TRANSBOUNDARY MOVEMENT OF EXOTIC SHRIMP SPECIES IN THE ASIAN REGION

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This compiled information were based on presentations at the AQUAMARKET Shrimp Session in Manila, Philippines, 2-6 June 2003, made by T.W. Flegel (BIOTEC), C.V. Mohan (NACA), P. Chanratchakool (AAHRI), and C.R. Lavilla-Torres (SEAFDEC).

Motives for Shrimp Introduction

The known motives for the introduction of exotic shrimp species in the region are:

1. strong market demand;
2. there is no suitable native organism;
3. culture of the native stock crashes; and
4. expansion, intensification and diversification of aquaculture

T. W. Flegel compiled the reasons for species introduction in the following table:

Cause of import	No. of records	%
Known and intentional		
Aquaculture	1386	39
Fisheries	299	8
Ornamental	263	7
Research	104	3
Other reasons	272	8
Total intentional	**2324**	**65**
Known but unintentional		
Angling/sport	283	8
Diffused from other countries	139	4
Accidental	267	8
Bait	14	>1
Total unintentional	**703**	**20**
Unknown	**552**	**15**

The movement of healthy shrimps between countries "with a species' range" is allowable. However, the movement of aquatic animals outside biological barrier needs careful consideration and high level of vigilance because of various reasons that include the following factors:

1. Crustaceans can carry unknown viral pathogens as innocuous but active infections;
2. These viruses may be deadly to other species or the same species at distant locations; and
3. Greater geographical separation implies greater danger.

Shrimp viruses are not harmful to humans but their outbreaks have raised concerns that viruses could spread from aquaculture facilities to wild shrimp stocks.

T.W. Flegel identified the following particular dangers from shrimp viruses:

1. Viruses are responsible for the most severe losses in shrimp aquaculture;
2. Shrimp and other crustaceans are characterized by persistent viral infections;
3. These infections often produce no gross signs of disease and no mortality; and
4. Many of these "hidden" or "cryptic" viruses are still unknown.

He also outlined the dual and multiple viral infections in shrimps as follows:

1. Dual, triple and multiple viral infections are often seen in shrimp, but rarely reported;
2. Rarely are "healthy" shrimp examined; and
3. A cryptic virus tolerated in one host or location may not be tolerated in another host or location.

As for the moment, a checklist of Asia's Shrimp Virus has been compiled and compared with the Western Hemisphere's Shrimp Disease Checklist.

Asia's Shrimp Virus Checklist	**Western Hemosphere's Shrimp Diseases**
White spot syndrome virus (WSSV)	Taura Syndrome Virus (TSV)
Yellow head virus (YHV)	Reo-like viruses
Infectious hypodermal and hemapoietic	Baculovirus penaei type virus (BP)
necrosis virus (IHHNV)	Necrotizing hepatopancreatitis
Penaeus monodon-type baculovirus	
(MBV)	
Hepatopancreatic parvovirus (HPV)	
Baculoviral midgut gland necrosis type	
virus (BMN)	

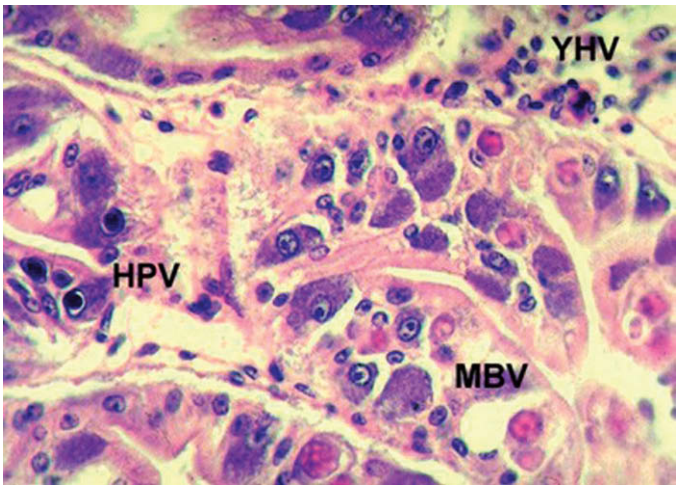
In a study of six ponds in Thailand, T. W. Flegel, et al, made an analysis on how healthy are "grossly healthy" shrimps. The results are shown in the following table:

Infection status	**No. of shrimps**	**% Total**
Uninfected	14	5.
Infected	223	94.1
Total tested	237	100.0
Single infections	50	21.1
MBV	8	3.4
HPV	13	5.5
WSSV	19	6.0
IHHNV	10	4.2
Dual infections	69	29.1
Triple infections	80	33.8
Quadruple	24	10.1
Dual to quadruple	173	73.0

White Spot Disease (WSD)

The most serious pathogen of cultivated shrimp in the world is the white spot disease carried by the White Spot Syndrome Virus (WSSV). This was first known in China during its serious outbreak in 1993. The disease led to the 70% production drop of cultured shrimps in China from 135,000 mt to 30,000 mt in a period of one year. As a result of the WSD, the global estimate of cumulative lost production to date exceeds 1.0 M mt. Thus, questions on the origin and spread of WSSV, i.e., seeds, broodstock, frozen shrimp, feeds, etc., need careful investigation.

T.W. Flegel also recommended the following diseases avoidance approaches: (1) no introduction, (2) inspection at source, (3) inspection upon entry, (4) quarantine, (5) Introduction of stock known to be clean.



Shrimp hepatopancreas showing triple viral infection (left) and presumably healthy shrimps (right)

The Asian WSSV pandemic (left) as portrayed by C.V. Mohan of NACA:

1991/1992: Taiwan

1993: Japan and Indian Ocean, India, China
1994: Thailand, Cambodia
1999: Philippines

T.W. Flegel presented an example of dangerous exchanges of shrimp species, in the following diagram (*P. monodon* (left) and *P. vannamei* (right)):

YHV
WSSV
IHHNV
MBV

LOVV
TSBPV
Reo-like virus

Thus, the consequences of movement of exotic shrimp species include: (1) parasites and diseases that organisms suffer from travel as well; (2) exotic organisms may escape from culture facilities either in the form of adults or larvae; (3) native species may be more susceptible to the exotic disease; and (4) these exotic species can interbred or out compete the native species and destroy the natural stocks.