

From Pathogens to Protection: Exploring Vaccines for a Healthier Aquaculture



The dual transcriptomic approach to evaluate lumpfish response from *Vibrio anguillarum* biofilm cells

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Background and motivation

The overall goal of this project is to better understand the intricate host-pathogen interactions and apply these discoveries to answer relevant clinical questions of immunology.

Project description:

We perform multidimensional transcriptomic studies on fish infection and immunology, encompassing functional analyses of immune cells, host-pathogen interactions, transcriptome-wide analysis of signaling pathways, and genomics with a focus on comparative and evolutionary studies.

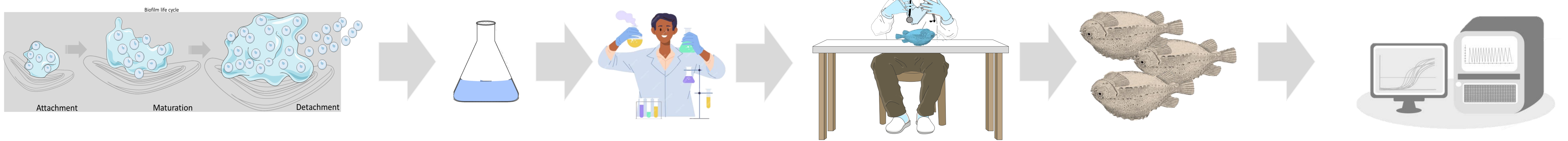
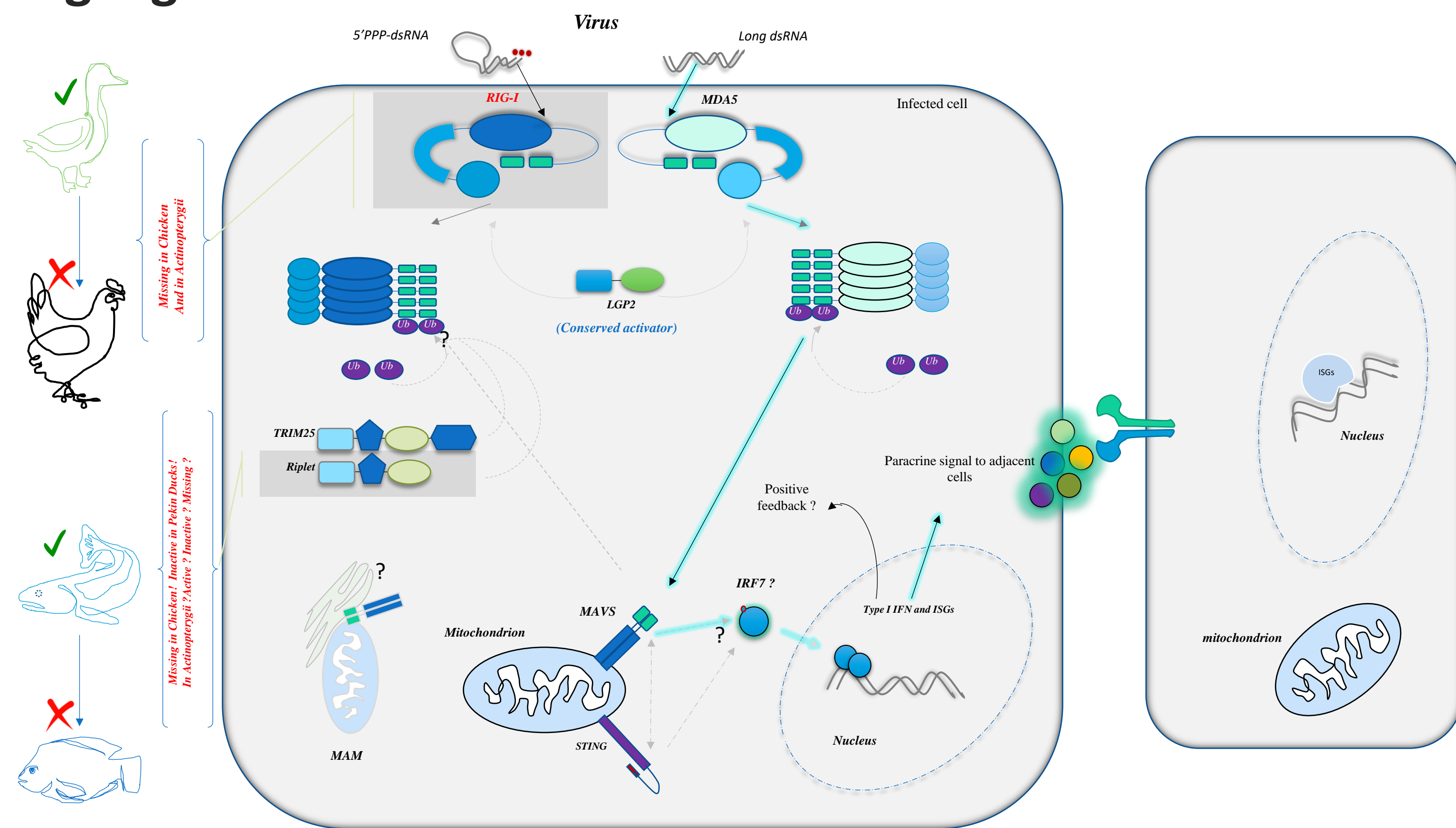


Figure 1: Graphical abstract for the experimental procedure.

Main questions

1. How effective are non-linear defense strategies in host-pathogen interactions, and what limitations do they present?
2. What are the hybrid warfare tactics employed by pathogens in infections, and how do they influence the dynamics of host-pathogen interactions?
3. In studying bacterial fawn responses in infections, what insights can we gain into the mechanisms of biofilm interactions?

Highlighted results



Modified from: Evseev et al., 2019. Veterinary Sciences; 6(1):5. & Rehwinkel et al., 2020. Nat Rev Immunol. ISSN 1474-1741

Figure 2 : Illustration of preliminary outcomes from the study.

Supervisory team

Supervisor:

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Professor Department of Biological Sciences,
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Co-Supervisor

Duncan John Colquhoun, Ph.D.

Professor, Department of Biological Sciences
University of Bergen, Bergen.

Aims

To establish a robust foundation for lumpfish vaccinology research, aiming to gain comprehensive insights into the intricate dynamics at the intersection of marine sustainability and veterinary medicine

Marine sustainability

Working towards marine sustainability along with our collaborators, we aim to develop novel approaches against infections through prophylaxis or/and preventions.

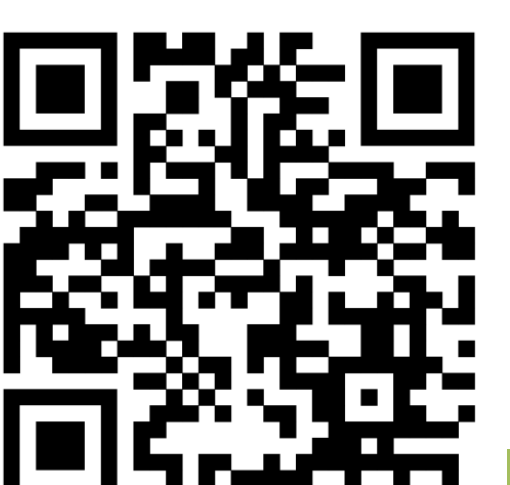
Activities

1. Workshop: 22nd Fish Workshop hosted by the Aquaculture & Fisheries group at Wageningen University & Research. At : Wageningen University, Netherlands; Subject: Fish immunology.
2. Conference: The Fourth Congress of the International Society of Fish & Shellfish Immunology At: Bodø Norway.

Publications :

- ✦ Rao SS, Skinnemoen L, Fond AKS, Haugland GT (2024). Analyses of the Mx family members in lumpfish: Molecular characterization, phylogeny, and gene expression analyses. Dev Comp Immunol. 9;159:105225.
- ✦ Rao SS, Haugland GT (2024). From Ocean Defenders to Immune Marvels: Discovering the Mysteries of how the lumpfish protect themselves against viruses. New Discovery, Front. Young Minds - Biodiversity.
- ✦ Rao SS, Nelson PA, Lunde HS, Haugland GT (2023). Evolutionary, comparative, and functional analyses of STATs and regulation of the JAK-STAT pathway in lumpfish upon bacterial and poly(I:C) exposure. Front Cell Infect Microbiol. 2023 Sep 22;13:1252744.
- ✦ Rao, S. S., Lunde, H. S., Dolan, D. W. P., Fond, A. K., Petersen, K., & Haugland, G. T. (2023). Transcriptome-wide analyses of early immune responses in lumpfish leukocytes upon stimulation with poly(I:C). Frontiers in immunology, 14, 1198211.

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