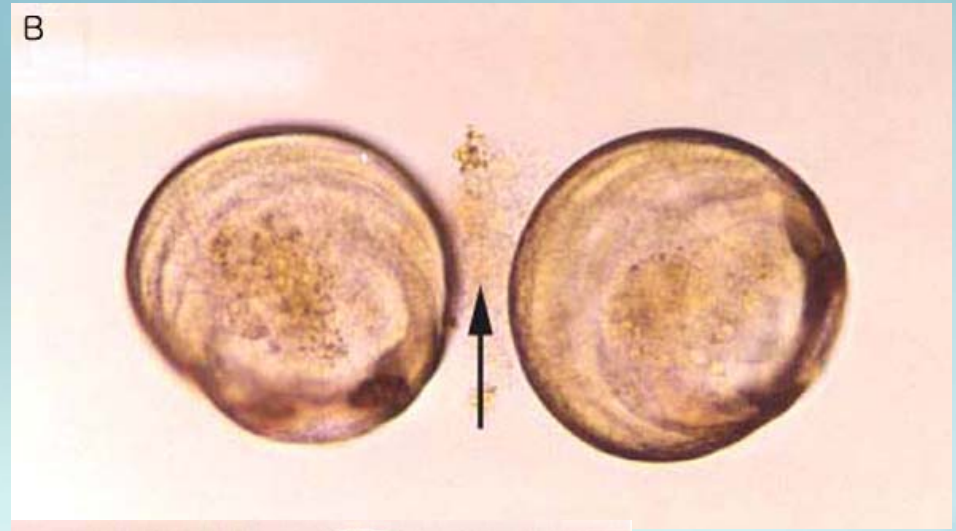
○ : Control, □ : isolated strain in Korea 7.40×10^3 CFU/mL,

△ : 7.40×10^4 CFU/mL, ● : 7.40×10^5 CFU/mL

III. Antibiotics

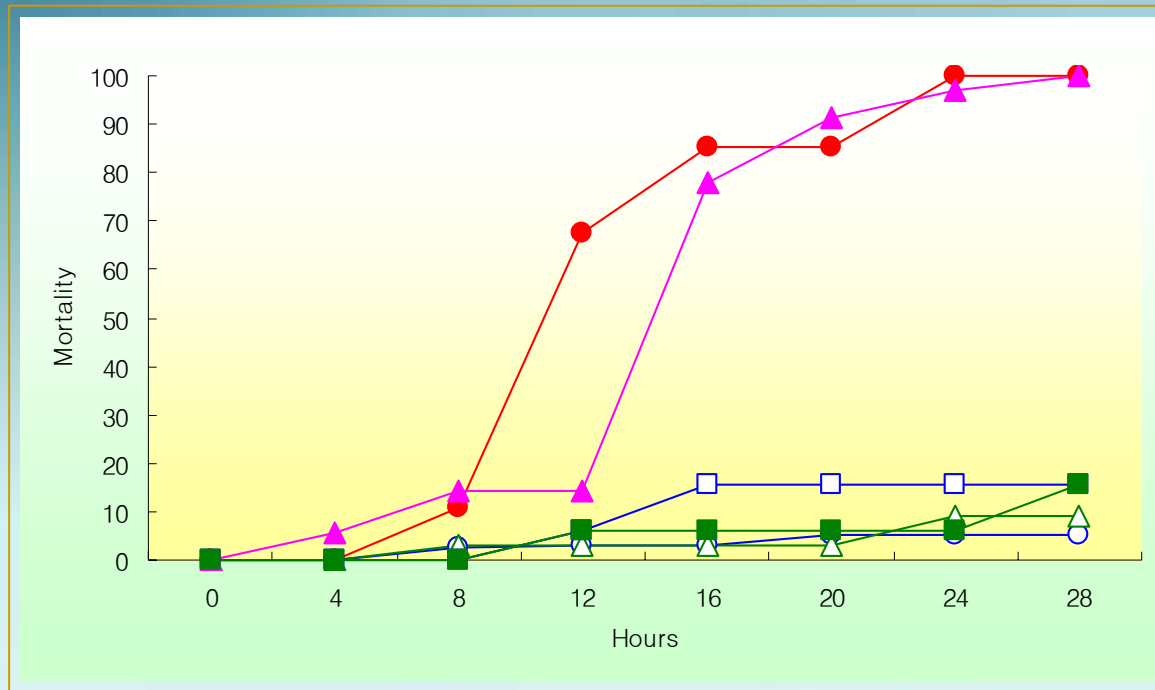


The oyster larvae infected in *Vibrio* sp.



III. Antibiotics

Comparing to the high pathogenicity



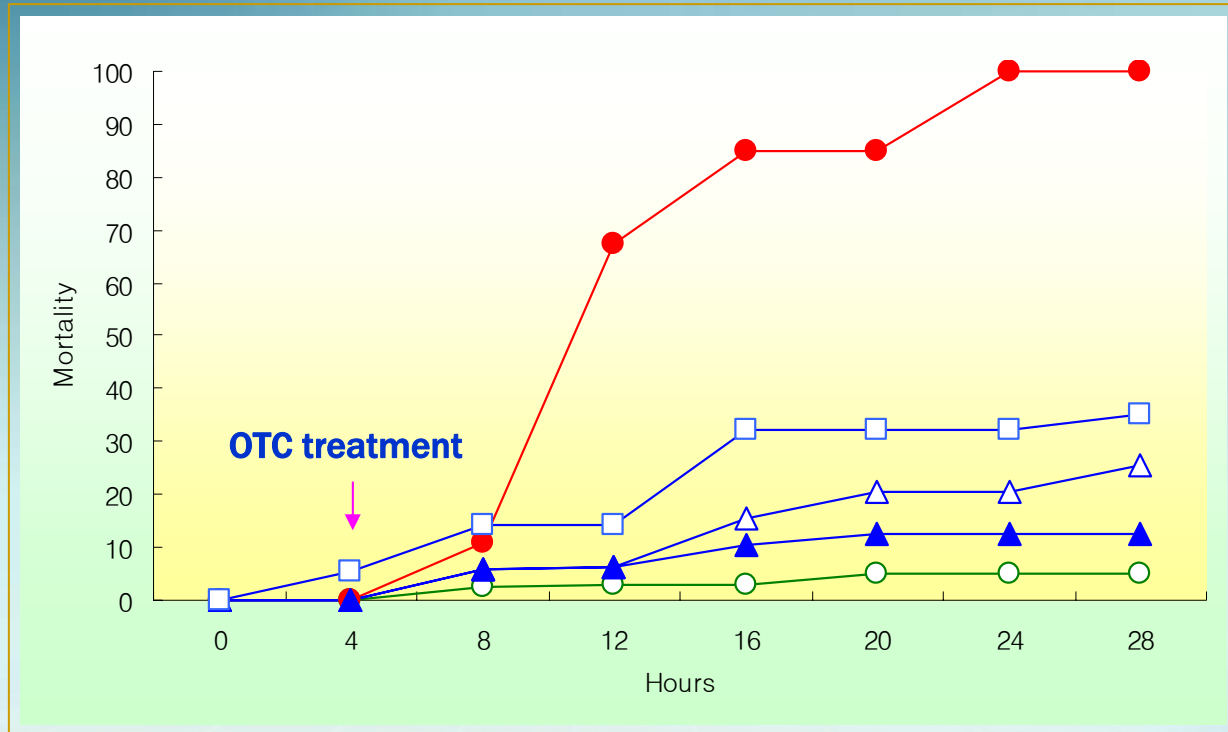
○ : Control, ● : isolated strain in Korea 7.40×10^5 CFU/mL,

▲ : *V. splendidus* 2.13×10^5 CFU/mL, △ : *V. angullarum* 1.07×10^6 CFU/mL,

■ : *V. vulnificus* 6.20×10^5 CFU/mL, □ : *V. cholerae* 1.90×10^6 CFU/mL

III. Antibiotics

The effect by Oxytertracycline treatment



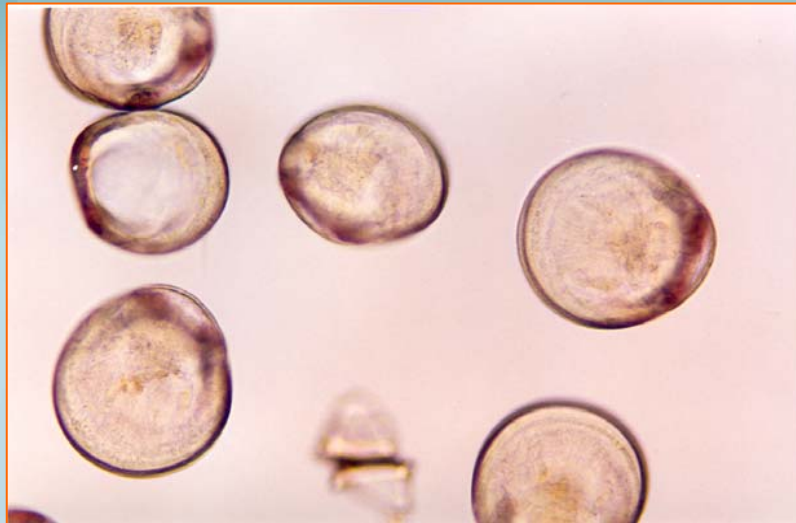
○ : negative control, ● : positive control, △ : oxytertracycline 25ppm,

▲ : oxytertracycline 50ppm, □ : oxytertracycline 100ppm

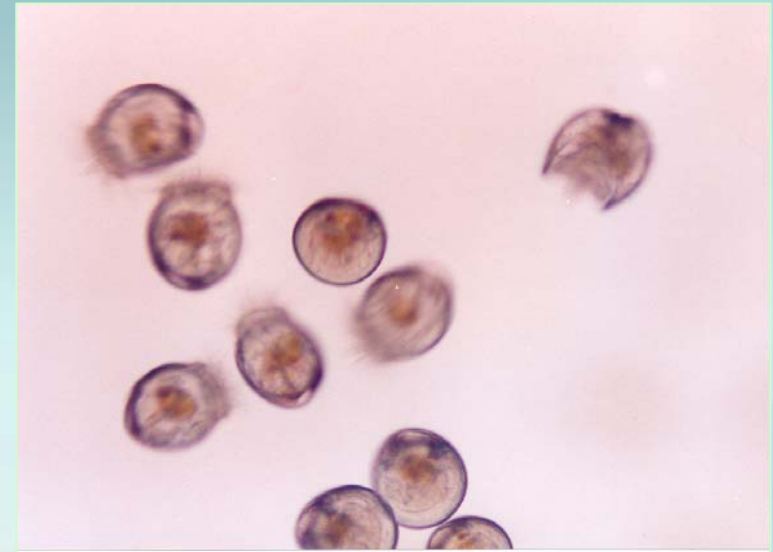
III. Antibiotics



The oyster larvae after antibiotic treatment



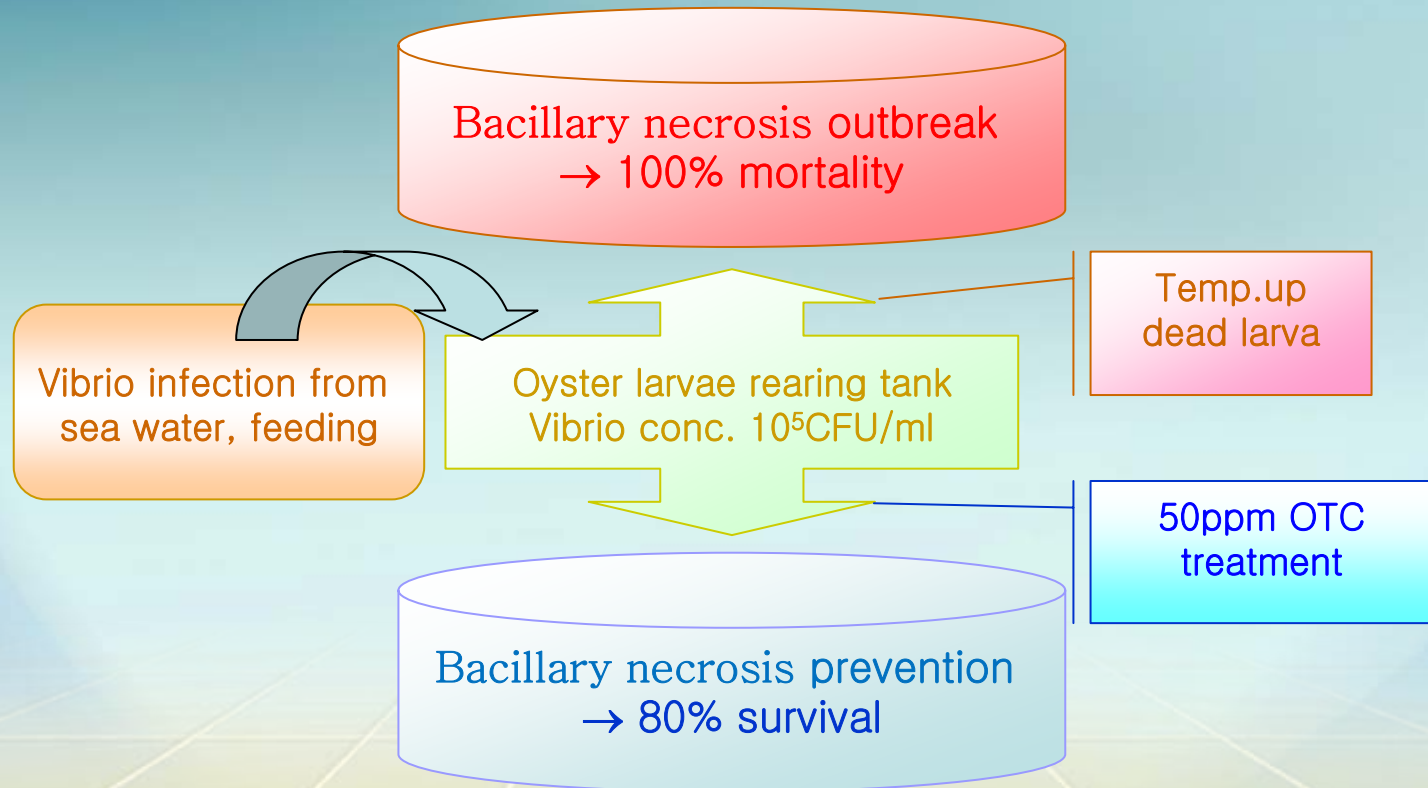
Control group



Antibiotic treatment group

III. Antibiotics

Treatment of the Bacillary necrosis





Thanks for your attention

Congratulations

on successful Beijing Olympic Games

