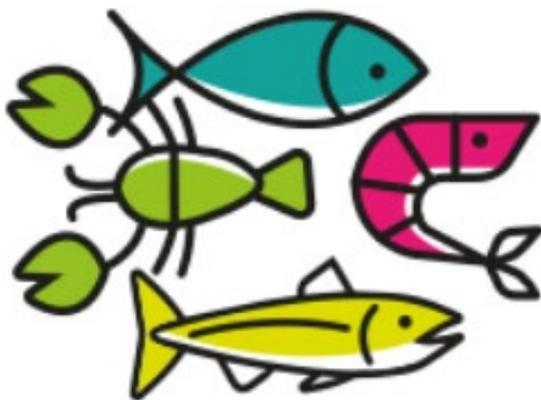




European  
Association of Fish  
Pathologists

# 20-Я МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ «ЗАБОЛЕВАНИЯ РЫБ И БЕСПОЗВОНОЧНЫХ»

The **20th** EAFP Conference was held virtually from 20 to 23 September **2021**



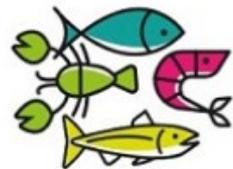
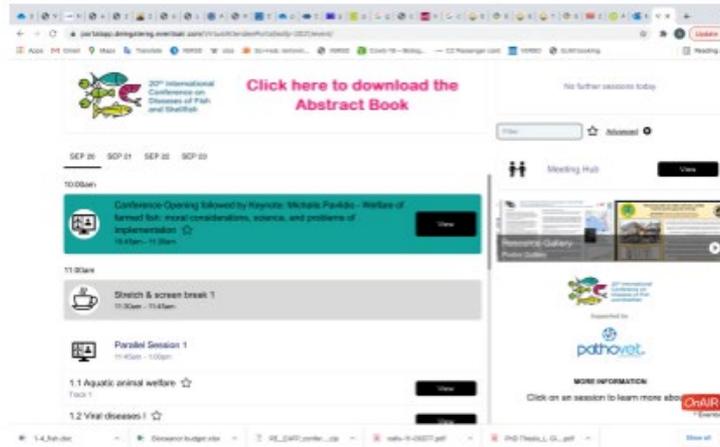
**20<sup>th</sup> International  
Conference on  
Diseases of Fish  
and Shellfish**

# Европейская ассоциация ихтиоптологов (1979)



898 членов из 49 стран, 37 региональных отделений

# Screenshots from the 20th EAFP Virtual Conference:



20<sup>th</sup> International Conference on Diseases of Fish and Shellfish

**EAFP 2021**  
20 - 23 September • Virtual



European Association of Fish Pathologists

# Пленарные докладчики

PROF. MICHALIS  
PAVLIDIS



Welfare of farmed fish: moral considerations, science, and problems of implementation

DR. GRANT STENTIFORD



Sustainable aquaculture through the One Health lens

# Обсуждение в рабочих группах на конференции

- Заболевания декоративных и лабораторных рыб (Olga Haenen, Bartolomeo Gorgoglione, Takafumi Ito & David Verner Jeffreys)
- Образование в области здоровья водных животных (David Scarfe, Francesc Padros & Despoina Iatridou)
- Изучение Myxozoan (Stephen Atkinson, Ivan Fiala, Jason Holland, Astrid Holzer & Pavla Sojkova)
- Как научные результаты европейских исследований (EU projects) смогут улучшить организацию аквакультуры в средиземноморье (Snježana Zrnčić, Francesc Padros & Edgar Brun)

# Заболевания декоративных и лабораторных рыб (Olga Haenen, Bartolomeo Gorgoglione, Takafumi Ito & David Verner Jeffreys)



Ornamental and laboratory fish populations are part of the global trade and can spread pathogens around the world. Laboratory fish are widely used as model for biomedical research, which can be impacted by underestimated health conditions affecting the fish model. Ornamental fish diseases can spread undetected between artificially recreated ecosystems, posing threats difficult to eradicate when established or when contaminating natural water systems.

This virtual workshop focuses on pathobiology and diagnostics of infectious threats that could be spread through ornamental fishes and impact research using laboratory fish models. We encourage researchers to contribute with oral presentations. A joint article from this workshop will be published on the EAFF Bulletin.

Workshop organizers Olga Haenen\* (WBVR, the Netherlands), Bartolomeo Gorgoglione (MSU, USA), Takafumi Ito (FRA, Mie, Japan), and David Verner Jeffreys (CEFAS, UK).

\* Contact: [olga.haenen@wur.nl](mailto:olga.haenen@wur.nl)

# Изучение Myxozoan (Stephen Atkinson, Ivan Fiala, Jason Holland, Astrid Holzer & Pavla Sojkova)



**Myxo Mixer\***

**Dear myxozoan researchers,**

Please join us for a relaxed but lively discussion on hot topics of research in Myxozoa and to discuss anything you feel is relevant for the study of these fish parasites in their hosts.

**Topics will include**

- Recent genomic and proteomic advances
- Key molecules of host-parasite interactions
- Species diversity and others

**RESERVE THE DATE: 22nd Sept. 2021 18:00 CET**  
(depending on location cocktail or coffee time!)

Email the Biology Centre of the Czech Republic myxo-team, Astrid Holzer (astrid.holzer@paru.cas.cz), Ivan Fiala (fiala@paru.cas.cz) or Pavla Sojková (bartosova@paru.cas.cz) for more topics or questions.

\*Term copyright to J Bartholomew



20<sup>th</sup> International  
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# Как научные результаты европейских исследований (EU projects) смогут улучшить организацию аквакультуры в средиземноморье (Snježana Zrnčić, Francesc Padros & Edgar Brun)

**Do you want to know what has been achieved with the funding of the H2020 EU program for Aquaculture in the Mediterranean area?**

23 September 2021  
14:15 – 16:30 CET

**EAFP 2021**  
20 - 23 September • Virtual

ParaFishControl

Interreg Italy - Croatia AdriaAquaNet

medAID

FUTURE EU AQUA

PerformFISH

20<sup>th</sup> International Conference on Diseases of Fish and Shellfish

**How outputs from EU projects can upgrade health management in Mediterranean aquaculture**

14:15 – 14:30 - Introduction to the workshop – Snježana Zrnčić, Francesc Padros, Edgar Brun

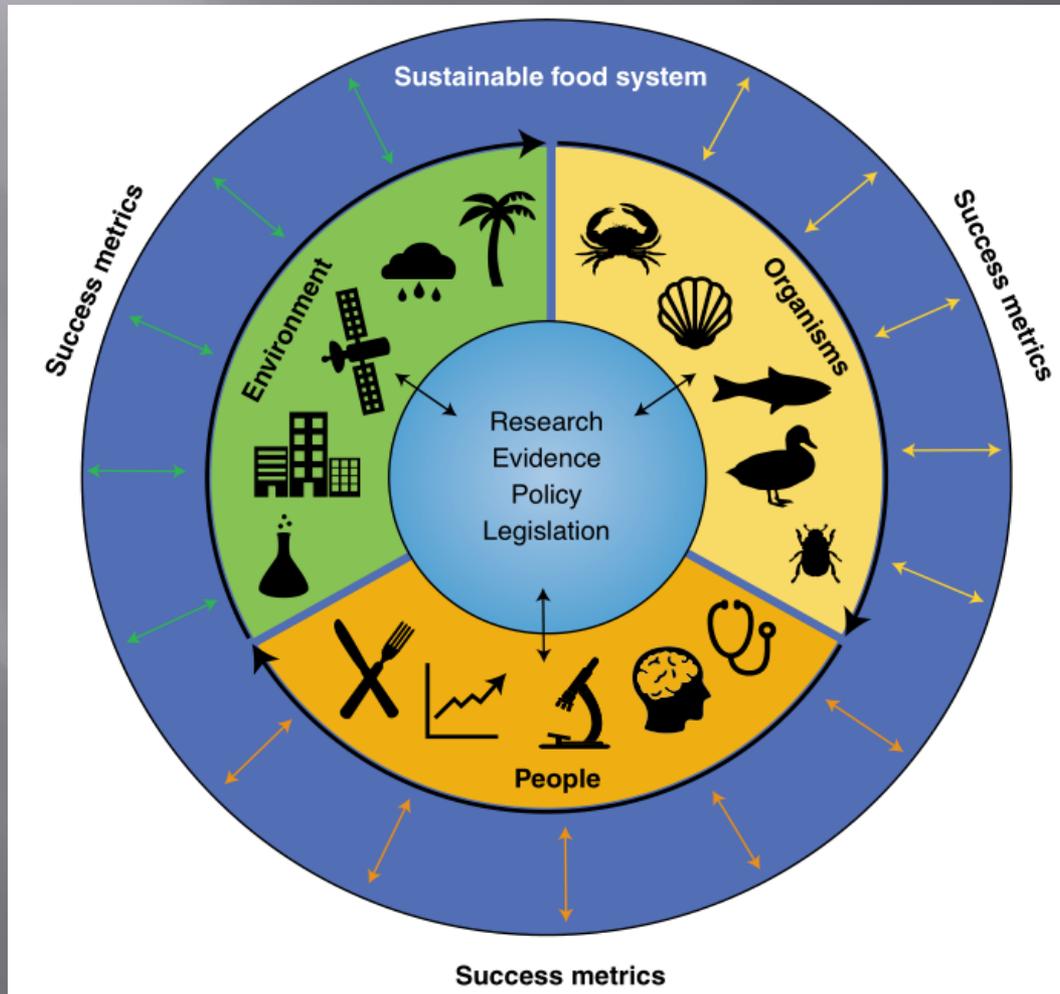
# ОСНОВНЫЕ ТЕМЫ ДОКЛАДОВ

- ▣ Aquatic animal welfare
- ▣ Viral diseases
- ▣ Diseases of wild and ornamental fish
- ▣ Parasitic diseases
- ▣ Environmental and toxicological diseases
- ▣ Cleaner fish diseases
- ▣ Salmonid viral diseases
- ▣ Aquatic animal epidemiology
- ▣ Bacterial diseases
- ▣ Gill diseases
- ▣ Genomic approach related to fish pathology
- ▣ Innovation in disease control
- ▣ Host-pathogen interactions
- ▣ Myxozoa
- ▣ Vaccines
- ▣ Immunostimulants, prebiotics & probiotics
- ▣ Microbiomes in relation to fish pathology/health
- ▣ Bivalve and crustacean diseases
- ▣ Fish and shellfish immunology
- ▣ Diagnostics
- ▣ Emerging pathogenes
- ▣ Nutrition and fish health
- ▣ Prophylaxis & treatment

# Направления в изучении заболеваний рыб

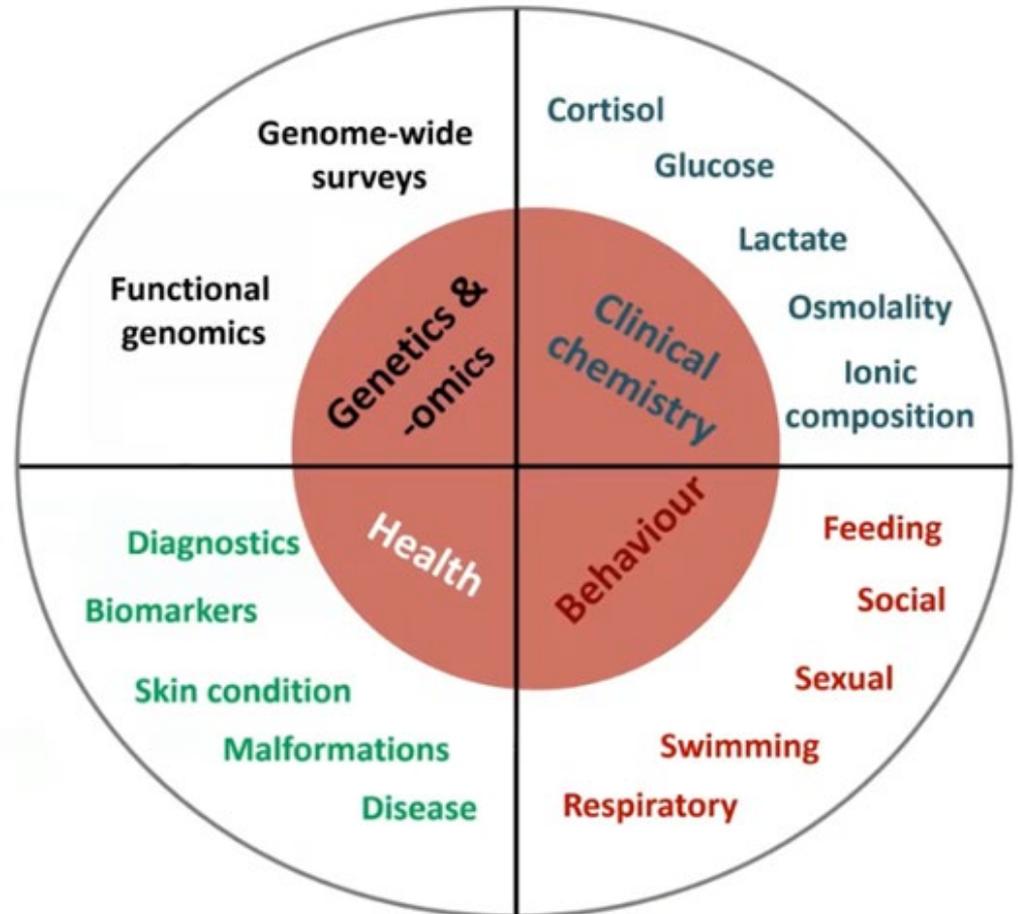
- ▣ Изучение заболеваний рыб с использованием клинических, патологоанатомических, морфологических, физиологических и генетических методов исследования
- ▣ Молекулярные, нейро-эндокринные и абиотические факторы взаимодействия организм-среда как реакция на стресс
- ▣ Разработка неинвазивных методов контроля здоровья рыб
- ▣ Концепция аквакультуры «Единое здоровье»: менеджеры, политики, ученые для единой системы контроля человек-среда-организм

# «Единое здоровье» анализ и разработка устойчивых продовольственных систем

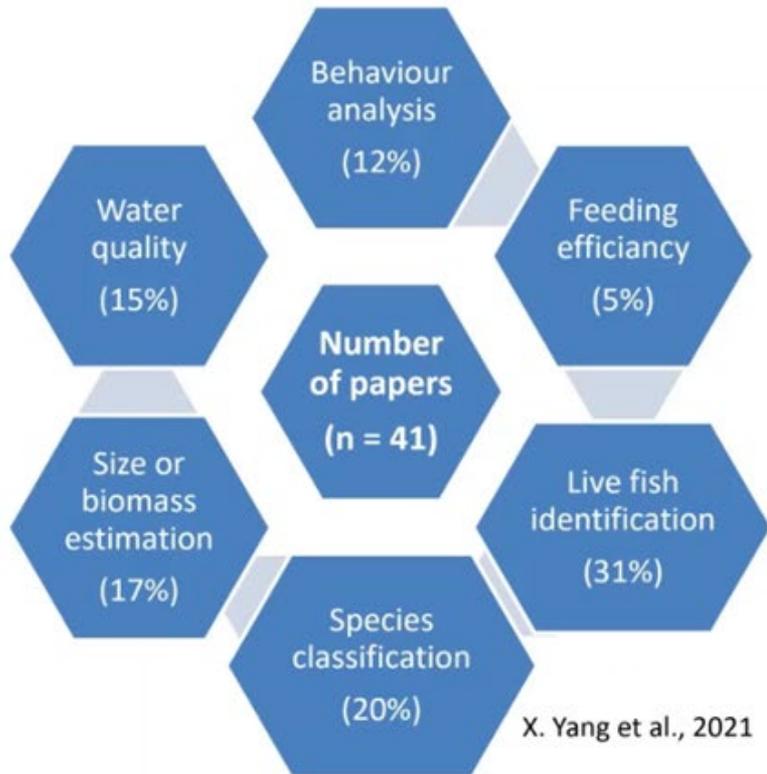


# Факторы, определяющие здоровье рыб

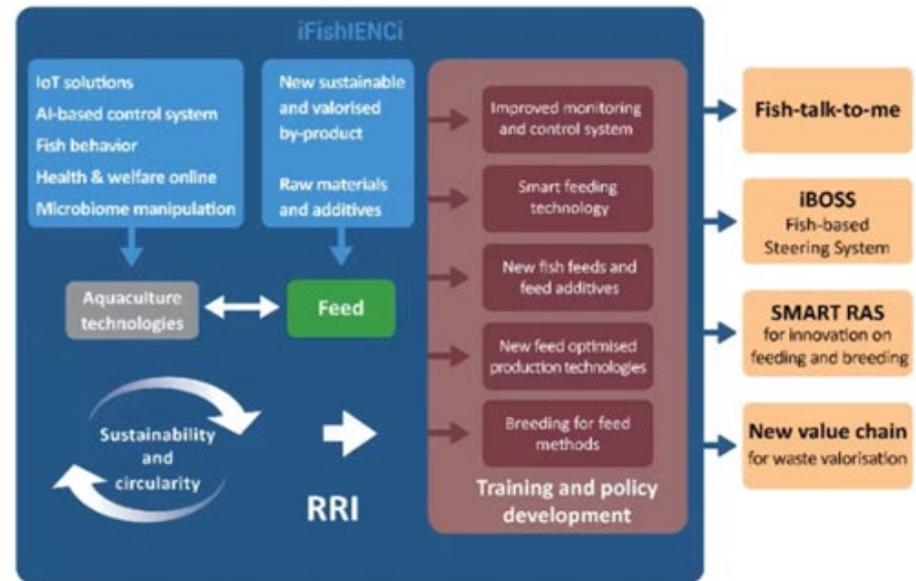
## Biological LABWIs & OWIs



# Применение неинвазивных методов исследования

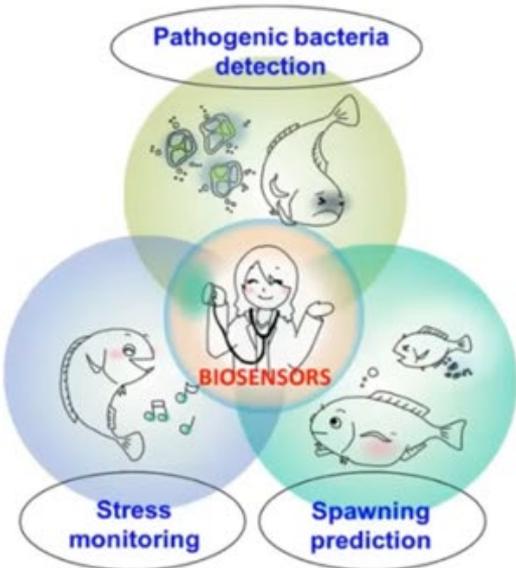


## Deep learning applications



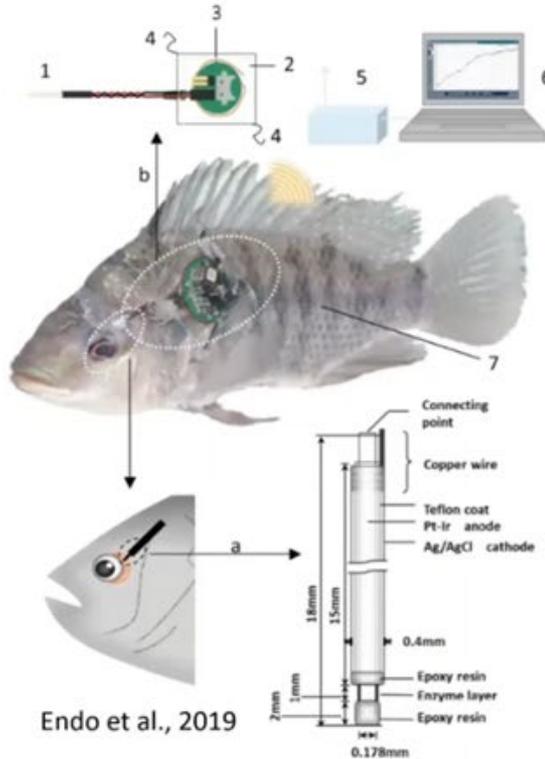
**Warning!** Hallucination / neural networks overlearning or overfitting

# Мониторинг глюкозы

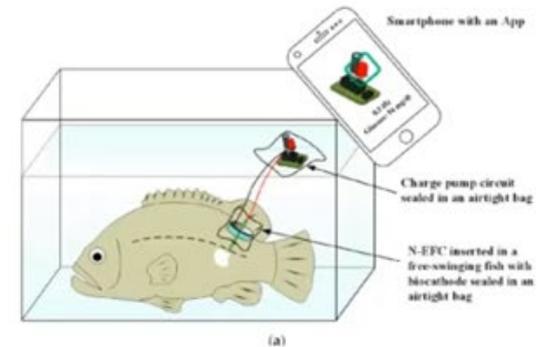


Endo & Wu, 2019

## BioSensors



Wireless enzyme system for real-time monitoring of blood glucose

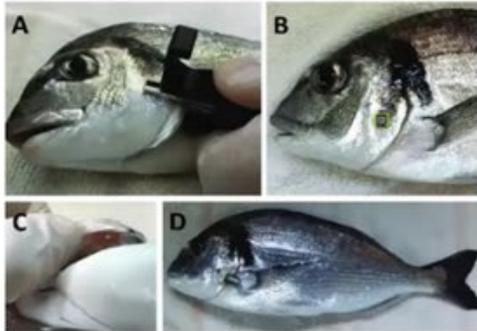
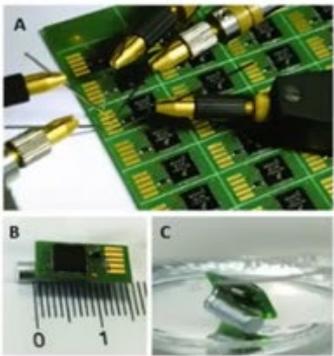


Huang et al., 2019



# Кардиограмма

Ultra-Low power sensor devices for monitoring physical activity and respiratory frequency in Gilthead sea bream



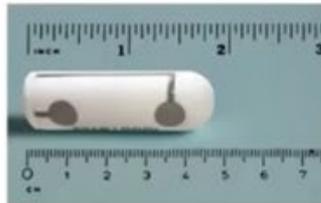
Martos-Sitcha et al., 2019

Heart rate bio-loggers as welfare indicators in Atlantic salmon

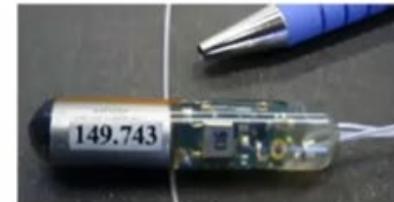


Hvas et al. 2020

Star ODDI logger DST  
centi-HRT ACT  
(heart rate + activity +  
body temperature)



Lotek coded  
electromyogram  
transmitter



FutureEUAqua

## BioSensors

# Поведение

Aquaai's robotic fish "Nammu"



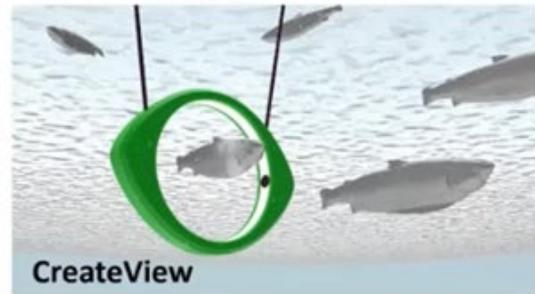
AKVA & Observed Technologies



FishNet.  
Mathisen et al., 2020

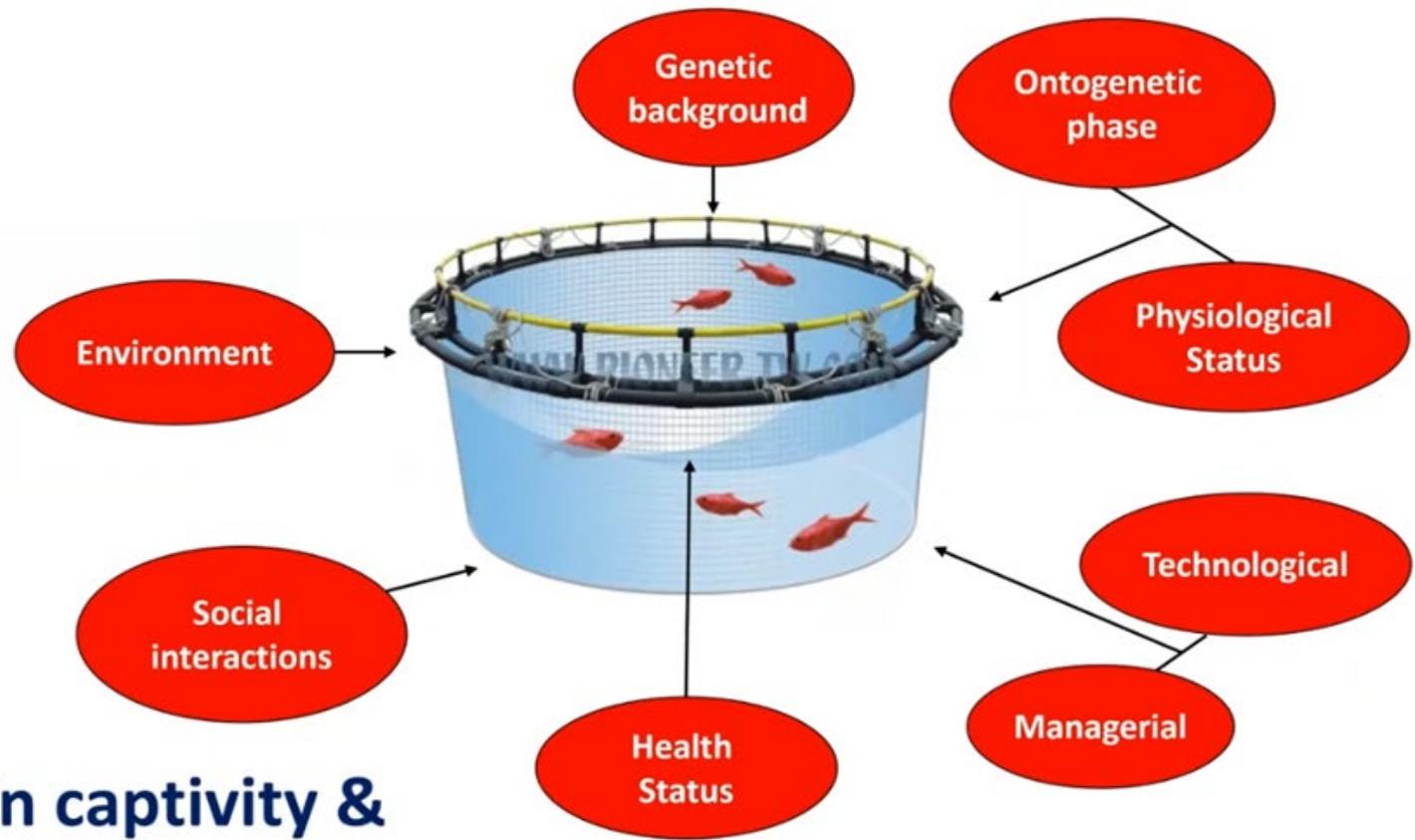
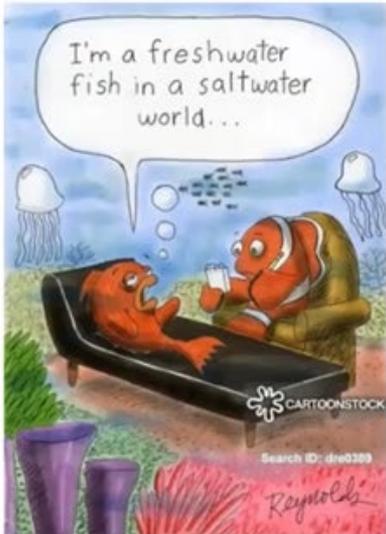


Alphabet



## Behavioural Monitoring

# Индикаторы благополучия в аквакультуре



**Life cycle in captivity & Welfare Indicators**

# Fish Necropsy Manual

Patricia Noguera - Carmen Ubeda - David Bruno - Liliana Semenas

**Fish Necropsy Manual**

Home - Fish groups - Teleost anatomy - Necropsy - Additional information - Español

### Fish groups

- Synbranch
- Pleuronchti
- Selachii
- Lepidii
- Caracii
- Columbii
- Columbii

### Teleosts

Skeleton and musculature

The teleosts are shaped like a fish and are arranged in segments or rays along the body (Fig. 1). All teleosts have a bony skeleton. The teleosts are arranged in segments or rays along the body (Fig. 1). All teleosts have a bony skeleton.

**Fish Pathology Archive**

This section was developed alongside the necropsy manual and designed to give an overview of some lesions attributed to both infectious and non-infectious diseases of the various species. We have included external and internal images for reference, which are intended as a guide for the pathologist. Full descriptions and histological level are available for salmonids, but examples from turbot and gaidaka are not widely available. We hope readers will benefit from having these images included as part of the necropsy manual. Please note that the images are subject to Crown Copyright and should not be copied from this web site.

### External Disease Signs

- Small furuncle and haemorrhage, color attributed to bacterial infection in Atlantic salmon (Salmo salar L.).
- Neuronic lesions on ventral surface of the head of rainbow trout (Salmo gairdneri Richardson).
- Reddish-orange (leg color) with head necrosis attributed to bacterial infection by *Aeromonas hydrophila* in rainbow trout (Salmo gairdneri Richardson).
- Opportunistic and chronic squamous metaplasia in rainbow trout (Salmo gairdneri Richardson).

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EUROPEAN ASSOCIATION OF FISH PATHOLOGISTS / 5M BOOK SERIES

# FISH PARASITES

A HANDBOOK OF PROTOCOLS FOR THEIR  
ISOLATION, CULTURE AND TRANSMISSION



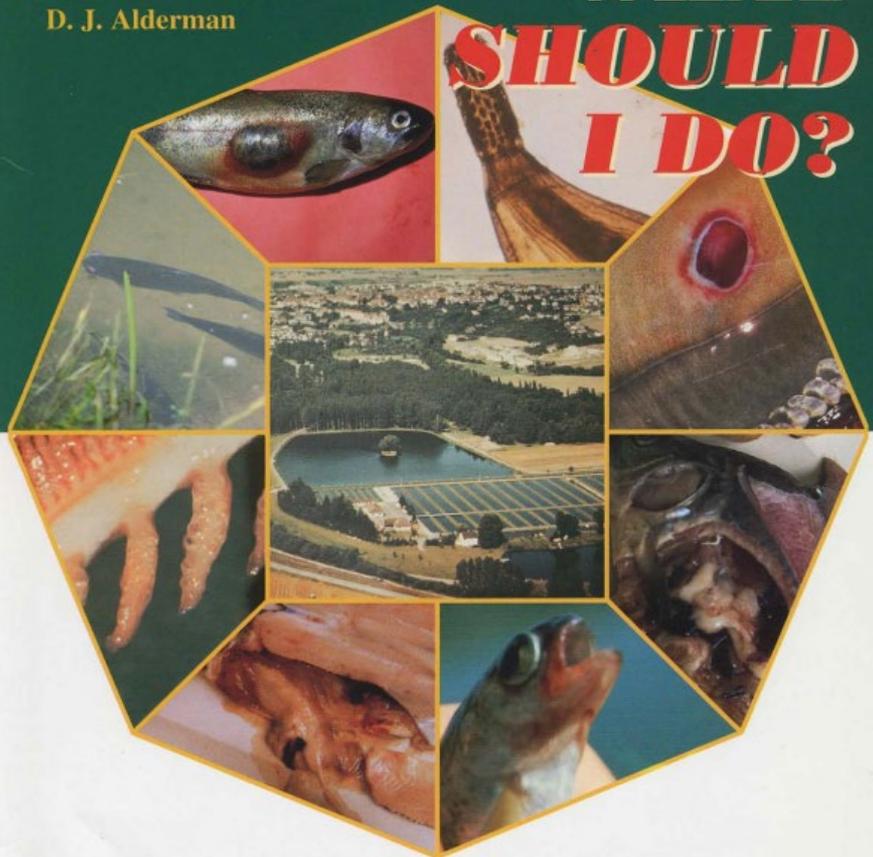
EDITED BY  
ARIADNA SITJÀ-BOBADILLA, JAMES E. BRON,  
GEERT F. WIEGERTJES AND M. CARLA PIAZZON



**EUROPEAN ASSOCIATION OF  
FISH PATHOLOGISTS**

H.-J. Schlotfeldt &  
D. J. Alderman

# **WHAT SHOULD I DO?**



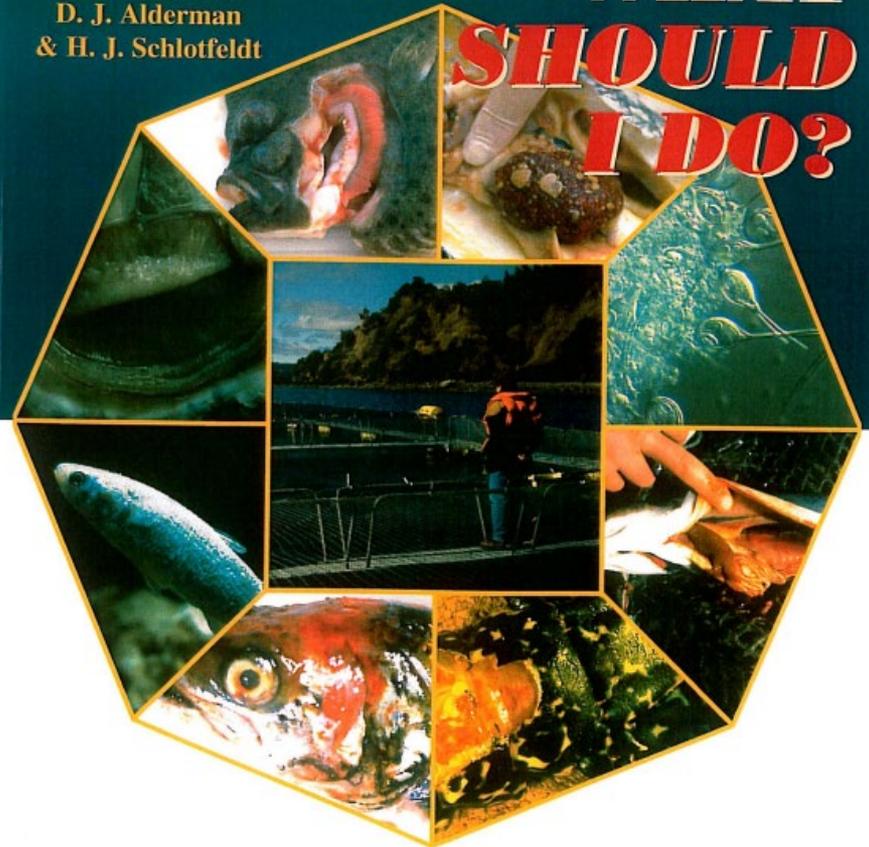
**A Practical Guide  
for the Fresh Water  
Fish Farmer**



**EUROPEAN ASSOCIATION OF  
FISH PATHOLOGISTS**

D. W. Bruno  
D. J. Alderman  
& H. J. Schlotfeldt

# **WHAT SHOULD I DO?**



**A Practical Guide  
for the Marine  
Fish Farmer**