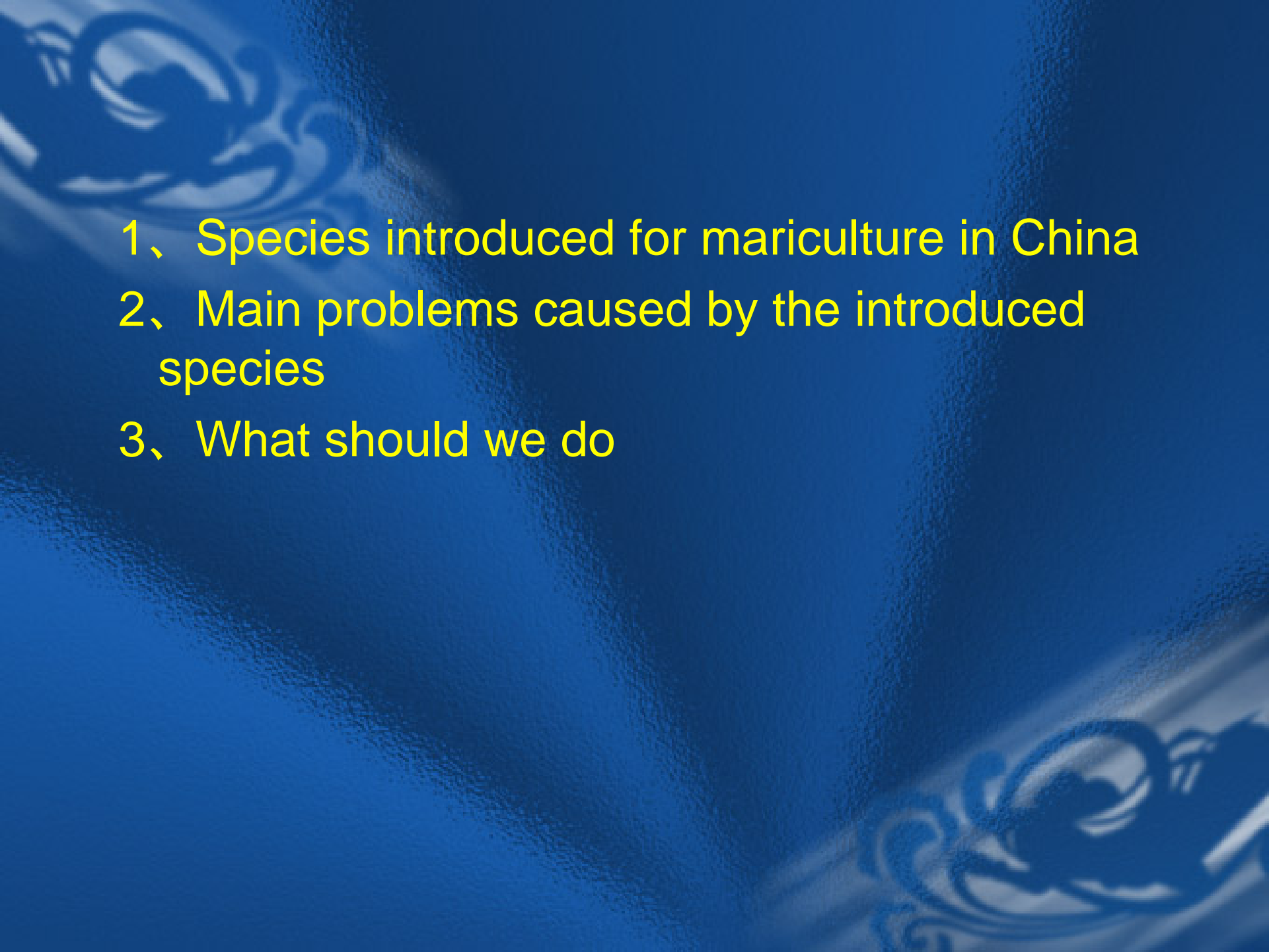


Species introduced for marine aquaculture and its impacts in China

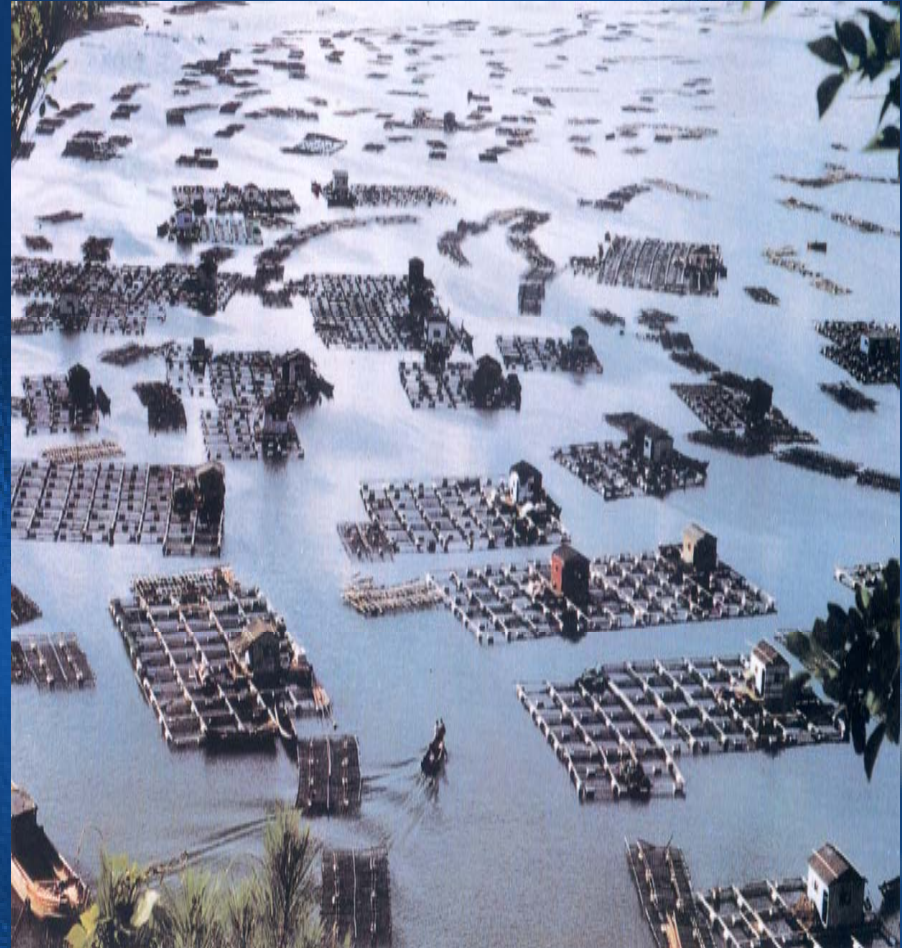
Lijun Wang

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Center, SOA**

- 
- The background is a solid blue color with faint, decorative patterns in the corners. The patterns appear to be stylized floral or scrollwork designs, possibly from a traditional Chinese motif, rendered in a lighter shade of blue. The overall aesthetic is clean and professional.
- 1、 Species introduced for mariculture in China
 - 2、 Main problems caused by the introduced species
 - 3、 What should we do

As the country with the biggest mariculture industry in the world, China has introduced some 41 species of alien marine organisms for the purpose of mariculture until 2007.

- ◆ **According inadequate statistic until 2007, there were**
- ◆ **5 species of alga**
- ◆ **13 species of shellfish**
- ◆ **7 species of crustaceans**
- ◆ **1 species of sea urchin,**
- ◆ **15 species of fish,**



Tab.1 Species introduced for marine aquaculture in China

Species	Introduction date	Source regions	Recipient regions
<i>Lamiraria japonica</i>	1950s	Japan	Shandong, liaoning etc
<i>Undaria pinnatida</i>	1950s	Japan	Shandong, liaoning etc
<i>Laminaria longissima</i>	1996	Japan	Shandong etc
<i>Macrocystis pyrifera</i>	1960s	EU	
<i>Eucheuma striatum</i>	1985	Philippine	Shandong etc
<i>Argopecten irradians</i>	1982	USA	China coast
<i>Argopecten irradians oncentricus</i>	1995	USA	Shandong etc
<i>Patinopecten yessoensis</i>	1981	Japan	Liaoning, Shandong, etc
<i>Crassostrea gigas</i>	Unknown	Japan	China coast
<i>Haliotis rufescens</i>	1985	USA	Liaoning
<i>Haliotis fulgens</i>	1985	USA	Liaoning
<i>Panopea abrupta</i>	1999	USA	Shandong, liaoning etc
<i>Mercernaria mercernaria</i>	1997	USA	Shandong, liaoning etc

**Tab.1 Species introduced for marine aquaculture in China
(continue above)**

Species	Introduction date	Source regions	Recipient regions
<i>Penaeus japonicus</i>	Unknown	Japan	China coast
<i>Penaeus vanamei</i>	1991	Ecuador	China coast
<i>Litopenaeus stylirostris</i>	1999	Mexico	China coast
<i>Cherax diserwctar</i>	1997	Australia	Shandong etc
<i>Cherax tenuimanus</i>	1999	Australia	Shandong etc
<i>Strongylocentrotus intermedius</i>	1985	Japan	Liaoning,Shandong,etc
<i>Salmo gairdneri</i>	1958	North Korea	China coast
<i>Scophthalmus maximus</i>	1992	EU	North China coast
<i>Anguilla anguilla</i>	1990s	EU	South China coast
<i>Fugu rubripes</i>	1996	Japan	North China coast
<i>Morone saxatilis</i>	1990s	USA	China coast
<i>Lates calcarifer</i>	1990s	USA	China coast
<i>Acipenser guneldenstaedti</i>	1993	Russia	North China coast
<i>Cynosion nebulosus</i>	1991	USA	China coast
<i>Macquaria ambigua</i>	1999	Australia	North China coast
<i>Bidyanus bidyanus</i>	1999	Australia	North China coast
<i>Oreochromis mossambica</i>	1978	Africa	China coast
<i>Oreochromis niloticu</i>	1978	Africa	China coast
<i>Oreochromis aureus</i>	1981	Africa	China coast

- ◆ The introduction of these species enormously promote the development of aquaculture and improve the quality of aquatic product in China. Although there have not taken place biological invasion due to introduction, it has brought negative impacts, such as exotic pathogen, genetic pollution.

Problem 1

Pathogen disease

Fig.1 Areas there has been broken out Perkinsus disease of clam *Ruditapes philippinarum*

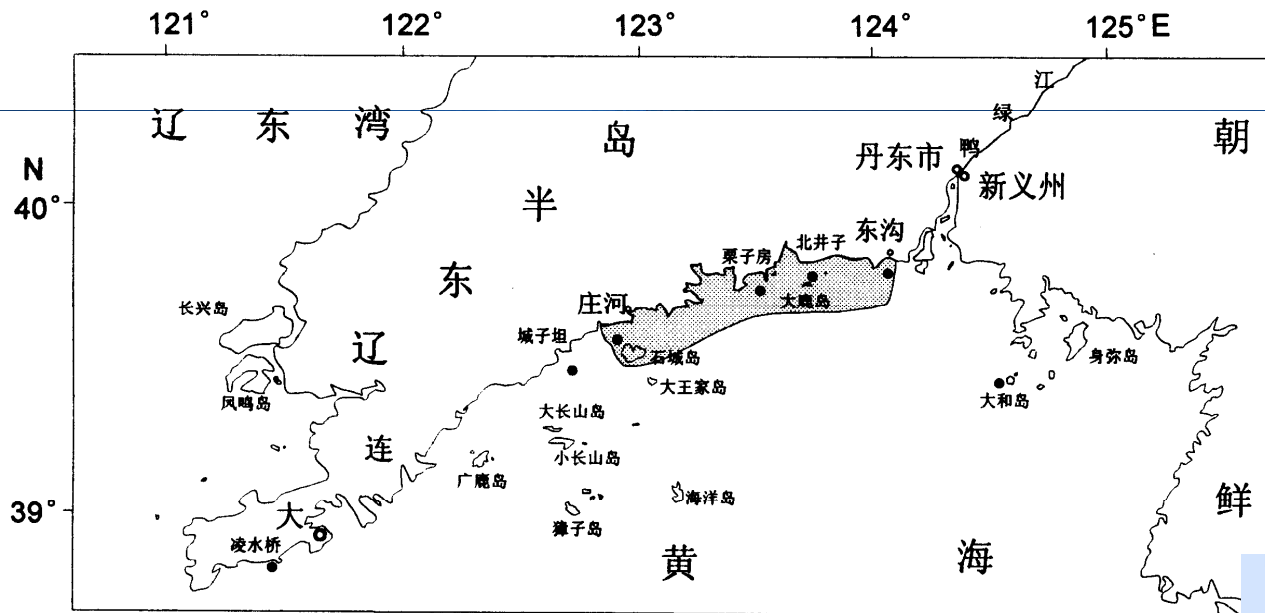
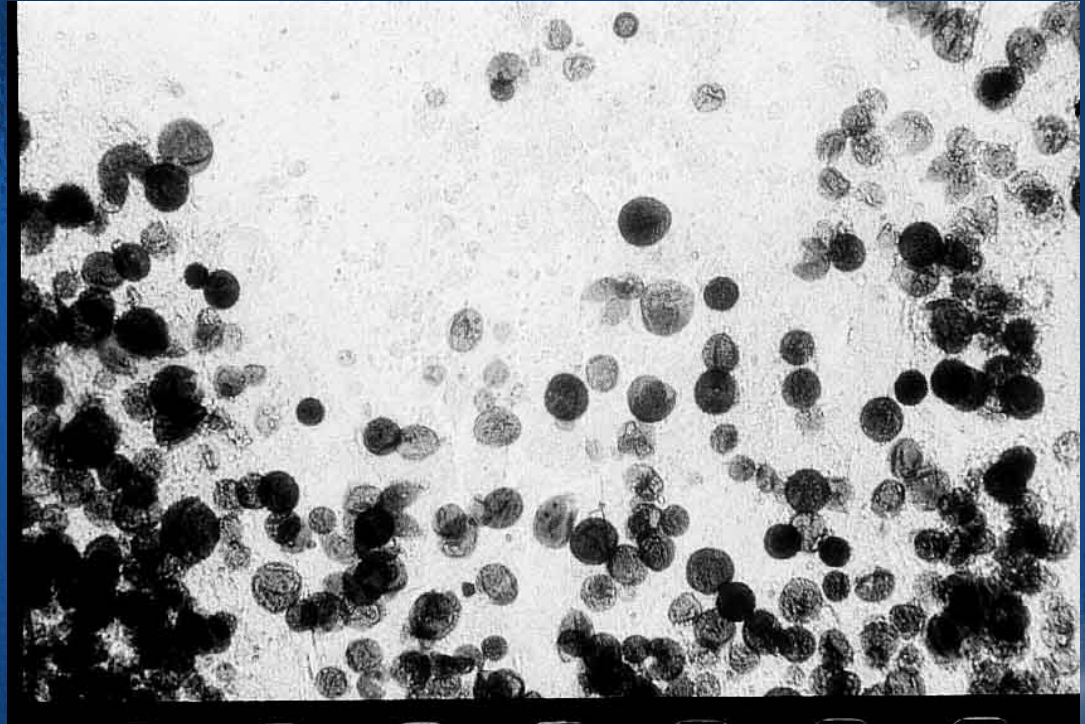


Fig.2 Dormant spores cultivated by FTM medium

Densities of spores amounts to one million per gram tissue



Shape and distribution of Perkinsus in *Ruditapes philippinarum*

- ① Dormant spores cultivated by FTM medium ;
- ② Dormant spores of gill cultivated by FTM medium ;
- ③ One cell nourishing spores of gill ;
- ④ Double cell nourishing spores of gill ;
- ⑤ Four cell nourishing spores of digestive gland ;
- ⑥ Eight cell nourishing spores of digestive gland.

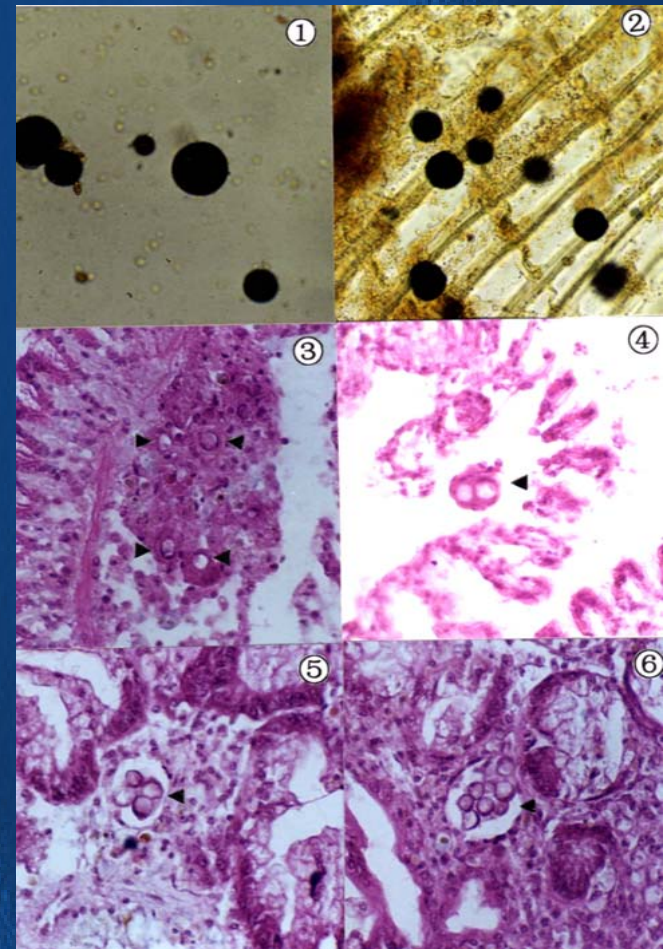


Fig.3 Region map

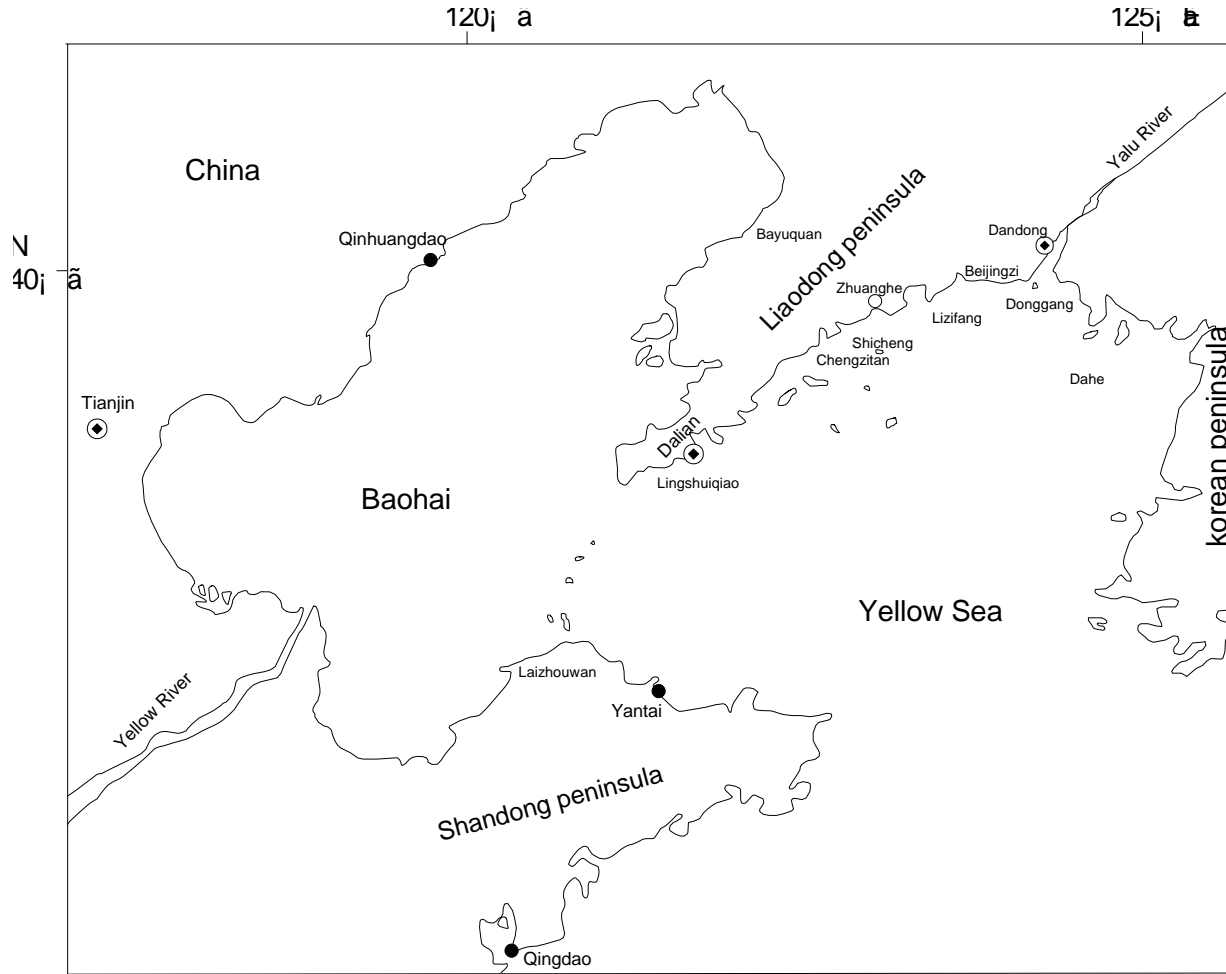
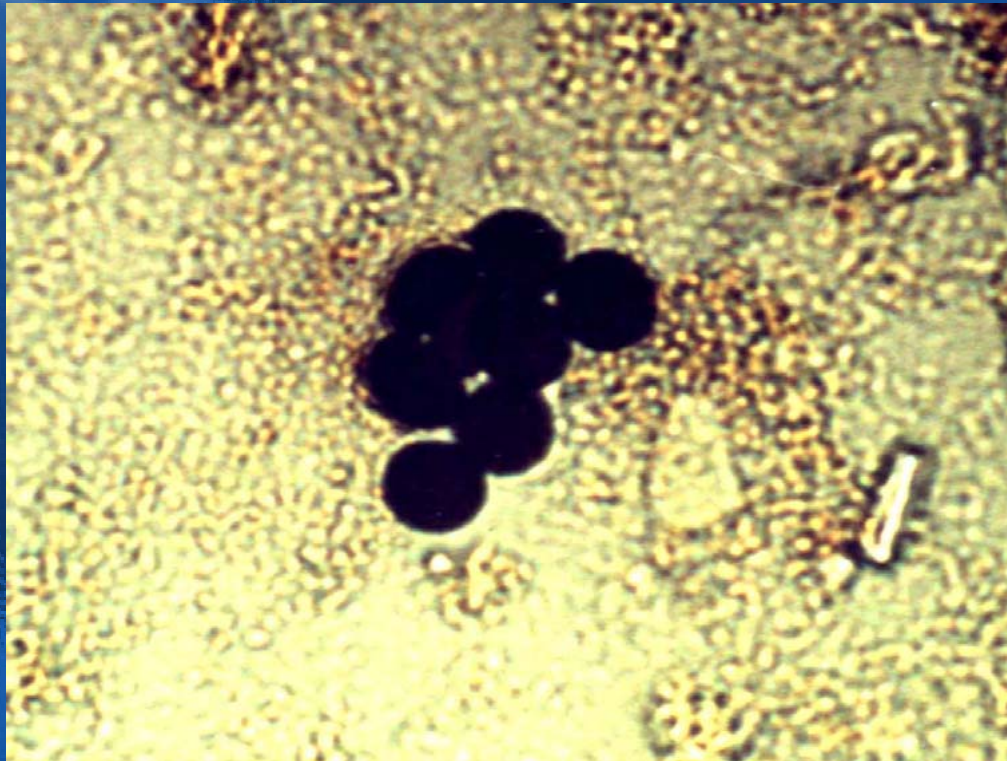


Fig.4 Spores cultivated by FTM medium in *Chlamys Farreri*



Other pathogens

- ◆ Penaeus monodon-type baculovirus(MBV);
- ◆ White spot syndrome virus(WSSV);
- ◆ Yellow-head Baculovirus(YHV);
- ◆ Taura syndrome Virus(TSV);
- ◆ Infectious hypodermal& haematopoietic necrosis(IHHN)
- ◆ iridovirus

Problem2:Genetic pollution

- ◆ Food contest and hybridization experiments between
 - Strongylocentratu s intermedius* and *Strongylocentrolu s nudus*
 - Hemicentrolus pulcherrimus*
 - Glyptocidaris crenularis*



Strongylocentrolus nudus



Hemicentrolus pulcherrimus



Glyptocidaris crenularis



Strongylocentratus intermedius

What should we do?

- ◆ **Ecological risk assessment technology for intentionally introducing species**
- ◆ **Formulate strict policies and regulations of limiting the introduction of alien marine species for mariculture or planting.**
- ◆ **Setup the environmental impact assessment for importing alien marine organisms.**
- ◆ **Strengthen quarantine of alien marine species importing.**
- ◆ **Promote monitoring, research and public awareness of alien marine species.**
- ◆ **Establish an effective and integrated management system for alien marine species.**



谢谢！
Thanks!