



Physical, Environmental and Chemical Methods of Marine Disease Prevention and Control

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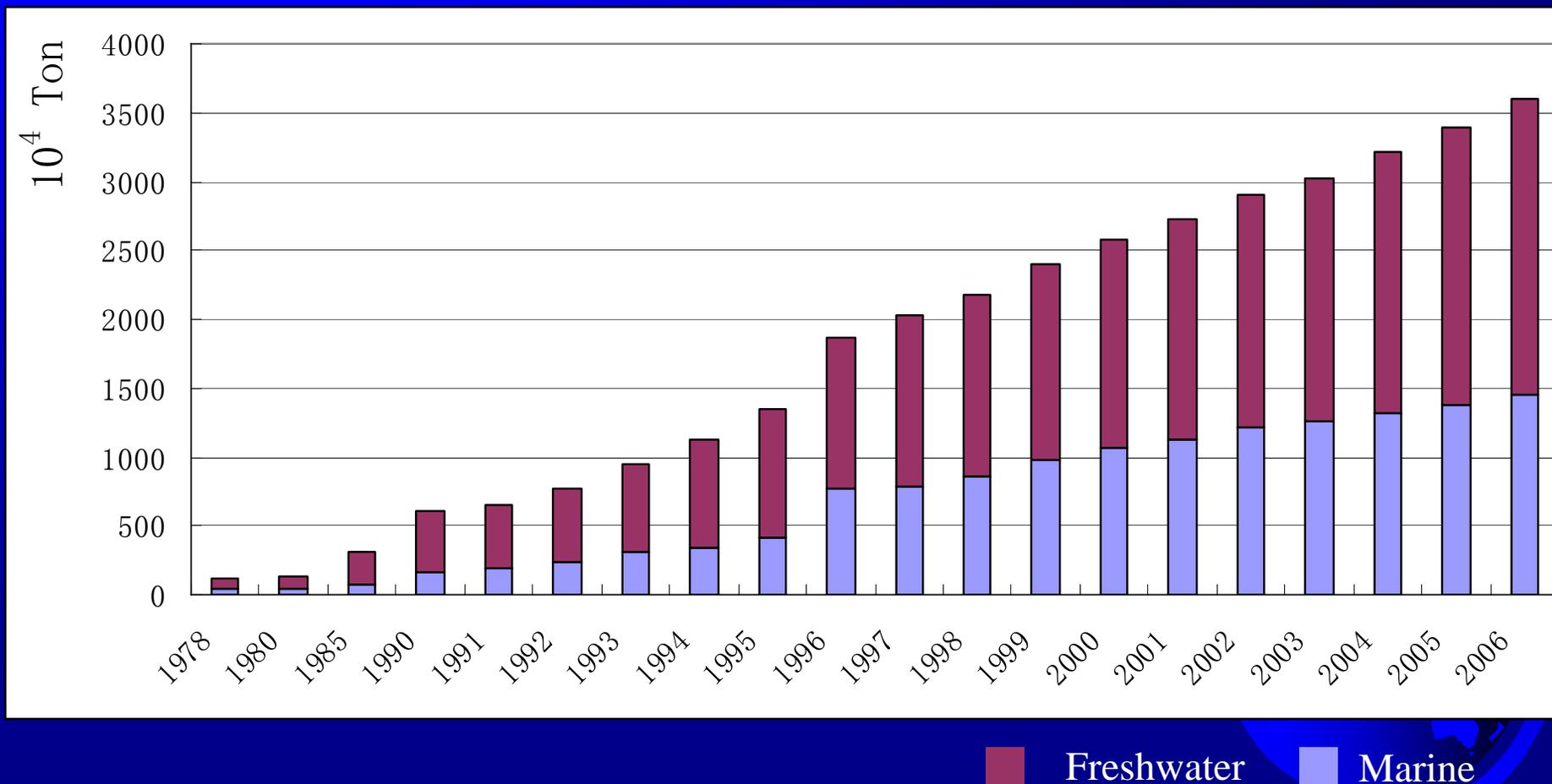
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Part 1. Background

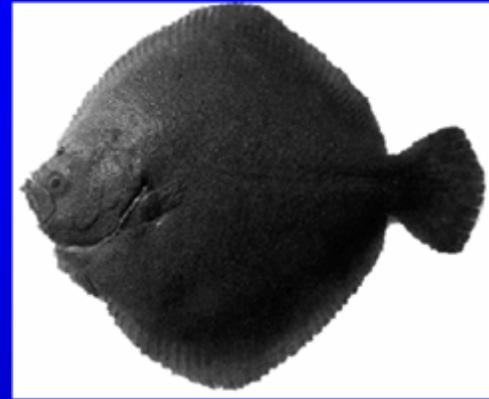


1. Gross production of Chinese aquaculture (1978~2006)



Freshwater Marine

2.The Major Cultured Marine Species in Yellow Sea



Fish : flounders, sea bass,
fugu, dark perch





Shrimps

Shellfish and Sea cucumber





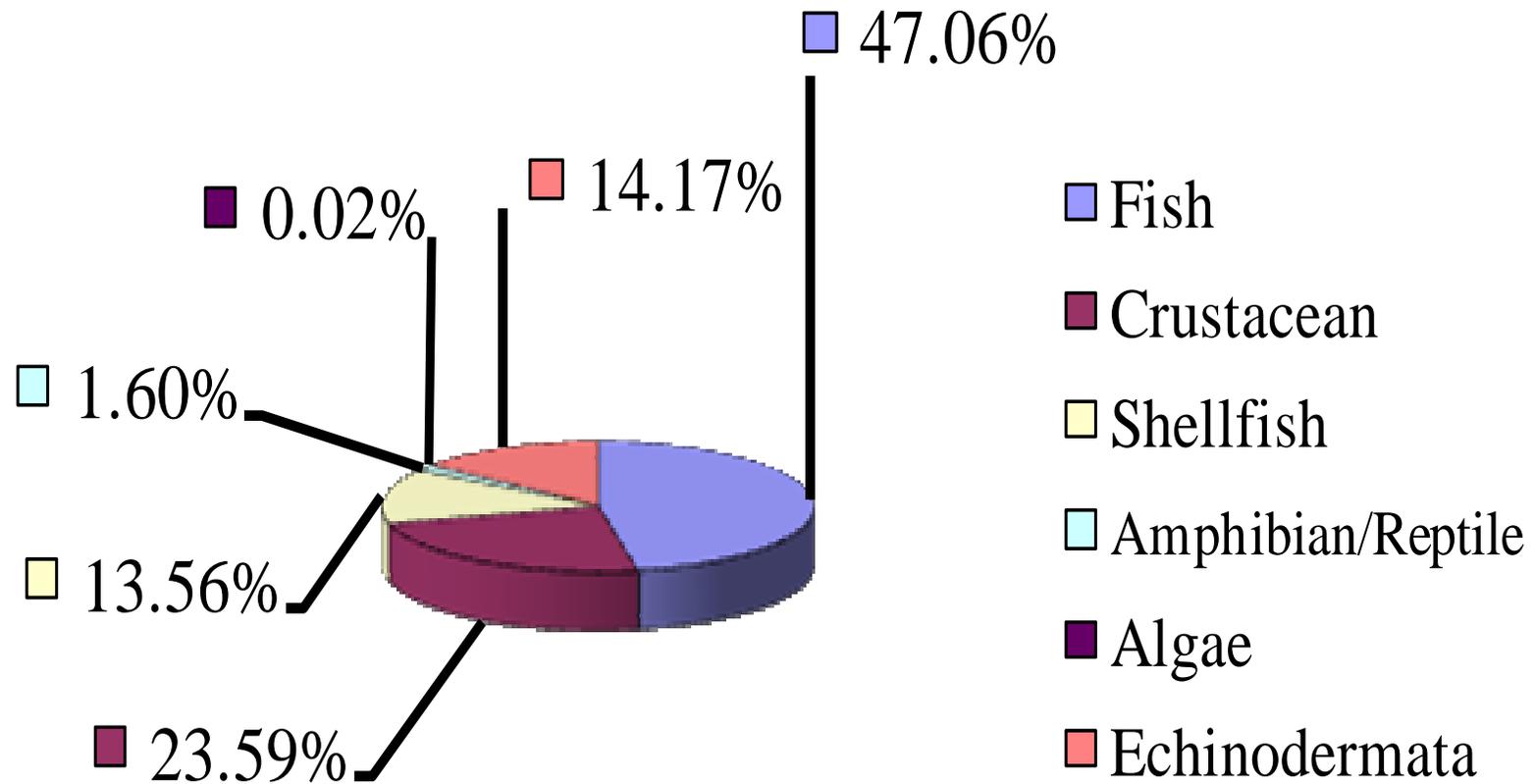
3.The Disease problems

Great expansion and intensification induced the occurrence of diseases since early 1990's

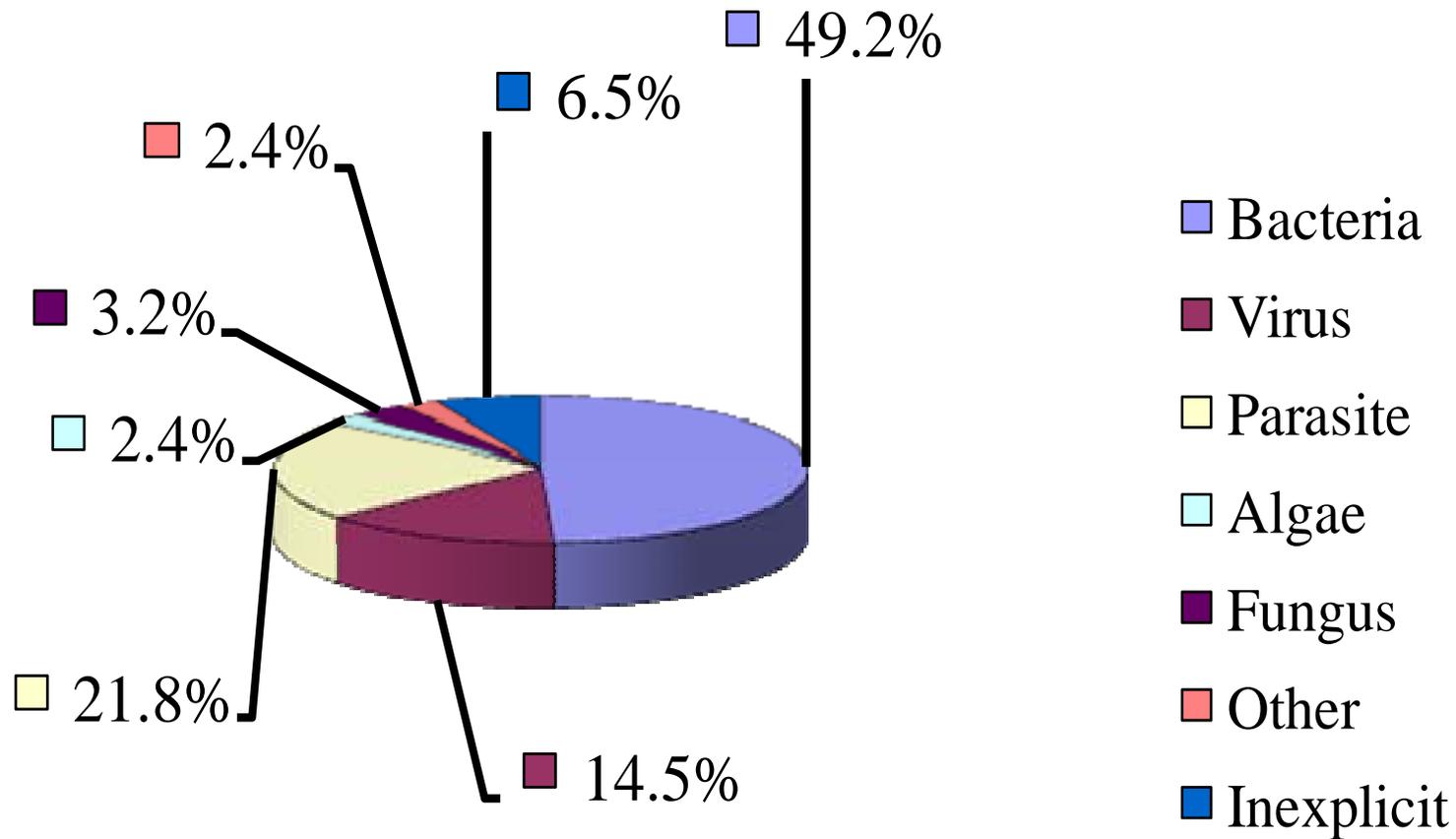
- white spot syndrome (WSSV) causing big losses of cultured shrimp in 1993 (1 billion USD per year)
- massive mortality of cultured scallop in 1998 (lost 0.5 billion USD from scallop acute viral necrotic disease (SAVND)
- severe diseases occurred in cultured sea cucumber since 2002
- totally lose 2.8 billion USD per year for Chinese aquaculture

Diseases have been the major limiting factor in the development of the industry!





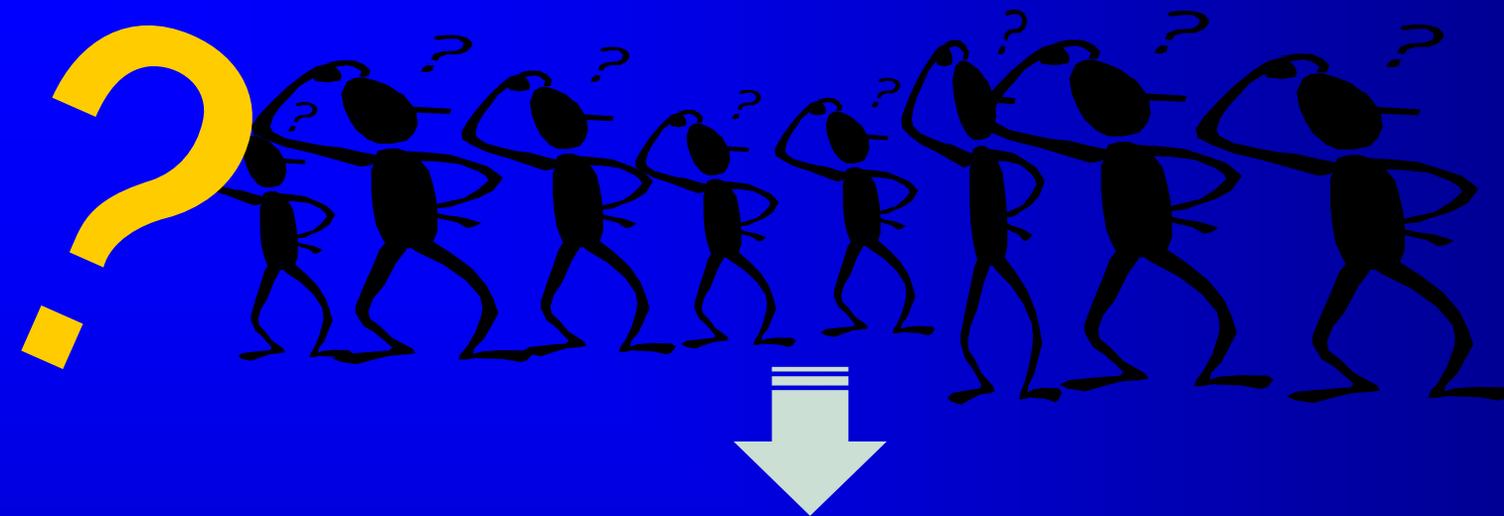
Ratio of the losses for different species



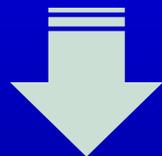
Occurrence of diseases caused by different agent

How to prevent and control diseases?

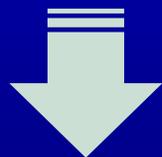




Diagnosis



Analyse



Physical, Environmental and Chemical Methods.....



Part II. Physical Methods



Physical method is usually applied in hatcheries and farms, to remove organic matters or kill the bed



Filters



UV light



Ozone(O₃)



Water Recycle System

- ☸ Screener
- ☸ Protein Skimmer
- ☸ Biofilter
- ☸



Part III. Environmental Methods

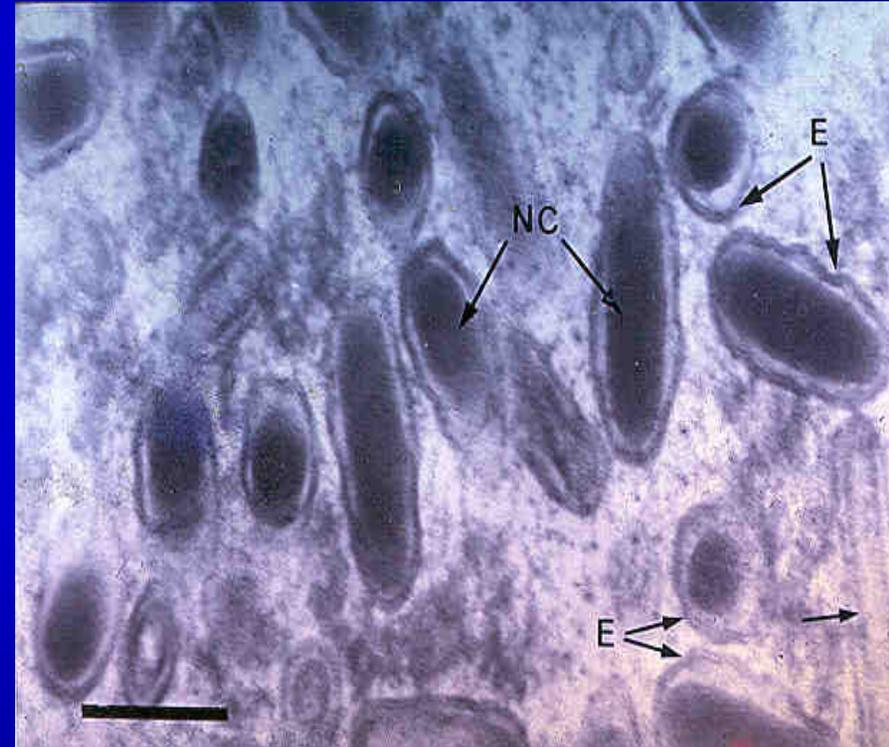
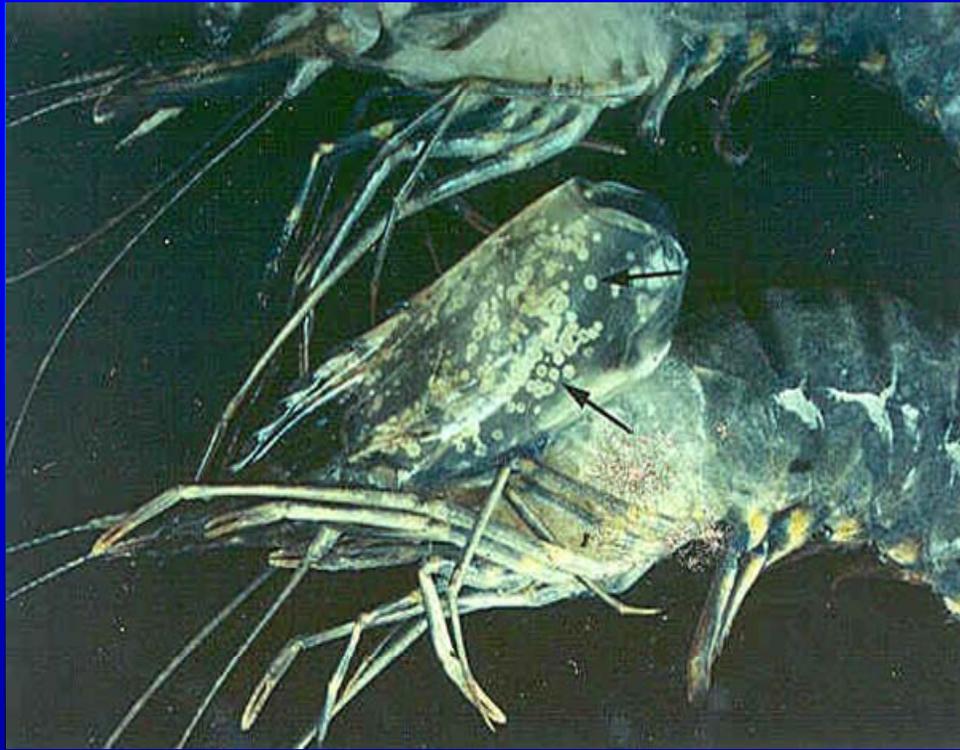


Environmental factors

Prevention

- ★ Keeping good water environment
 - ★ Increase or decrease salinity and temperature
 - ★ Suitable stocking density
 - ★ Establish detection and warning system
 - ★ Cut off infection route f. water source & feedstuff
- 

★ Increase or decrease salinity and temperature



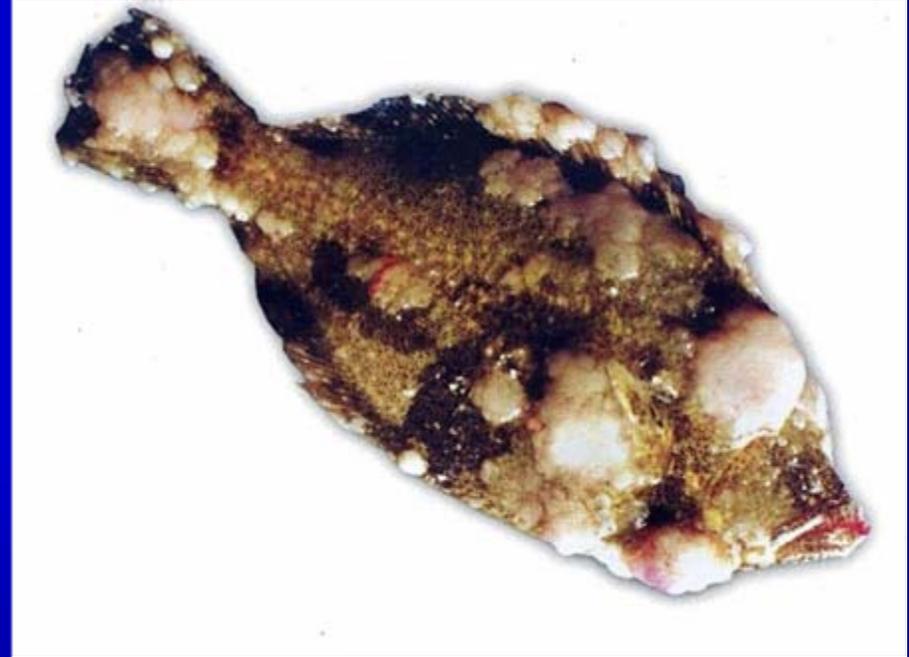
White spot syndrome(WSS):

- WSS will occur after temperature shock down after heavy rain
- Shrimp culture in freshwater (or low down salinity) could against WSS
- The reason why the Chinese shrimp production increased after WSS outbreaks

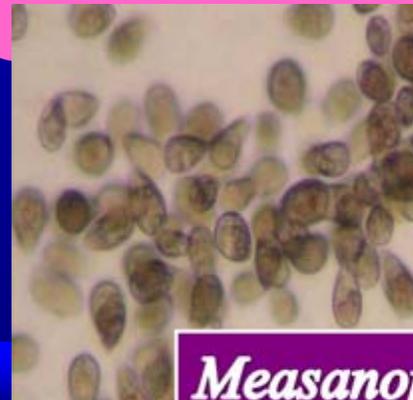
Scuticociliatosis



Lymphocystis disease

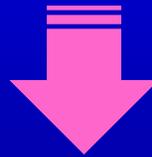


Temperature increased 3-4 °C could be useful in the treatment of above disease



Measanoophrys carcini

Bacterial ulceration syndrome of Sea Cucumber



Treatment :

Increasing temperature up to 15°C, could against BUS during winter nursery.



Marine fishes are shortly immersed in freshwater will be a useful treatment for parasitic infections

Fresh water
and fish

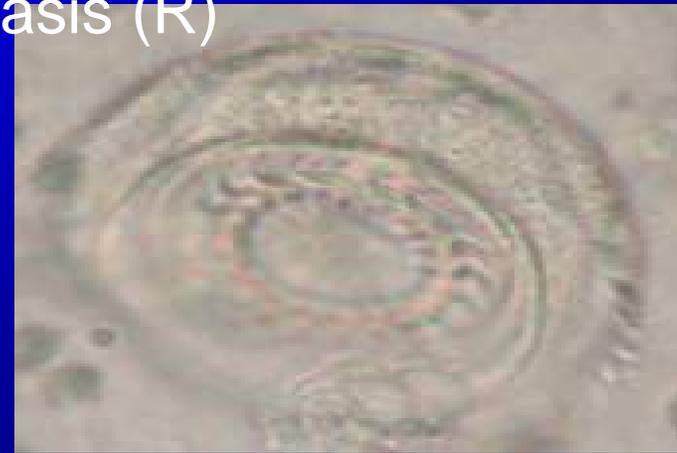


Take out
fish after
5-10 min





Diseased turbot infected by *Ichthyobodo necatrix* (L) & trichodiniasis (R)



Photography of *Ichthyobodo necatrix* (left) and trichodiniasis (right)



Ichthyophthiriasis locate on fish gills and its
photography of parasite *Ichthyophthirius marinus*



Part IV. Chemical Methods



Biological products
immunostimulant, vaccine,
microecological modulator,
diagnostic reagent etc.

Antibiotics

Disinfectants

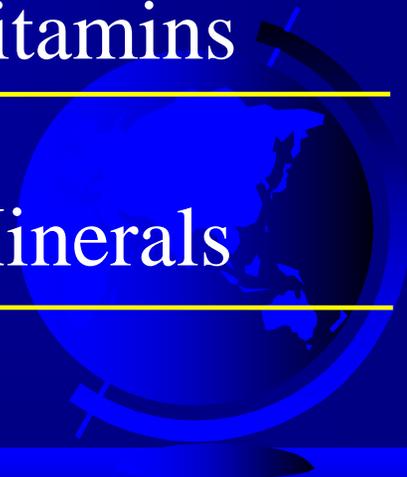
Pesticides

Vitamins

Herbals

Minerals

Chemical



Aquatic medication



Disinfectants

e.g. NaClO , Iodine, CaO etc.

**Liming with
CaO**



Antibiotics

Use of high efficiency, but no harm, no residues, non prohibited approved drugs



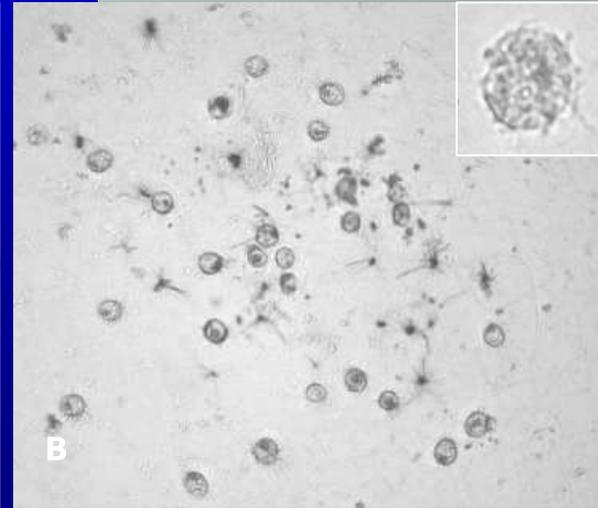
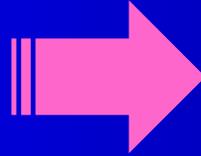
Antibiotic
Sensitivity
Test

ATB细菌分析检测仪



Herbals

Oral: powder or extraction

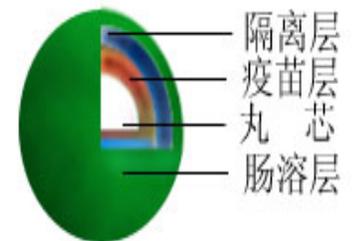


Biological products

immunostimulant, vaccine, microecological modulator, diagnostic reagent etc.

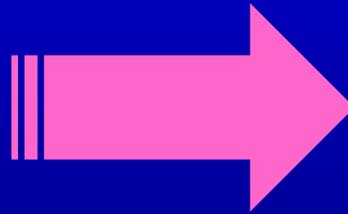


Oral Vaccine-Enteric-coated Capsule



肠溶包衣疫苗结构示意图

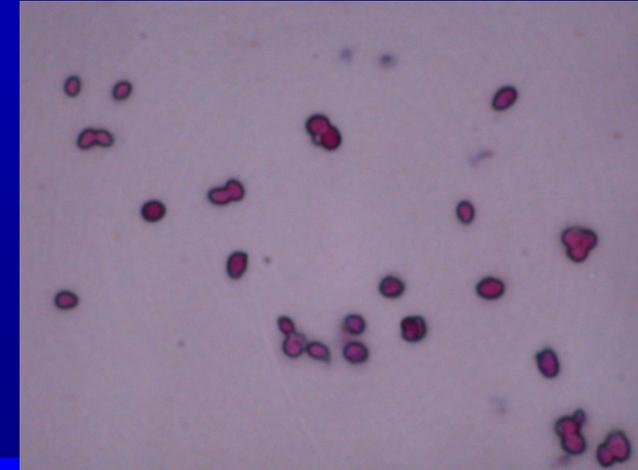
Environment improvement



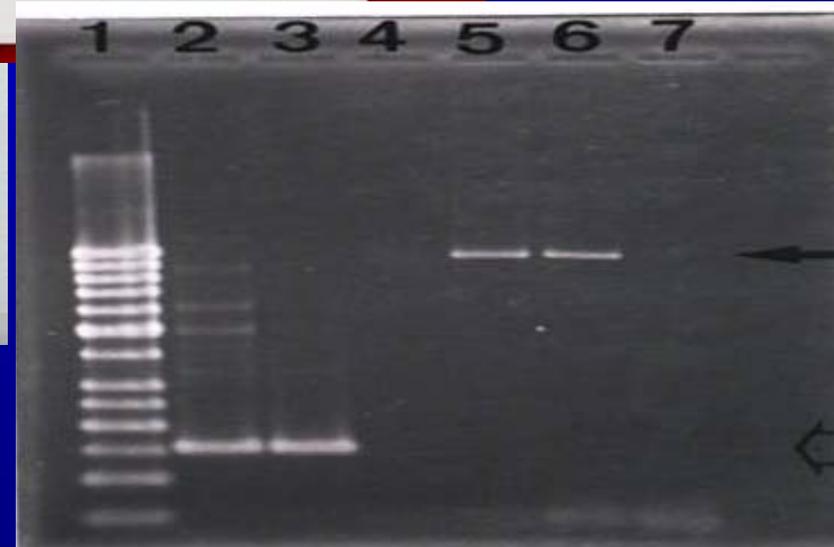
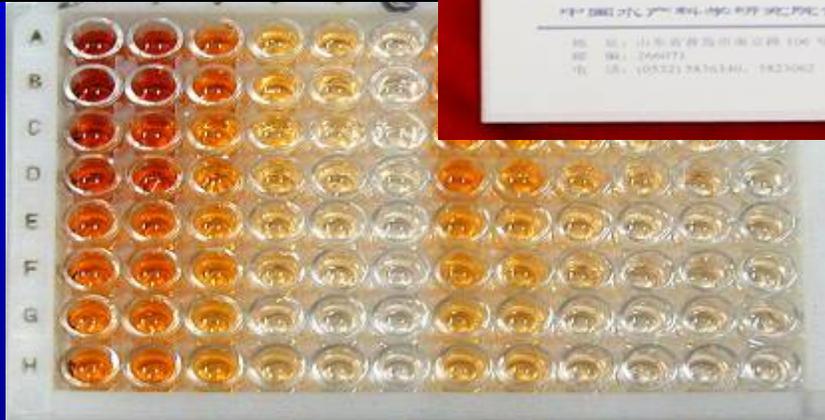
Subtilis sp.



Rhodococcus phenolicus



Diagnostic reagent



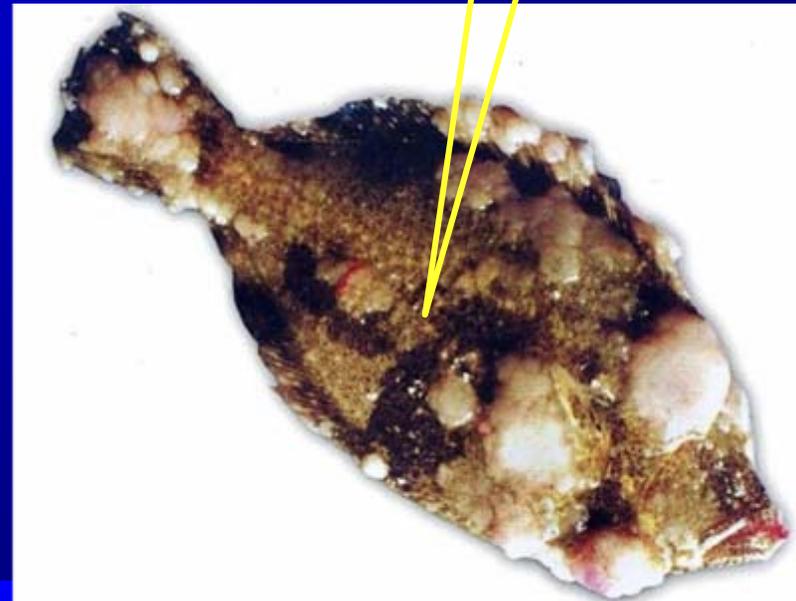
Polyinosinic-polycytidylic Acid (poly I:C) treatment

□ Poly(I:C) is a synthetic analog of double-stranded RNA(dsRNA), a molecular pattern associated with viral infection. dsRNA is known to induce interferons (IFN) and other cytokines production.

□ IFN induction is mediated by two different pathways. The first pathway leading to NF- κ B activation depends on the dsRNA-responsive protein kinase (PKR)1, whereas the second pathway is PKR-independent and involves TLR3.

□ Transfection of 293 T cells with

TLR3 (TLR1/2, TLR4)





Food
Safety

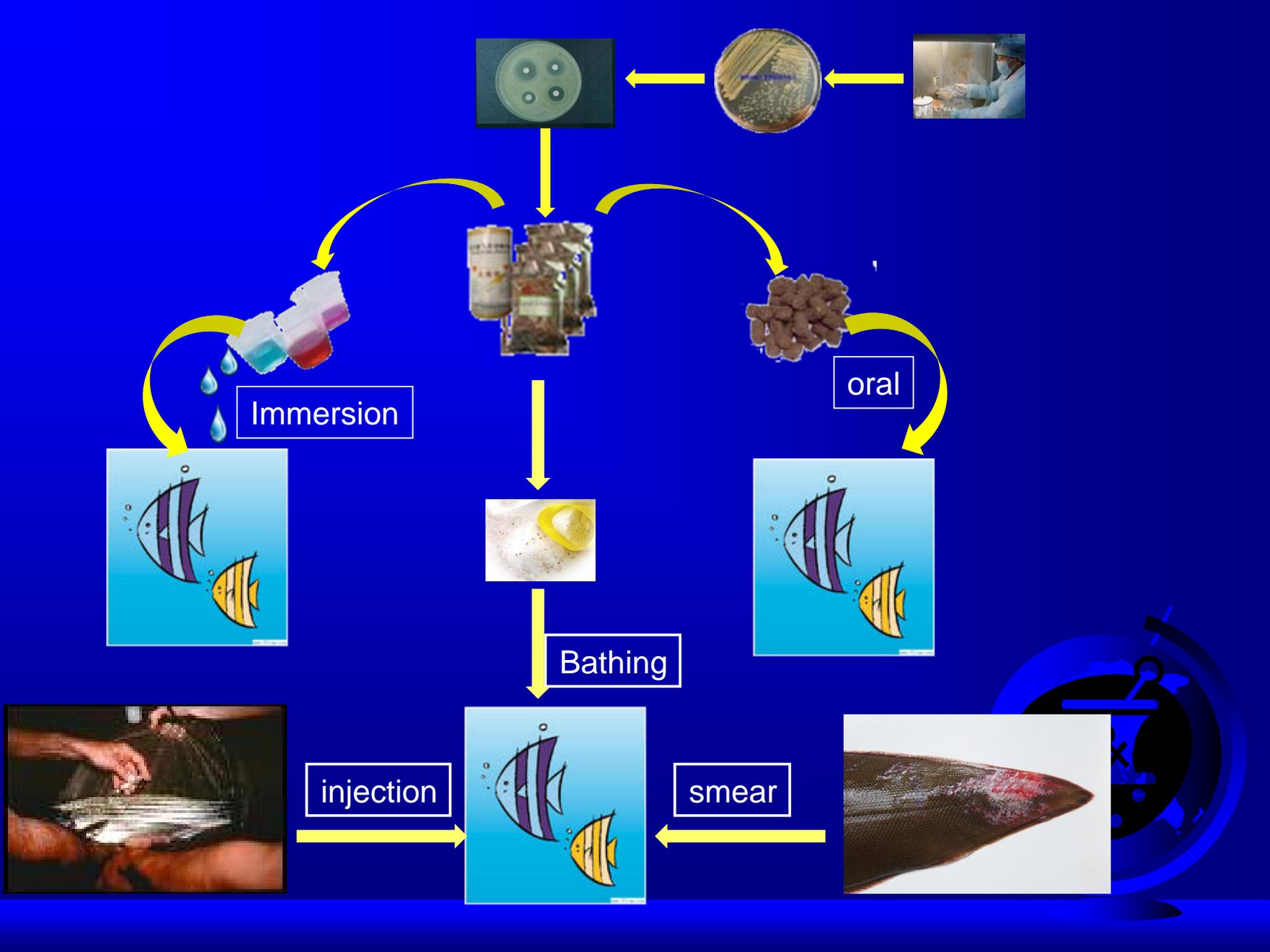


Efficiency



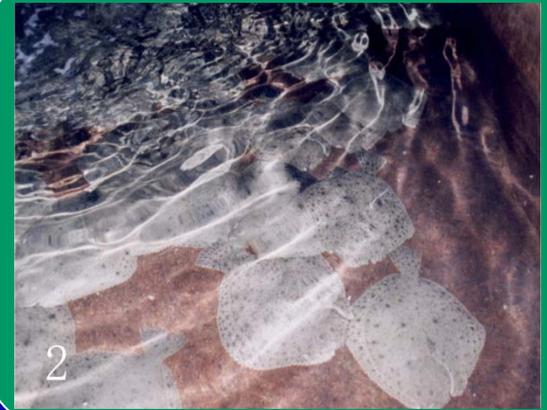
No
Residue







Happy Fish!





Thank you

for your attention



Aquatic medicament

★ disinfectants

★ antibiotics

★ herbal

★ bactericidal

★ parasitocidal

★ antivirotic

★ antifungal

★ nutritional additives

★ Immunoenhancer

★ environment improvement



Viral disease prevention and control

- **Pond clean and disinfected**
- **Closed water supply system**
- **Decrease salinity**
- **SPF or SPR fry**
- **Suitable stocking density**
- **Poly-culture**
- **Cut the infect route**
- **Monitor the virus quantity termly**
- **Administration of herbs and immunopotentiator**
- **Feed with virus receptor inhibitor**



Bacterial disease prevention and control

- **Pond clean and disinfected**
- **Closed water supply system**
- **Monitor water quality ($< 10^4$ CFU/ ml)**
- **Water disinfection (UV or O^3)**
- **Tools disinfection**
- **Suitable stocking density**
- **Avoid overfeeding**
- **Administration of herbs and immunopotentiator**
- **Apply special antibiotics**



Parasitic disease prevention and control

- Keep ponds and tools clean and disinfected
- Closed water supply system
- Decrease salinity
- Increase water exchange
- Cut the infect route and isolate infected fish
- Suitable stocking density
- Apply pesticide

Herb



Infusorian

