



前瞻蝦類養殖國際研發中心
International Center for the Scientific
Development of Shrimp Aquaculture

WOAH Reference Laboratory for
White Spot Disease and
Acute Hepatopancreatic Necrosis Diseases
Reference Centre
World Organisation
for Animal Health

WOAH Reference Laboratory for WSD and AHPND

International Center for the Scientific Development of Shrimp Aquaculture
(ICSDSA), National Cheng Kung University, Tainan, Taiwan



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1. Overview

At ICSDSA, NCKU, Taiwan, the WOAHP Reference Laboratories for White Spot Disease (WSD) and Acute Hepatopancreatic Necrosis Disease (AHPND) provide diagnostics, outbreak investigations, pathogen characterization, technical consultation, and capacity building for WOAHP Members worldwide. Supported by an ISO/IEC 17025-accredited diagnostic platform for WSD and AHPND and extensive expertise in shrimp health, the laboratories also address emerging diseases, including Translucent Post-Larvae Disease (TPD). Beyond diagnostics, ICSDSA promotes disease prevention through SPF *Penaeus monodon* breeding, biosecurity-based production systems, and antibiotic-free health-management strategies aligned with the One Health approach. Through research, innovation, and international collaboration, the laboratories strengthen disease preparedness and support sustainable shrimp aquaculture.



2. Expertise, services and facilities

SPF Broodstock Breeding & Genetic Preservation

SPF Larval Production

SPF Broodstock Multiplication

SPF Broodstock Supply System

Market Shrimp Supply Chain

0.5-hectare SPF Shrimp Nuclear Breeding Center

A 3-hectare SPF Broodstock Multiplication Center

for Shrimp Biology and Pathogen Research

Infrastructure & Facilities

- WOAH Reference Laboratories for WSD and AHPND
- SPF breeding and multiplication facilities
- Shrimp Biology & Pathogen Research Laboratories

Disease Diagnosis & Surveillance

- Confirmatory diagnostics for shrimp diseases
- Molecular diagnostics and histopathology
- Pathogen surveillance and characterization

Research Translation & Sustainable Aquaculture

- Host-pathogen interactions and multi-omics
- Advanced diagnostics (AI/Raman)
- Antibiotic-free health management
- SPF *Penaeus monodon* breeding
- Biosecurity and sustainability

3. Recent Innovations, research highlights, technical developments

WSD & WSSV

A. Taxonomy and International Standards

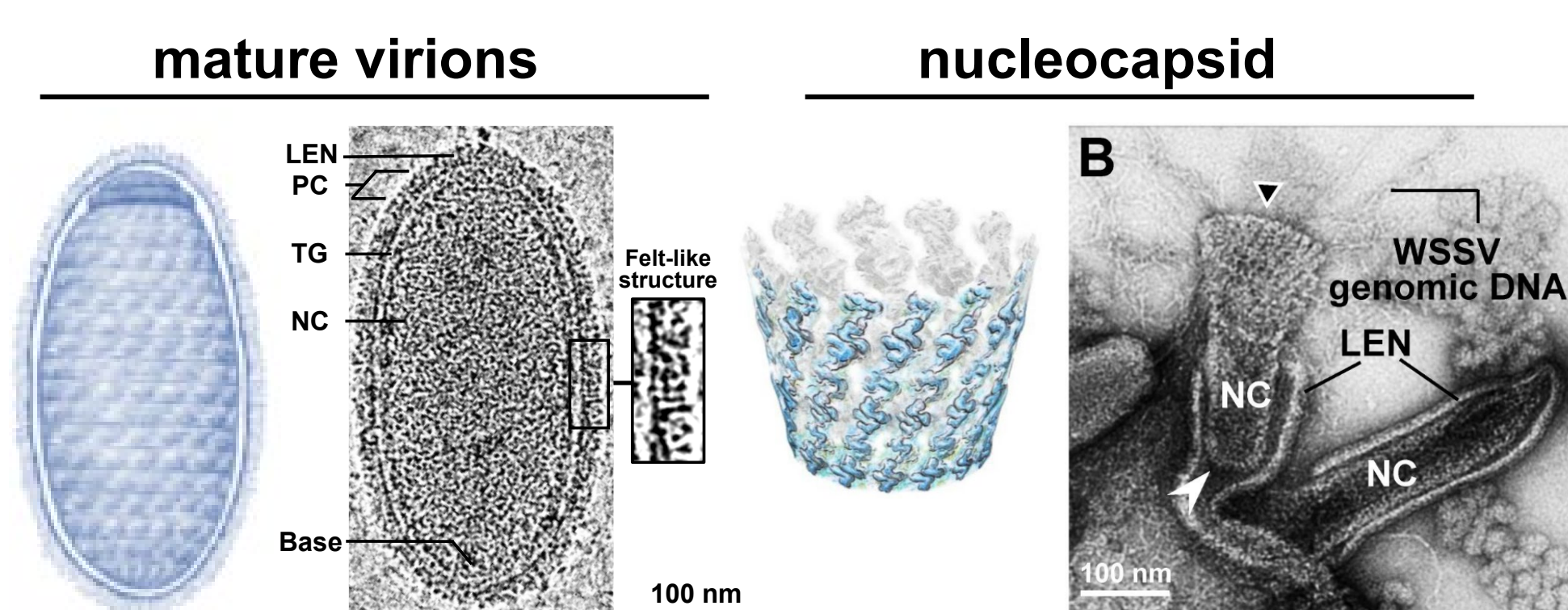
- WSSV has an official species name: *Whispovirus xiabaidian* (2026)

"xiabaidian" derived from Mandarin xia = shrimp, bai dian = white spot

- Whispovirus lacteolymphae* established as a new species within the family Nimaviridae

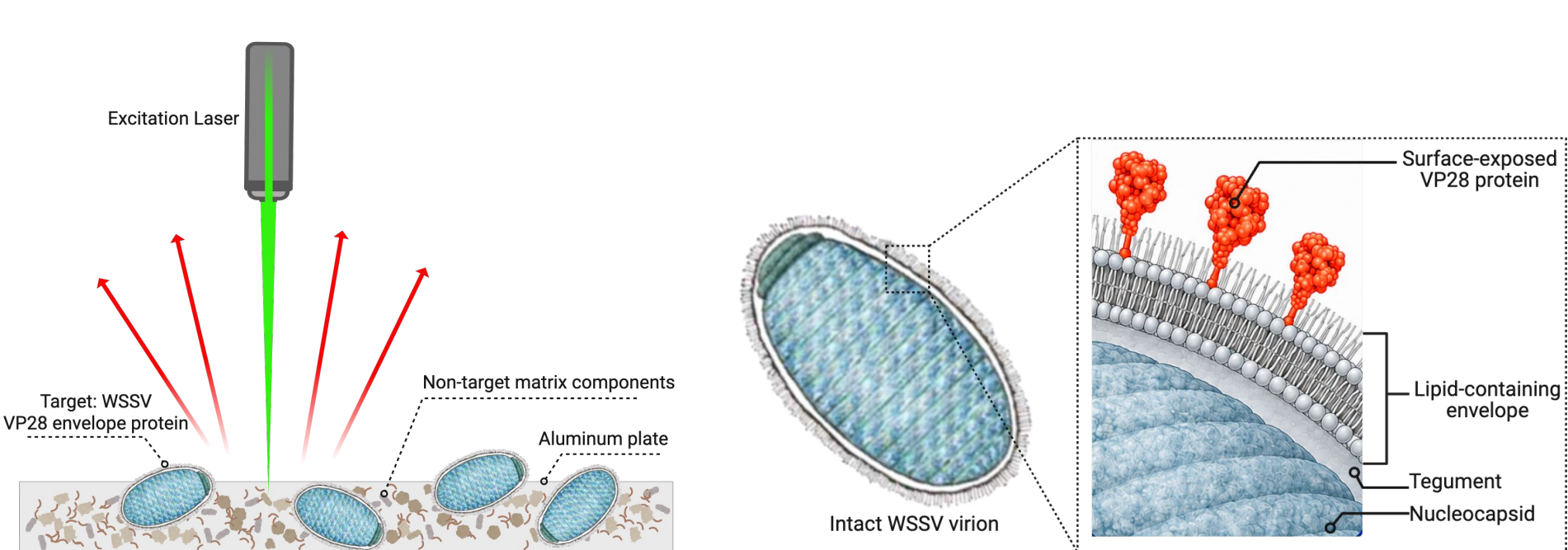
B. Pathogen Biology

- Cryo-EM and TEM reveal revised WSSV virion architecture: tail-less mature virions and unique C14-symmetric helical nucleocapsid dissociation.



C. Diagnostic Innovation

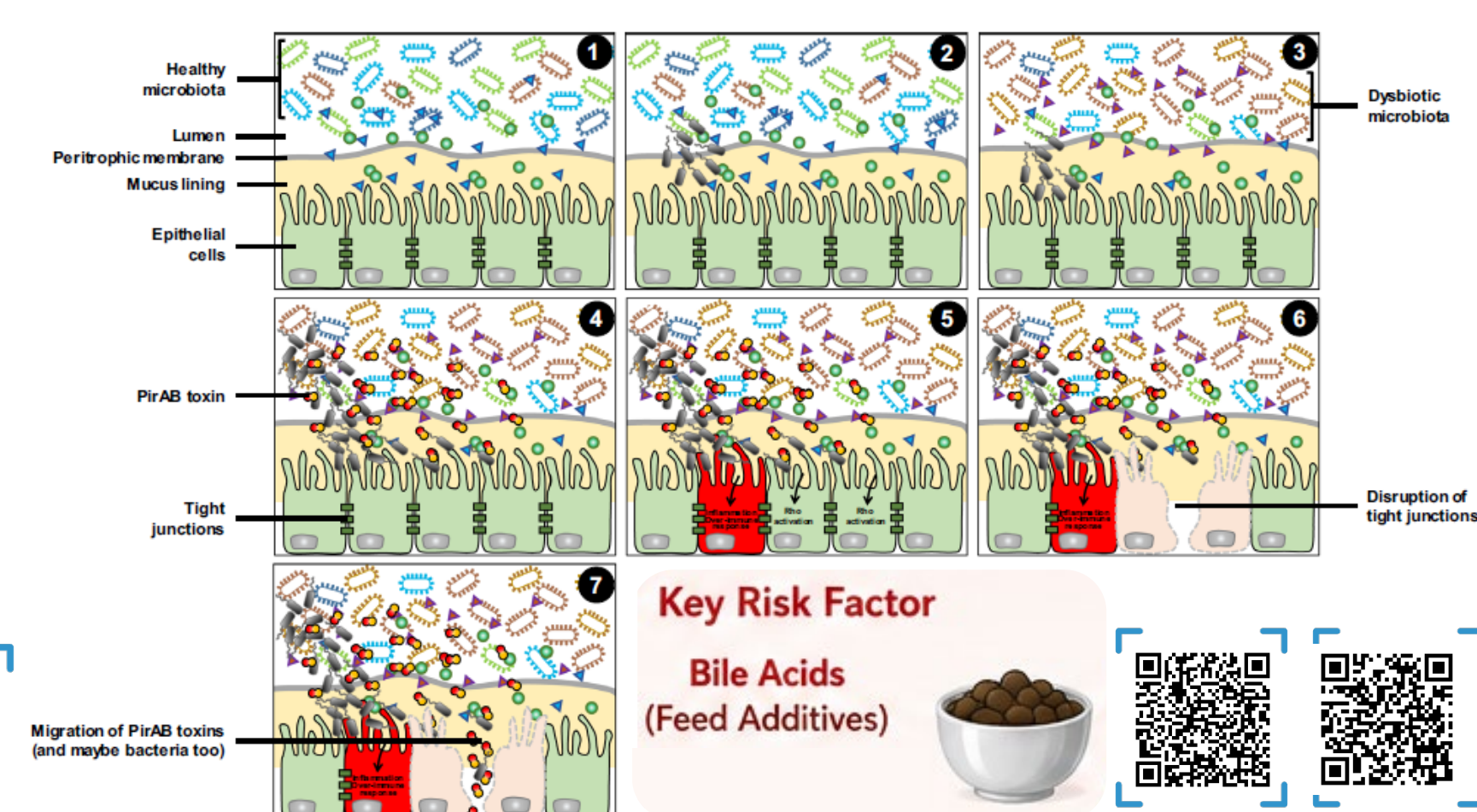
- AI-assisted platform for rapid disease detection
- Simultaneous detection of WSSV



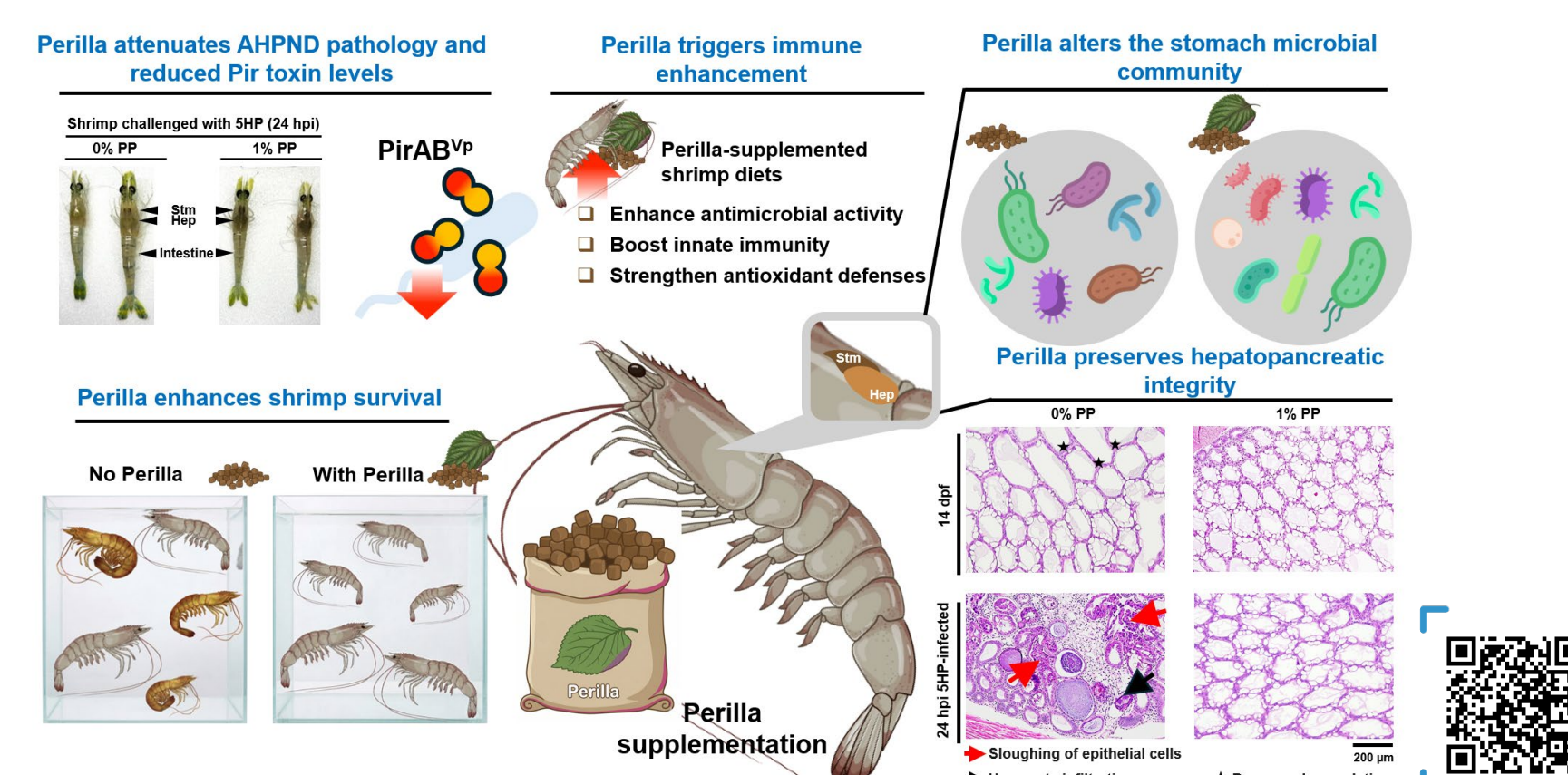
AHPND

A. Disease Mechanisms

- Microbiome dysbiosis contributes to AHPND pathogenesis
- Metabolic alterations are associated with disease progression
- Excessive bile acid supplementation may increase the risk of AHPND outbreaks.

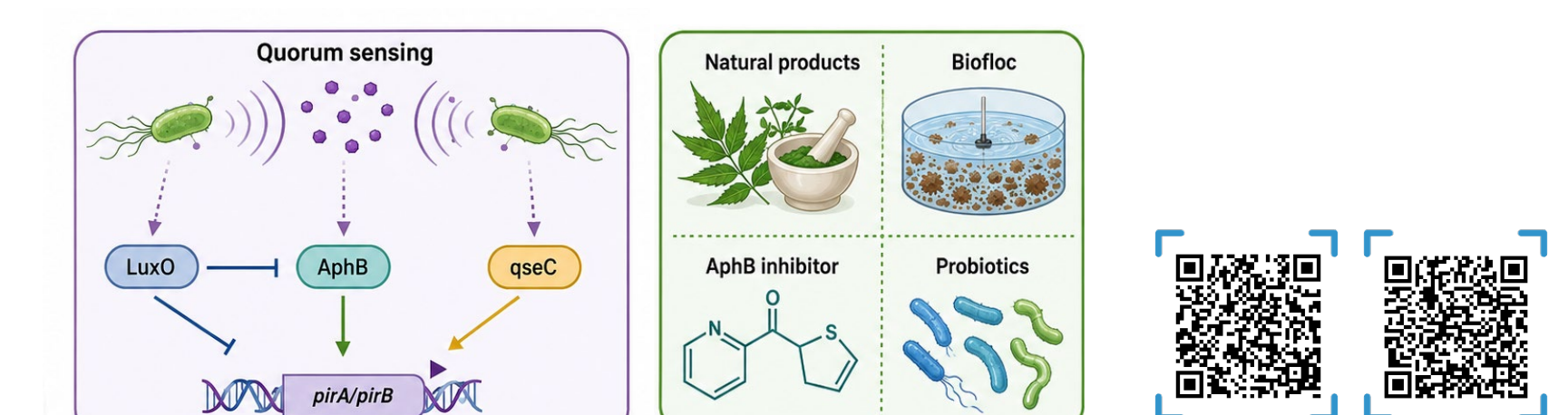


B. Antibiotic-Free Strategy for AHPND Control



C. Quorum Sensing

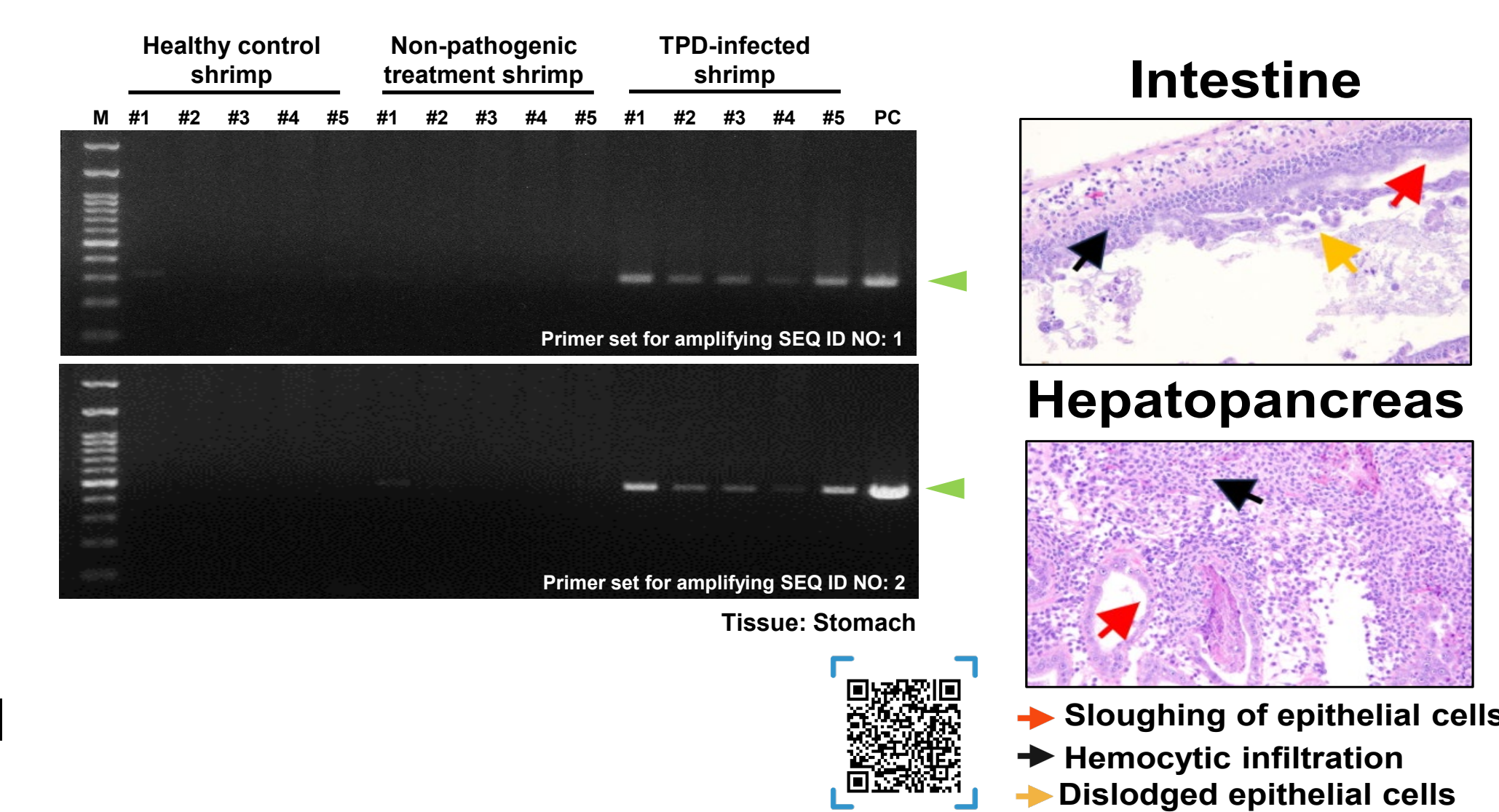
- QS regulates biofilm formation and PirA/PirB toxin expression.
- QS inhibition enables sustainable antibiotic-free AHPND control



TPD

Translucent Post-Larvae Disease (TPD)

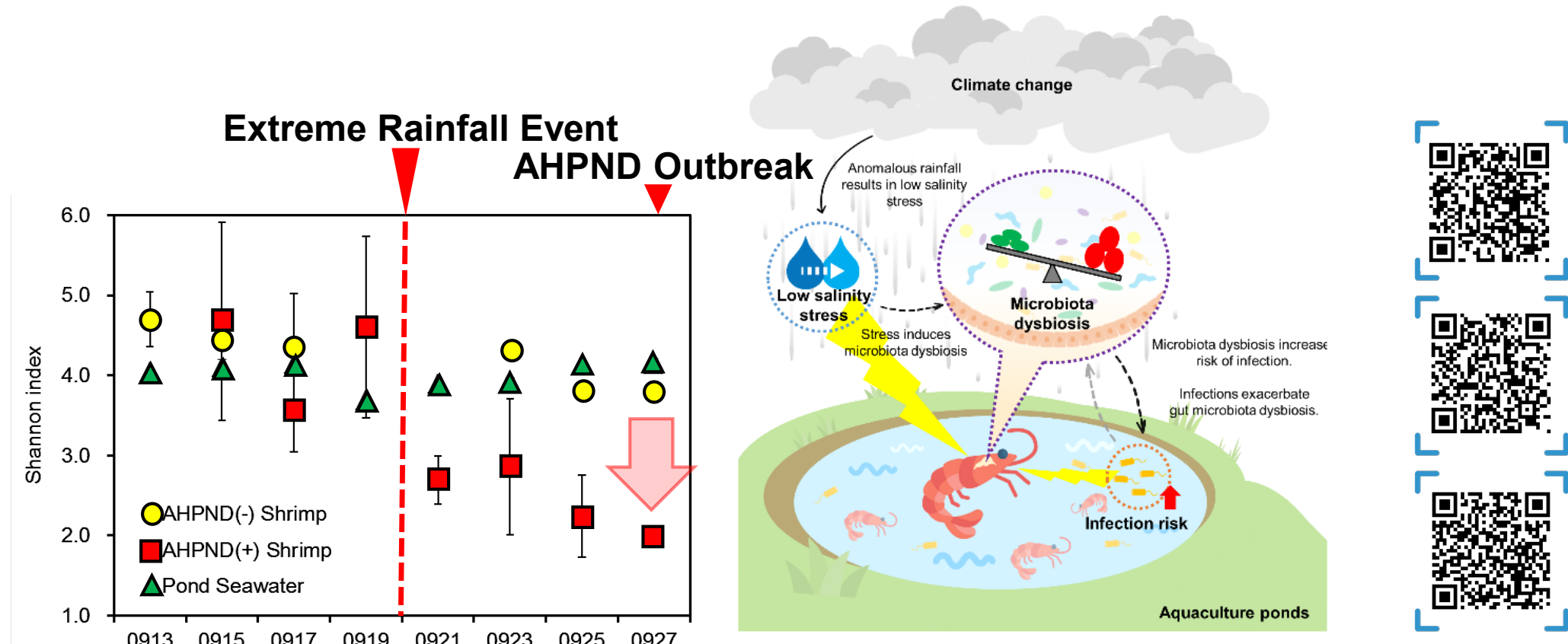
- TPD is caused by pathogenic *V. parahaemolyticus*
- Early TPD infection is detectable in the stomach and intestine
- Histopathology revealed epithelial sloughing, necrosis, and hemocytic infiltration in the hepatopancreas and intestine
- Novel molecular markers identified for improved TPD diagnosis



Climate Change & Aquatic Animal Health

Environmental Drivers of Disease Emergence

- Climate-driven salinity fluctuations increase disease risk
- Environmental stress reshapes shrimp microbiota
- Microbiome dysbiosis facilitates pathogen outbreaks
- Environmental monitoring supports disease preparedness



4. How can we support Members?

Technical & Diagnostic Support

- Diagnostic method validation
- Reference materials and diagnostic samples (WSD & AHPND)
- Laboratory reproducibility assessment
- Technical consultation on shrimp diseases and health management



Capacity Building

- International student and researcher exchange
- Laboratory training and research visits
- Workshops and seminars on shrimp disease diagnostics
- Training in shrimp health management and disease prevention



Research Collaboration & Innovation

- International collaborative research
- Emerging disease investigations
- Disease preparedness and risk assessment
- Technology development and transfer



Biosecurity & Sustainable Aquaculture

- SPF *P. monodon* breeding programs
- Biosecurity implementation
- Antibiotic-free health management strategies
- Sustainable shrimp production systems



Consultation and Technical Support for Shrimp Diagnostics



Through diagnostics, technical expertise, capacity building, research collaboration, and sustainable aquaculture solutions, the WOAHP Reference Laboratories for WSD and AHPND at ICSDSA support disease preparedness and strengthen aquatic animal health among WOAHP Members.



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