

Reference Laboratory for Infection with *Aphanomyces invadans*

Regional Workshop for WOAHP Focal Points for Aquatic Animals

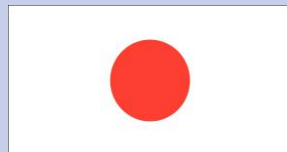
Name of the speaker: P. K. Pradhan

7 – 9 July 2026 | Tokyo, Japan

Position of speaker: Principal Scientist and Head
Exotics and Aquatic Animal Health Division
ICAR-National Bureau of Fish Genetic Resources, Lucknow, INDIA



World Organisation
for Animal Health



Australian Government
Department of Agriculture,
Fisheries and Forestry



国立大学法人

東京海洋大学

Tokyo University of Marine Science and Technology



Infection with *Aphanomyces invadans*



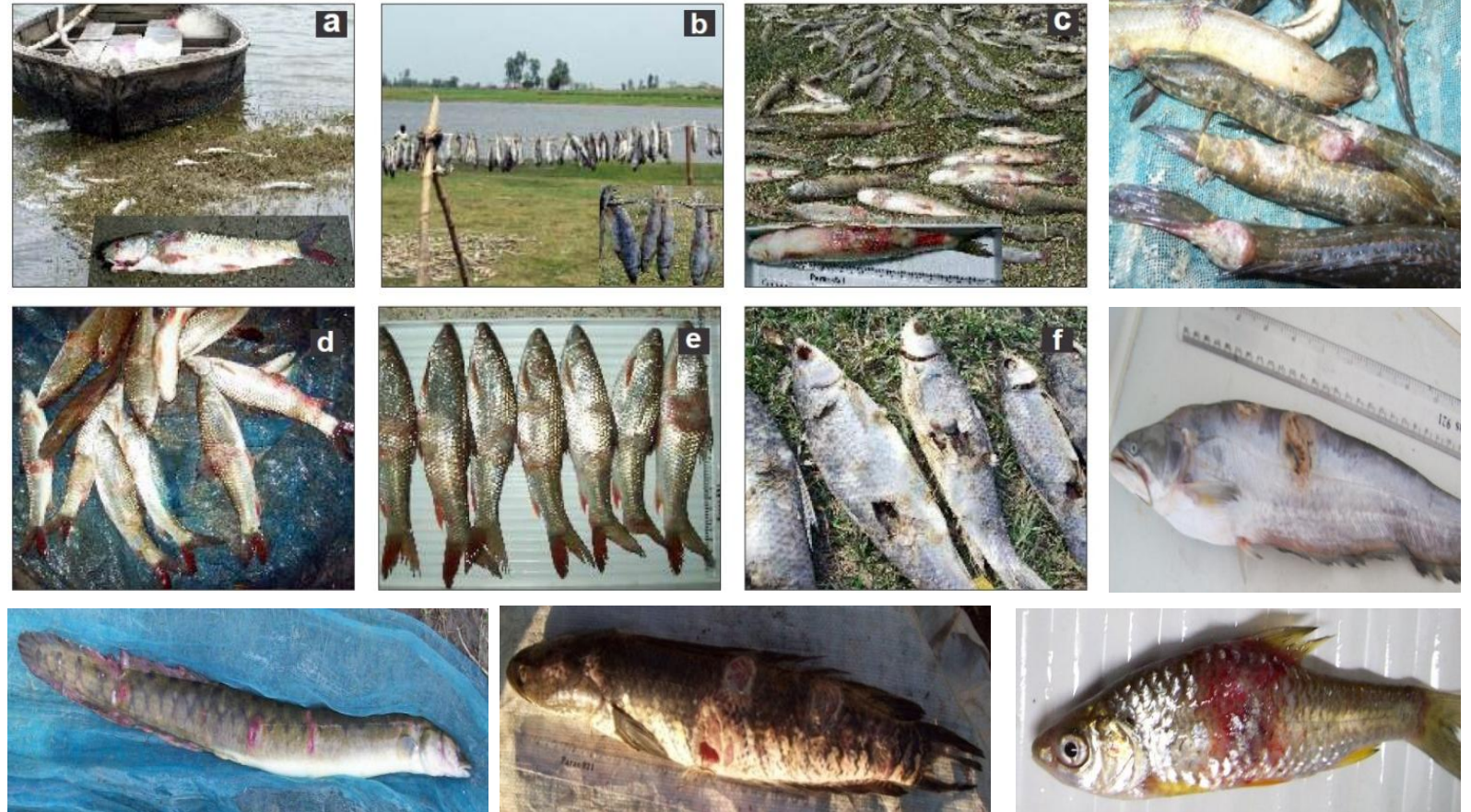
Fig. 1 – First occurrence of EUS outbreaks in fresh water fish worldwide (see also Table 1). Countries are labelled in colours according to the decade of their first *A. invadans* infection outbreak. The outbreaks started in the South-East of Asia and are now disseminating to all continents likely due to global trading.

Global distribution: Historically reported from 28 countries across 4 continents

India: First report-1988

Re-emergence-2011

Recent report: 2025

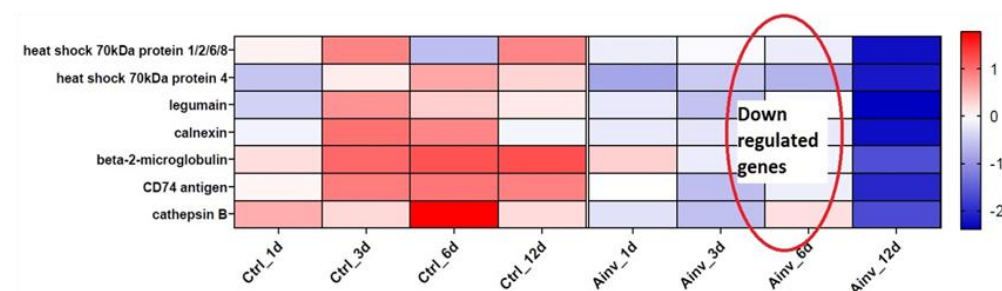
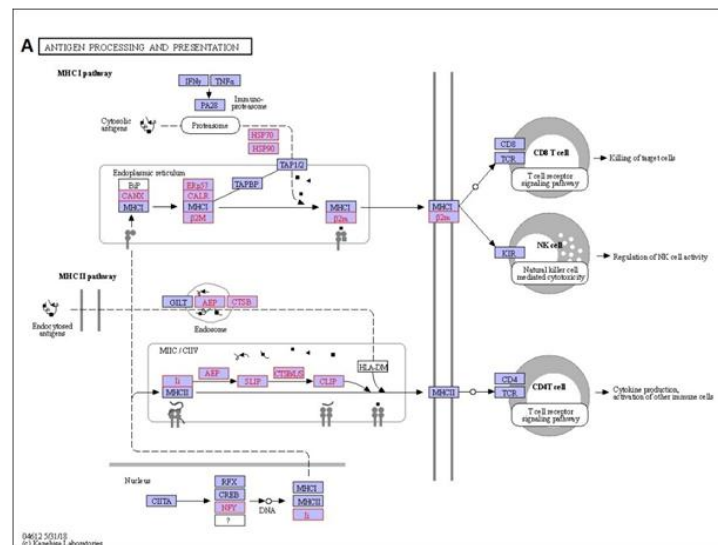
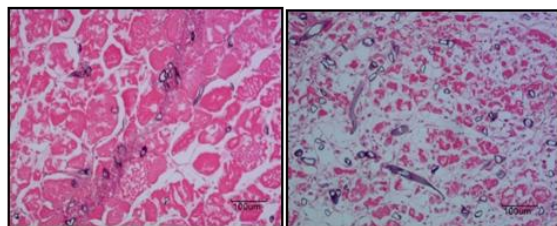


Emergence of epizootic ulcerative syndrome: large-scale mortalities of cultured and wild fish species in Uttar Pradesh, India

P. K. Pradhan^{1,*}, G. Rathore^{1,2}, N. Sood¹, T. R. Swaminathan¹, M. K. Yadav¹,

More than 160 fish species affected - host range is expanding (Herbert et al. 2019)

Susceptible rohu

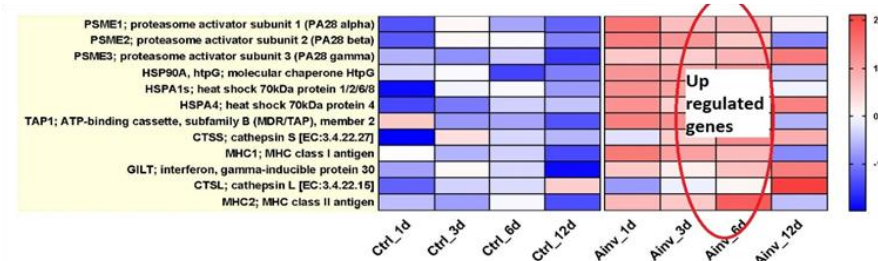
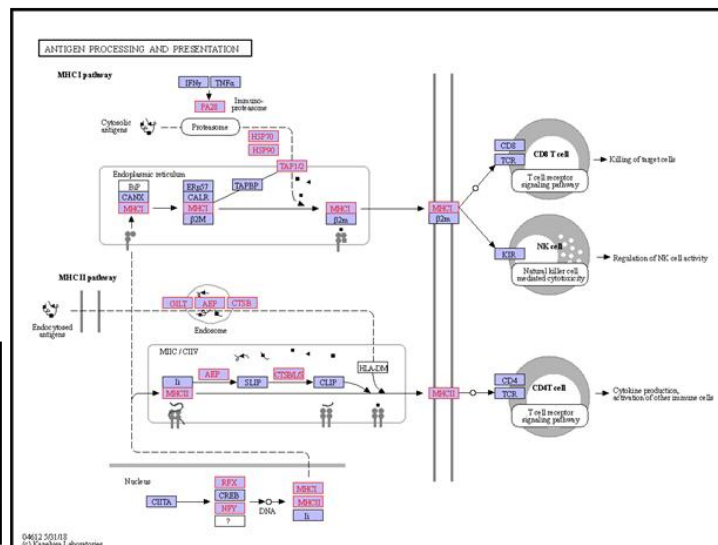
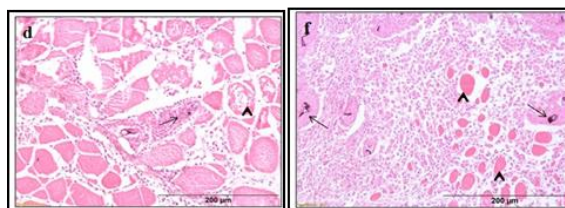


OPEN Molecular insights into the mechanisms of susceptibility of *Labeo rohita* against oomycete *Aphanomyces invadans*

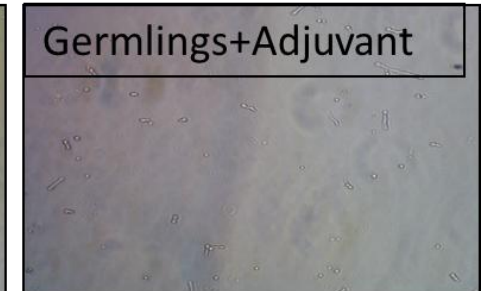
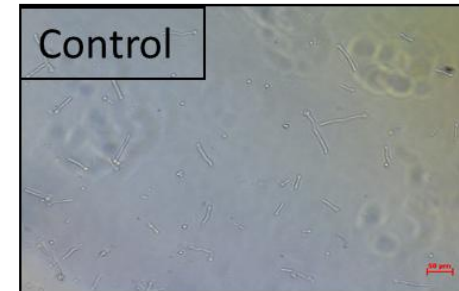
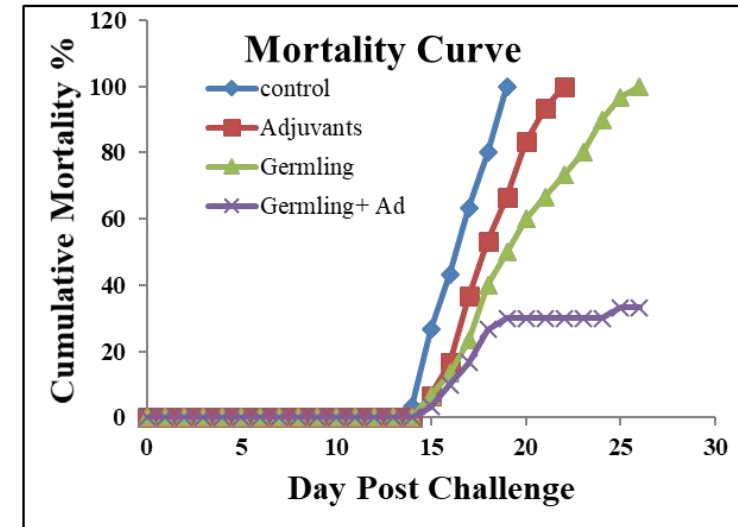
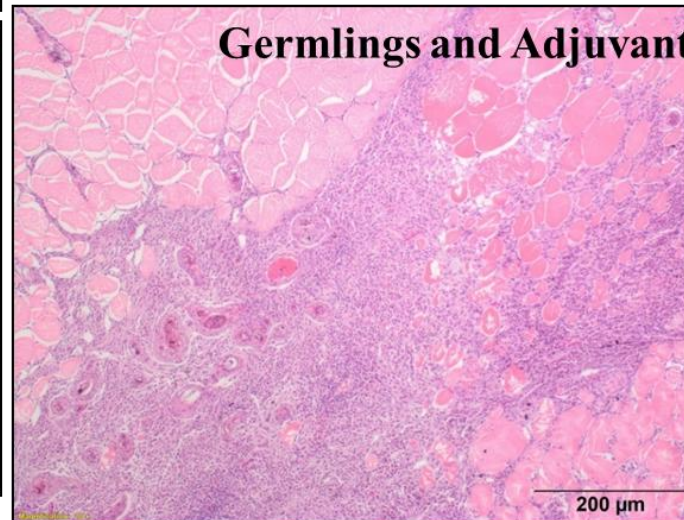
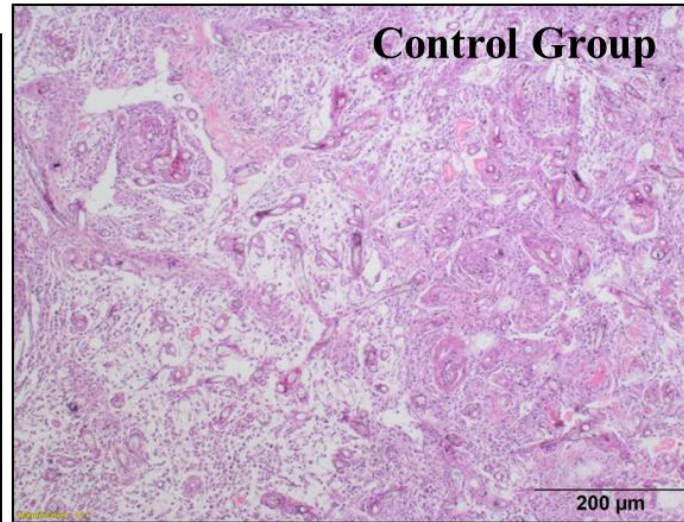
P. K. Pradhan^{1,5}, Dev Kumar Verma^{1,5}, Luca Peruzzi^{3,5,6}, Shubham Gupta⁵, Syed Assim Haq¹, Sergei V. Shubin¹, Kenton L. Morgan⁴, Franziska Trusch^{3,7}, Vinodhya Mohindra¹, Chris Houston², Pieter van West⁵ & Neeral Sond^{1,2}



Resistant common carp

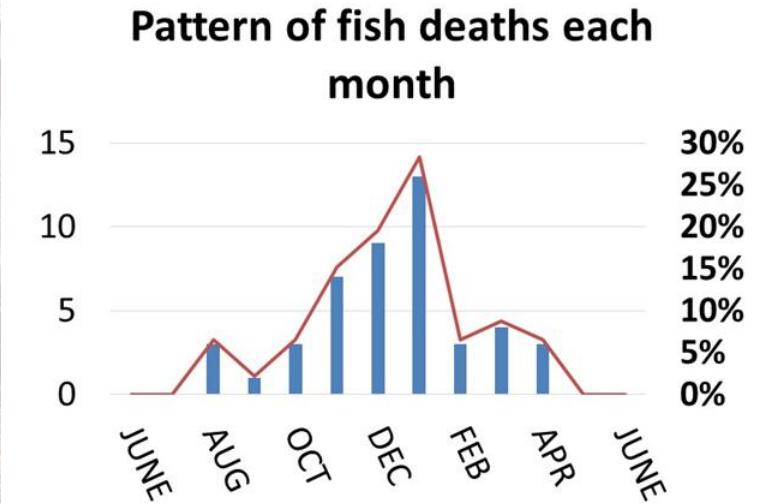


Effect of immunisation against *A. invadans*

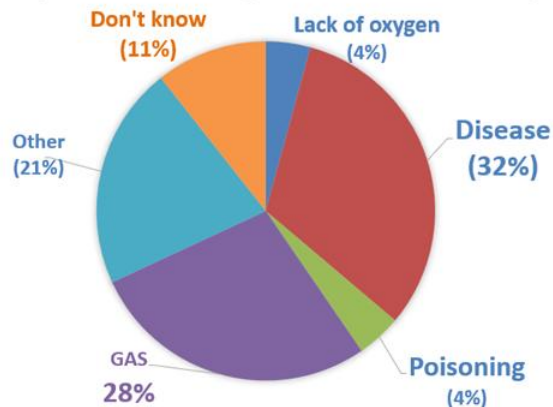




Farmer-assisted epidemiological study of risk factors associated with disease in fish culture



Farmer reported causes of large numbers of fish mortality



80% of diseased fish had wounds- suggests the presence of a disease which causes skin ulceration and death

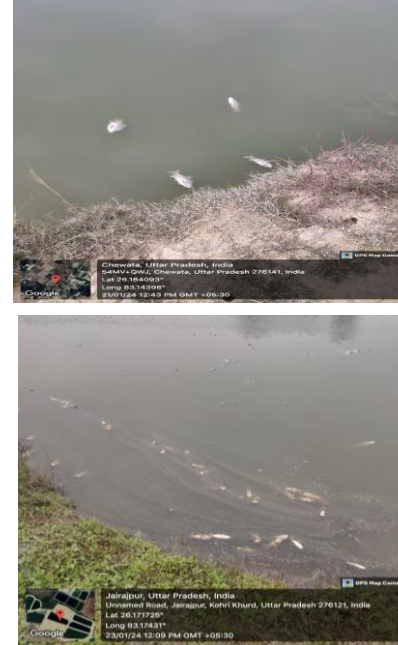
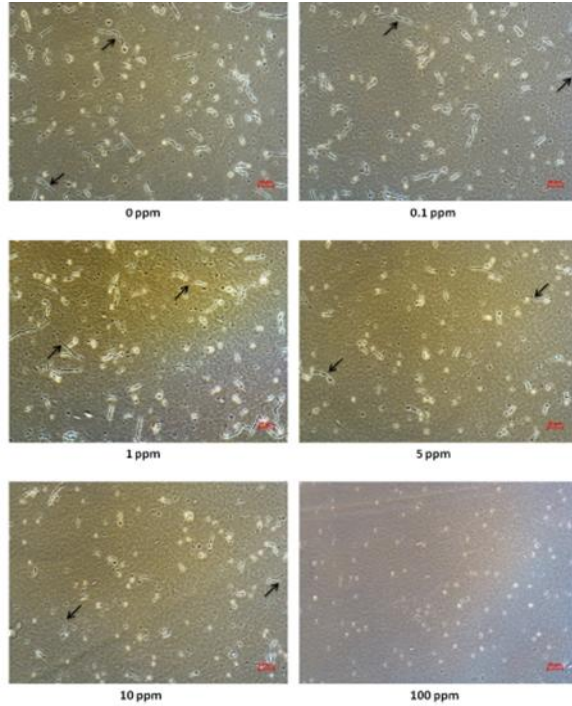


Risk Factors associated with Disease

- Knowing about dissolved oxygen and measuring by simply watching fish behaviour reduces the risk of fish death.
- Algal bloom have a two fold risk of mortality
- Stocking density affects risk of mortality



Development of formulation for treatment of Fish Oomycete diseases





All India Network Project on AMR in Fisheries and Livestock

- Launched on 22nd May, 2024
- As operational framework of INFAAR by ICAR

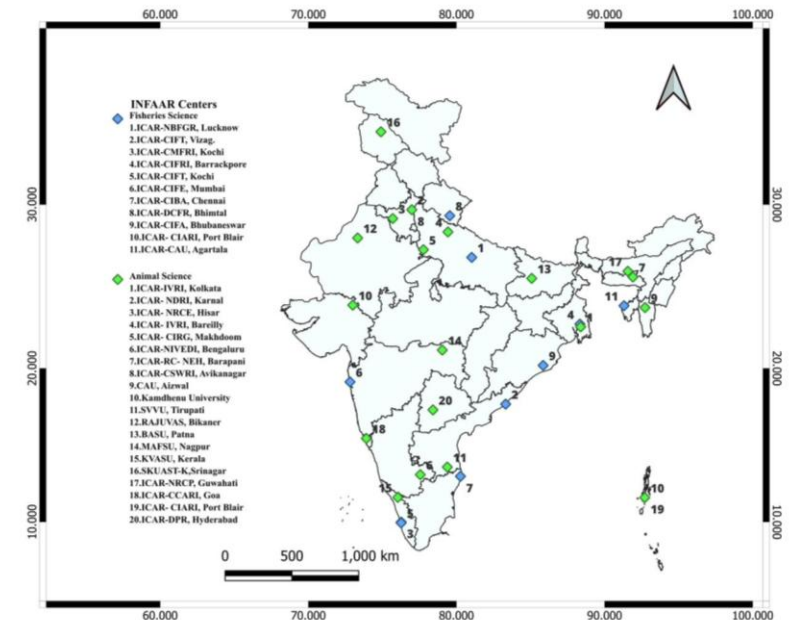
ICAR-NBFGR Nodal Centre



- Establish **baseline data on the prevalence of antimicrobial resistant microorganisms** and determinants in farmed fish and food animals
- Collect **information on antimicrobial resistance trends** in relevant microorganisms

Indian Network of Fisheries and Animal Antimicrobial Resistance: 31 centres

Geographical coverage of INFAAR





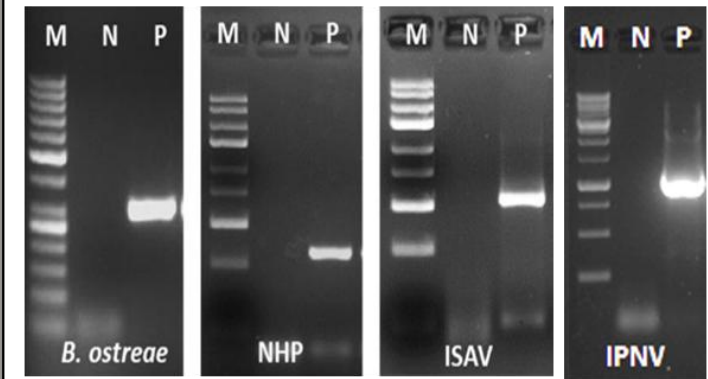
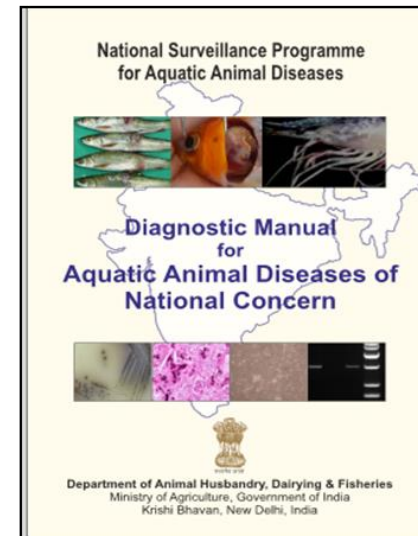
National Surveillance Programme for Aquatic Animal Diseases



Strengthening farmer-based surveillance and Scientific advice to the farmers



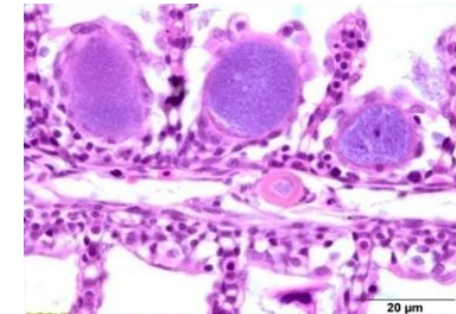
Launch of NSPAAD





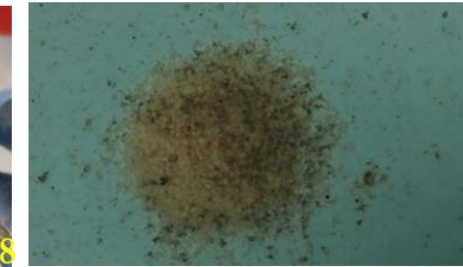
Strengthening of Passive Disease Surveillance with Report of New Pathogens

Finfish diseases



Ca. Actinochlamydia pangasiae sp. nov.

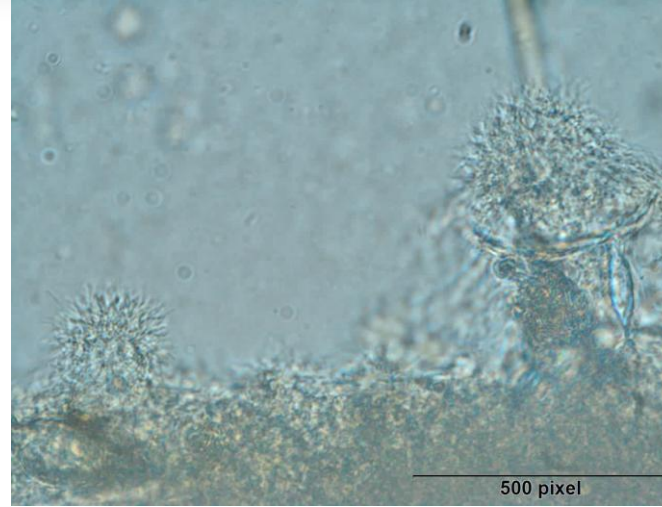
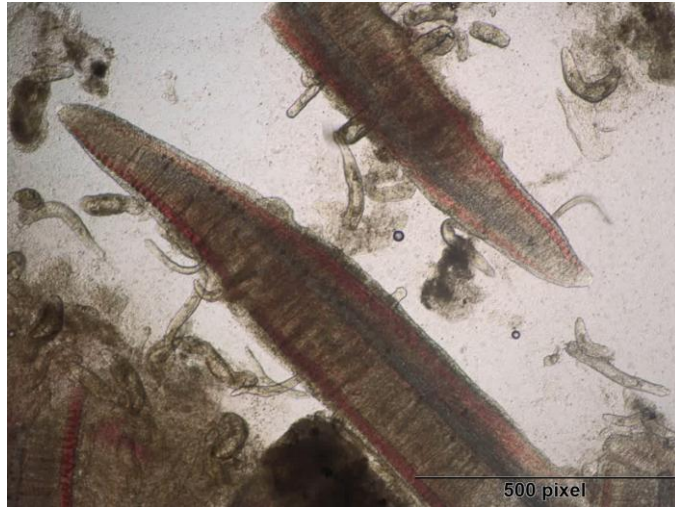
Shellfish diseases



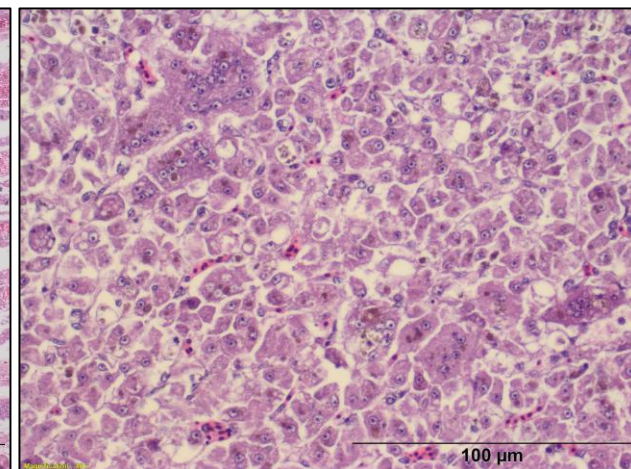
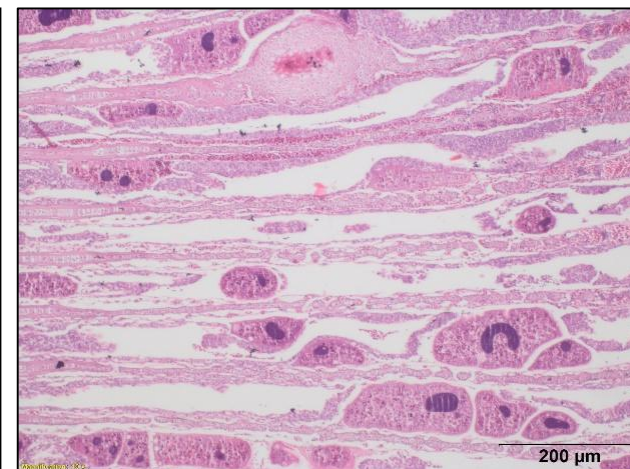
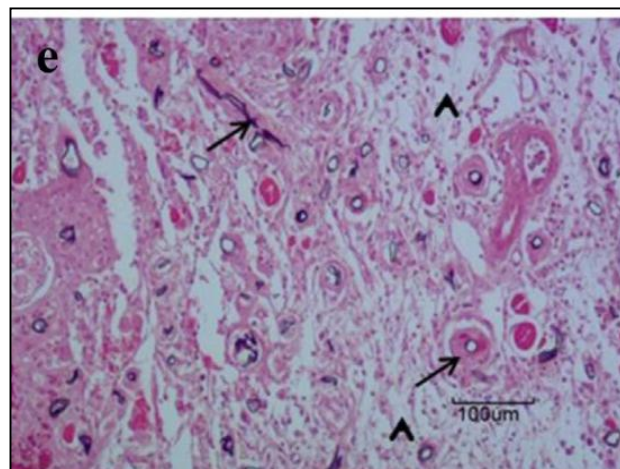
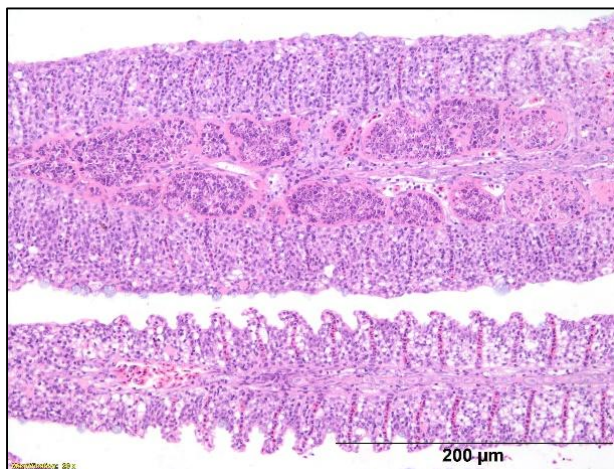


Wet Mount

Wet Mount & Histopathological Examination

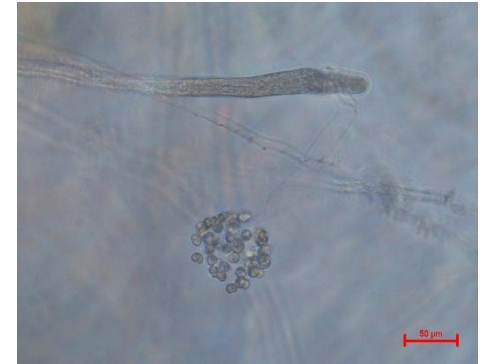
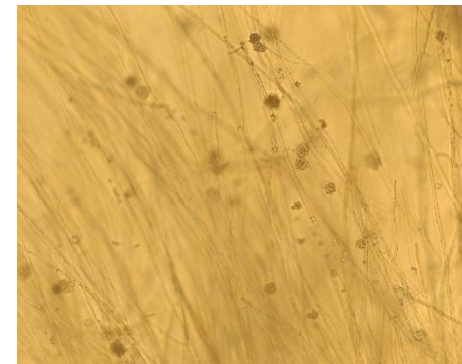
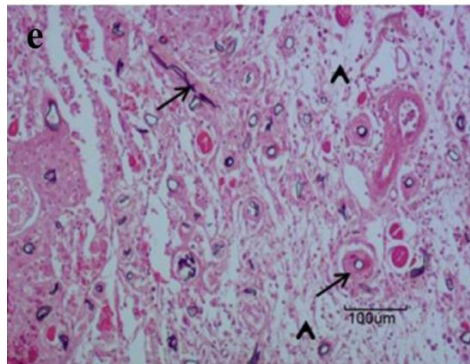
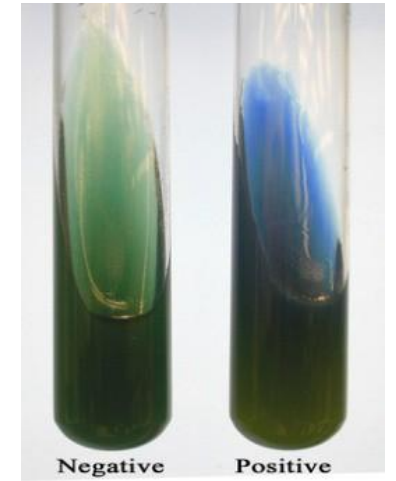
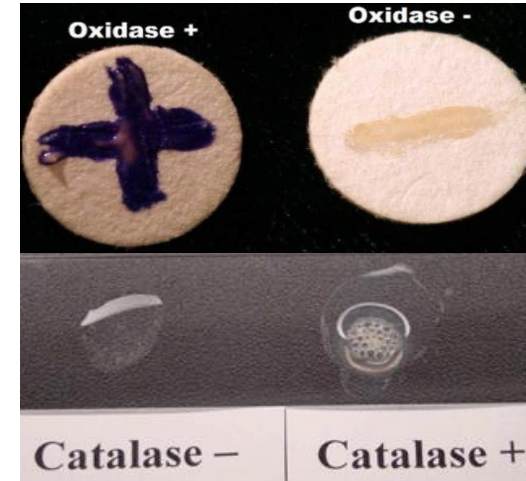
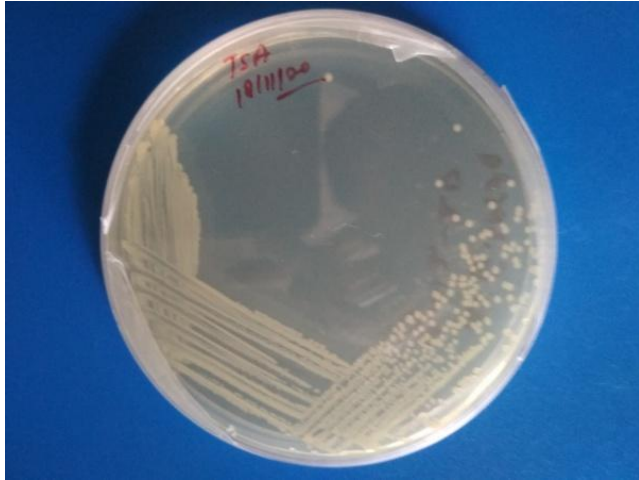


Histopathology





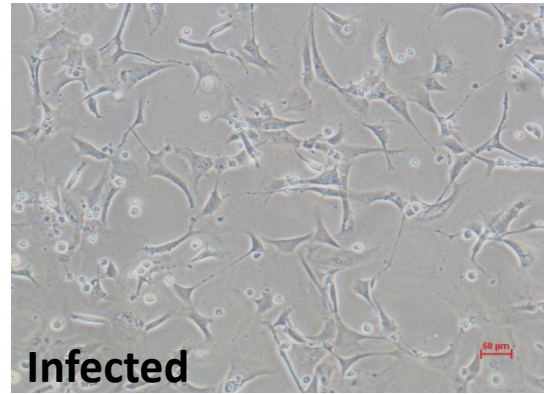
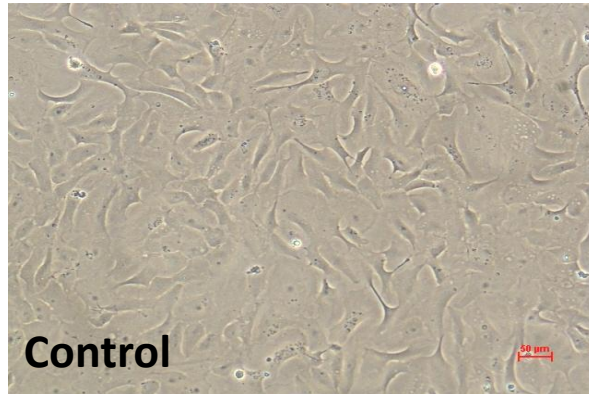
Bacterial and Oomycete Isolation



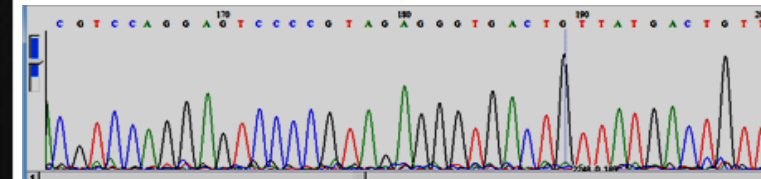
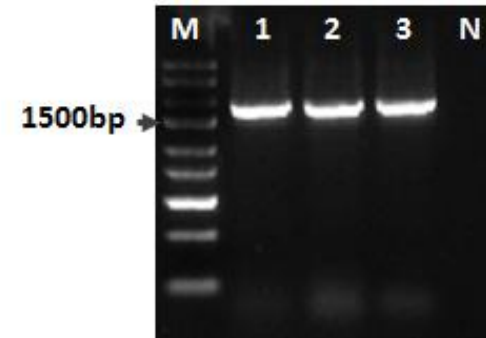


Advanced Diagnostic Techniques

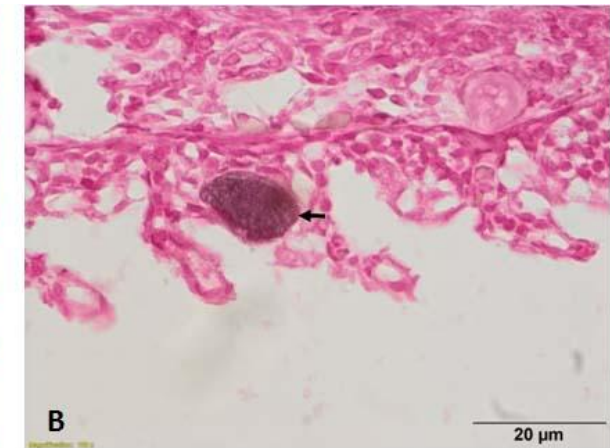
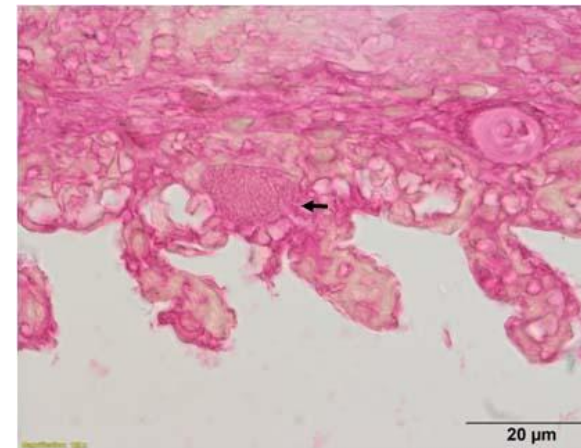
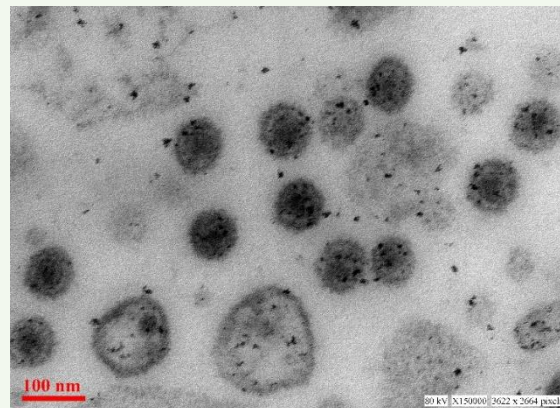
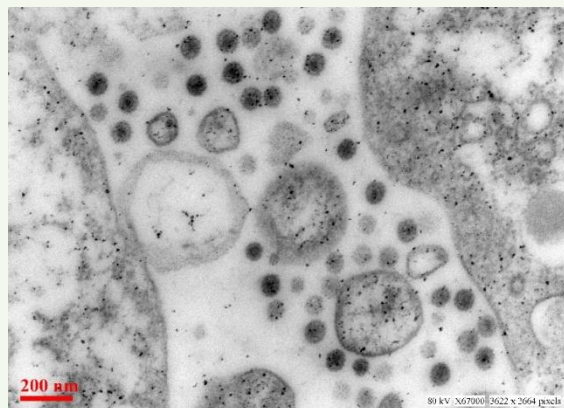
Virus isolation



Molecular techniques



Electron microscopy





Opportunities for Support and Collaboration with Member Countries

- Confirmatory diagnosis of suspected EUS cases
- Sharing of *A. invadans* isolates and reference materials
- Training in molecular detection of WOAHA/ NACA-listed aquatic animal pathogens
- Isolation and characterization of viral, bacterial, and oomycete fish pathogens
- Participation in regional aquatic animal health initiatives of WOAHA, FAO, & NACA
- Capacity building through collaborative research, training, and expert exchange



Present & past interlaboratory collaboration

Prof. Dr. Ir. Pieter van West

Oomycete Laboratory
University of Aberdeen
Scotland UK

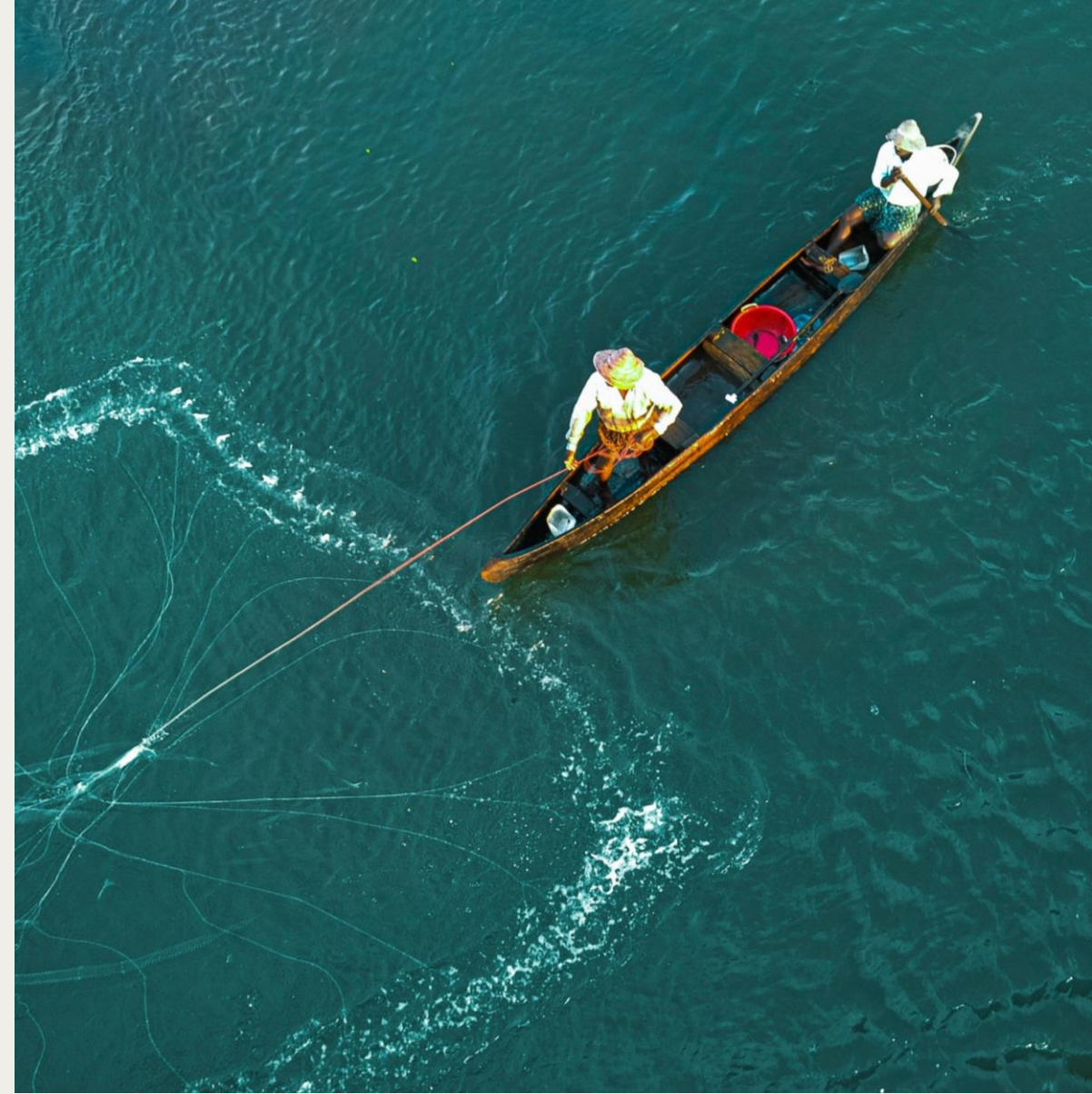
Dr. Kenton L. Morgan

Former Emeritus Professor of Epidemiology
University of Liverpool, UK

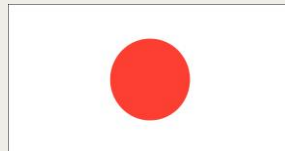
Prof. Do-Hyung Kim

Pukyong National University
Busan, South Korea

Thank you



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for Animal Health



Australian Government
Department of Agriculture,
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Tokyo University of Marine Science and Technology