PARAFISHCONTROL: ADVANCED TOOLS AND RESEARCH STARTEGIES FOR PARASITE CONTROL IN EUROPEAN FARMED FISH

11th March 2020
WEBINAR

ParaFishControl

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Castellón, Spain

HORIZON 2020

CSIC
Consejo Superior de Investigaciones Científicas

ParaFishControl

1 The ParaFishControl Project

2 The targets

3 The approach and solutions

4 Our legacy and impact on the Aquaculture Industry

ParaFishControl

1 the ParaFishControl Project

Advanced Tools and Research Strategies for Parasite Control in European farmed fish

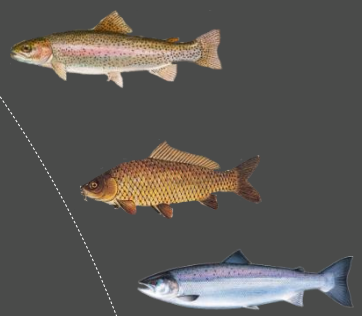
Total cost

8,104,133 €

EU Contribution

7,800,000 €

5 **YEARS COLLABORATIVE PROJECT-Started in 2015**



GLOBAL OBJECTIVE

- ✓ Increasing sustainability and competitiveness of European aquaculture
- ✓ Improving understanding of fish-parasite interactions
- ✓ Developing innovative solutions and tools for the prevention, control and mitigation of the major parasites

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CONSORTIUM
OVERVIEW

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28 partners

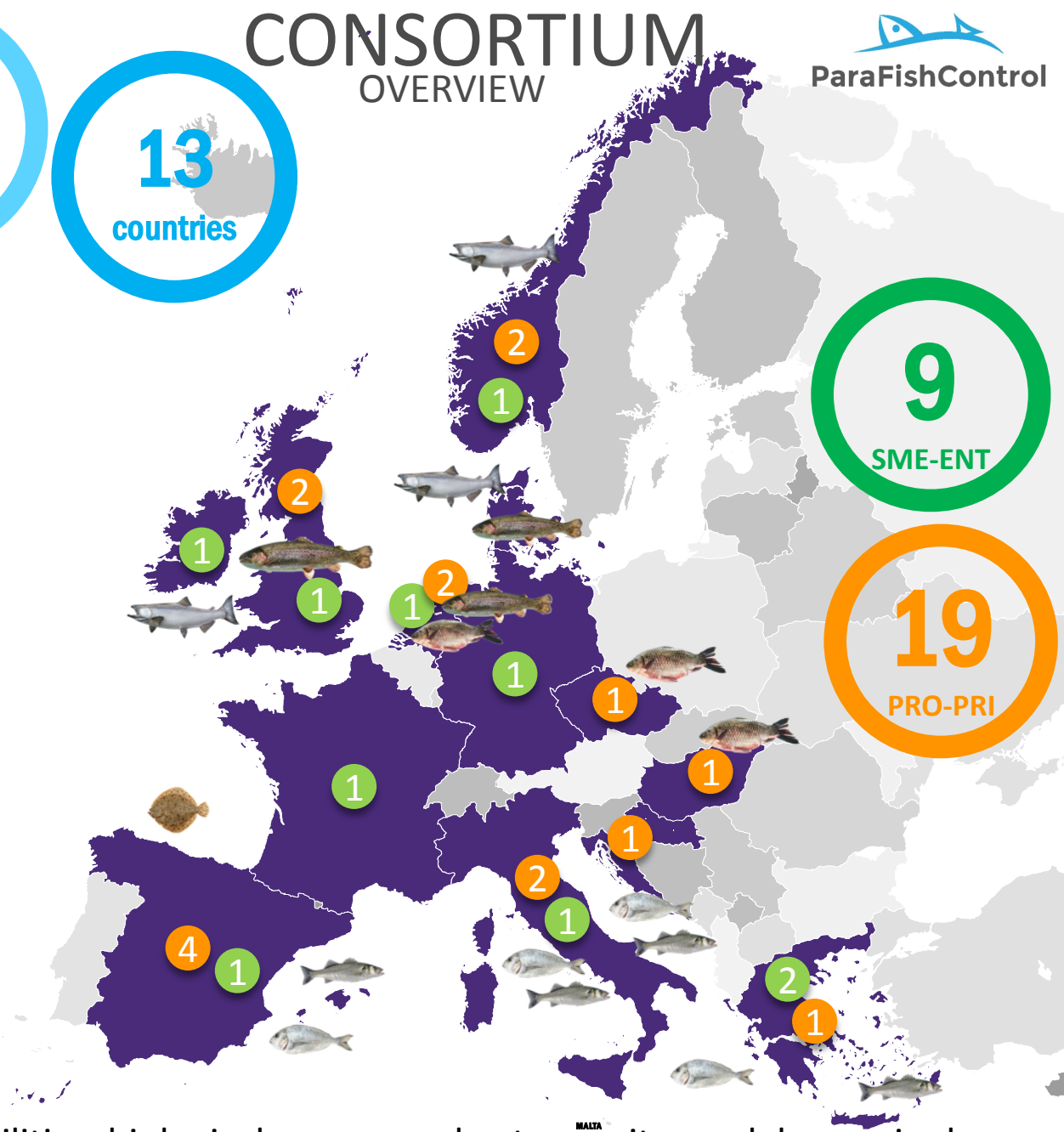
13 countries

9 SME-ENT

19 PRO-PRI

Expertise in

- Parasitology
- Epidemiology
- Immunology
- Molecular biology
- Genetics
- Genomics
- Food safety
- Pathology
- Chemotherapy



Access to: Research facilities, biological resources, host-parasite models, vaccinology, sequencing devices, biotechnology

Industry

Aquark

AQUATT
Science. Communication. Knowledge. Innovation.

AndromedaGroup
YOUR NEARBY SEA FISHERMAN

VERTEBRATE ANTIBODIES

SKRETTING
AQUACULTURE RESEARCH CENTRE

NGENASA

Future Genomics Technologies

W42

Industrilaboratoriet

Research

CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

IATS

IIM
Instituto de Investigaciones Marinas de Vigo

REAL JARDÍN BOTÁNICO - CSIC

UNIVERSITY of STIRLING

INRA Transfert

DTU

WAGENINGEN UR
For quality of life

NIOO

Institute for Veterinary Medical Research
Centre for Agricultural Research
Hungarian Academy of Sciences

USC
UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

1495
UNIVERSITY OF ABERDEEN

UNIVERSITY OF COPENHAGEN

hcmr
ΕΛΚΕΘΕ

UNIVERSITAS BERGENSIS

Cefas

INIA
Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria

BIOLOGY CENTRE CAS

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

azti tecnalia

UNIVERSITÀ DEGLI STUDI DI UDINE

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WP1	**Host-parasite interactions:** Study transcriptomes and determine key genes (NGS); Proteomics to determine key proteins of parasites and their hosts. Use data to identify potential drug and/or vaccine targets and develop diagnostic tests
WP2	**Wild-farmed fish parasite transfer:** Develop necessary molecular tools and collect data to help provide a basis for better/novel zooprophylactic strategies
WP3	**Prophylaxis: Vaccine development and testing** at lab and field trials and development of **immunostimulatory feeds** with *in vitro* tests and farm trials
WP4	**Diagnostics:** Lab tests with analytical optimisation; Reference diagnostic tests, validated methods in ringtests; Rapid on-site assessment, point-of care kits
WP5	**Innovative treatments:** Rapid to implement alternative treatments; Water- and fish rearing unit treatments; Optimised use of predator fish; Newly identified reagents for parasite treatment; Targeted treatments/immunotherapy
WP6	**Risk analysis and surveillance**: Biosecurity and IPMS; Tools for assessing economics of alternative control strategies; Future risks and sector level solutions and future challenges; Deposition of parasite samples and metadata in Biobank
WP7	**Fish product safety:** On-site detection of presence of zoonotic parasites based on validated/calibrated detection methods; Establishment of a Voluntary Control System; Good Practice Handbook for parasite-free culture
WP8	**Dissemination, technology transfer and take-up**
WP9	**Coordination and Management**

WP leaders

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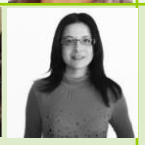
WP1		**Geert Wiegertjes**	Geert.Wiegertjes@wur.nl	**WU**
WP2		**Ivona Mladineo**	mladineo@izor.hr	**IOR**
WP3		**James Bron**	j.e.bron@stir.ac.uk	**UoS**
WP4		**Oswaldo Palenzuela**	oswaldo.palenzuela@csic.es	**CSIC**
WP5		**Niels Lorenzen**	nilo@vet. dtu.dk	**DTU**
WP6		**Alastair Cook**	alastair.cook@cefas.co.uk	**Cefas**
WP7		**Miguel Angel Pardo**	mpardo@azti.es	**AZTI**
WP8	 	**Marieke Reuver** **Emma Bello**	marieke.reuver@aquatt.ie emma@aquatt.ie	**AquaTT**
WP9		**Ariadna Sitjà-Bobadilla**	coordination.parafishcontrol@csic.es	**CSIC**

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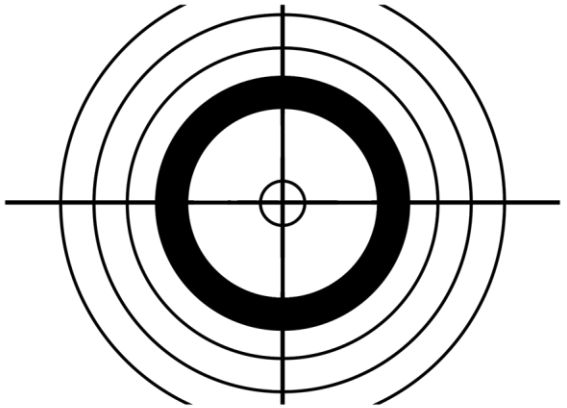
2 The targets



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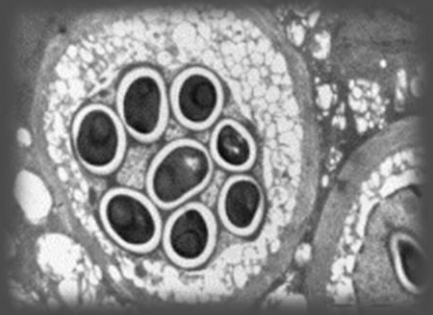
Enterospora nucleophila

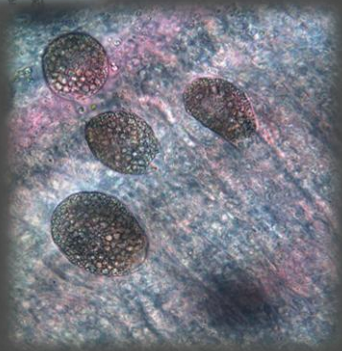


Enteromyxum leei

Sparicotyle chrysophrii

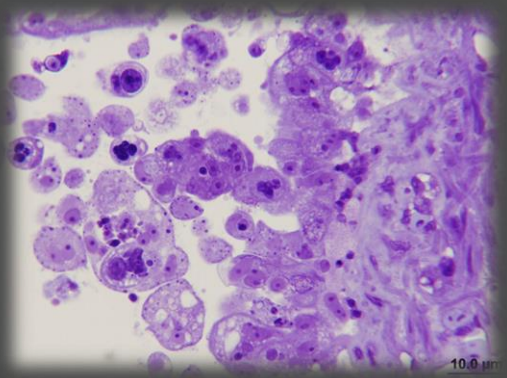
P. Varvarigos

Ceratothoa oestroides

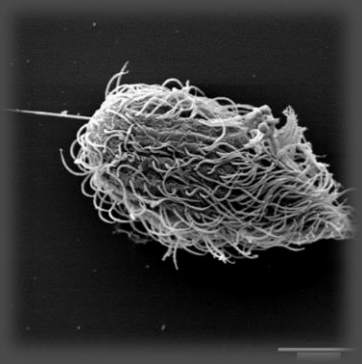


Amyloodinium ocellatum

Enteromyxum scophthalmi



Philasterides dicentrarchi



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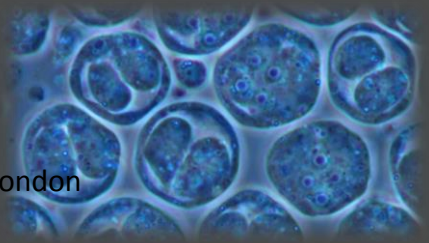
Lepeophtheirus salmonis

Neoparamoeba perurans

Saprolegnia parasitica

Tetracapsuloides bryosalmonae



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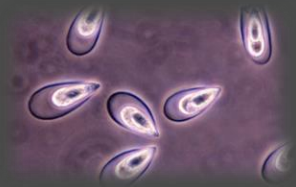
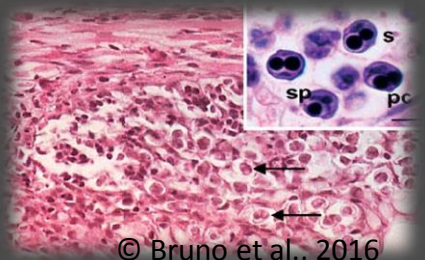
Ichthyophthirius multifiliis



Telohanellus kitauei

Sphaerospora molnari



© Bruno et al., 2016

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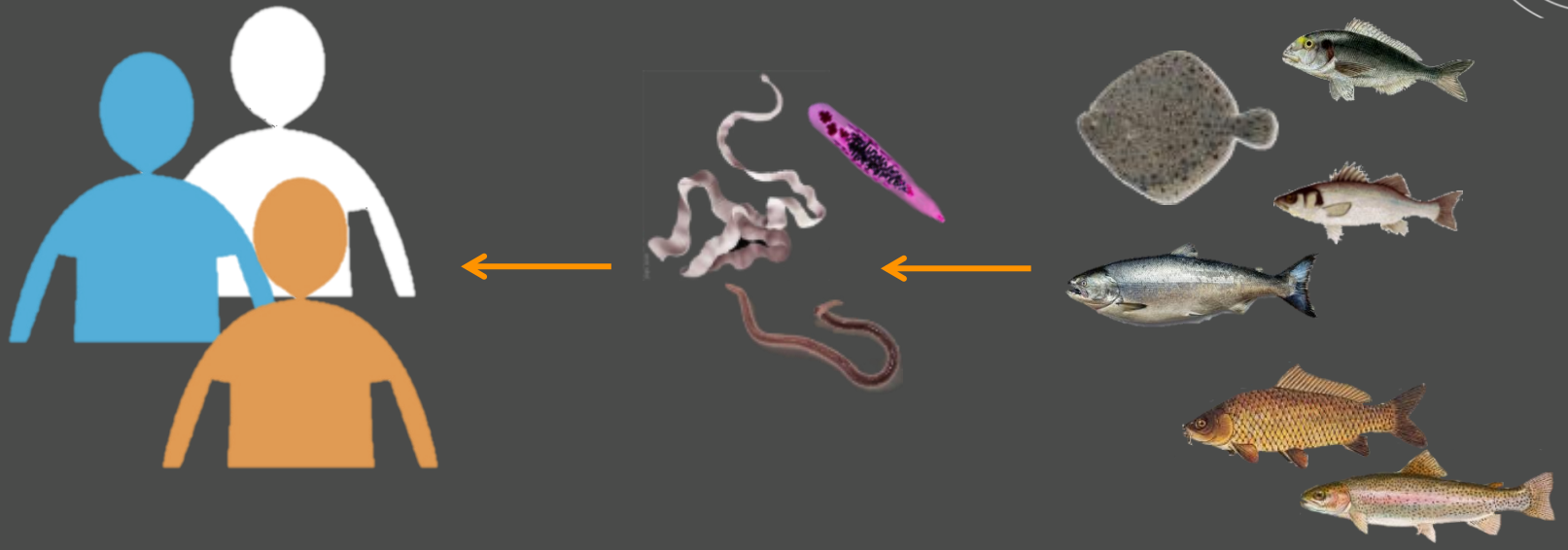
Zoonotic helminths



Economic Impact of Parasites in Finfish Aquaculture

- Direct mortality
- Morbidity: Decreased FCR & growth, parasitic castration
- Increased susceptibility to other diseases (opportunistic)
- Reduced ability to cope with changes and handling
- Harvest downgrades, loss of market, reduced durability
- Costs of treatments, prevention strategies, mort disposal, etc.
- World (Shin et al., Global Aquaculture Advocate, 2015):
  - Estimated losses due to parasitism: hatchery (20 %), growout (1-10% harvest)
  - Parasites' annual cost : from $1.05 billion to $9.58 billion
- EU (+ Norway) (H. Rodgers, FishVetGroup):
  - The value of salmon aquaculture in 2016: €12.5 billion
  - Parasite impact: €525 to 725 million pa (direct & indirect)

SOLUTIONS !!

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3 The approach and solutions


2020
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2015


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46
1,230
PM
57
DEADLINES


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> 47 KOs collected

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- KO #1 - Risk Factors for parasite infections (Owner: Cefas, ANDROMEDA, AQUARK, CSIC, IOR, SKRET, USC, UNIBO, UNIUD)
- KO #2 - Infection model for *Saprolegnia* (both *diclina* and *parasitica*) (WU)
- KO #3 - White spot disease control with bacterial surfactant (Owner: KNAW, KU - Patent number EP17202669)
- KO #4 - Sparicotylosis alternative treatments (Owner: IOR)
- KO #5 - Anisakis detection portable kit (Owner: AZTI)
- KO #6 - Best Practices of farm management to avoid presence of Anisakis in farmed fish (Owner: AZTI et al.)
- KO #7 - Alternative treatment strategies for *Saprolegnia* (Owner: UNIBO)
- KO #8 - Ich recombinant protein and homogenate vaccines (Owner: KU, MTA)
- KO #9 - Expression of two proteins of *Ich* in *Pichia* (Owner: KU, W42)
- KO #10 - PKD Vaccine (Owner: UNAB)
- KO #11 - In vivo infection model for AGD in salmon (Owner: Cefas)
- KO #12 - In vitro infection model for AGD in salmon (Owner: UoS)
- KO #13 - Compound that works against *Paramoeba perurans* (AGD) (Owner: UoS)
- KO #14 - Salivary gland proteins from *Lepeohtheirus salmonis* (Owner: UiB and UoS)
- KO #15 - Vaccines against *Sphaerospora molnari* in carp (Owner: BCAS)
- KO #16 - Immunostimulants against *Sphaerospora molnari* in carp (Owner: BCAS, SKRET)
- KO #17 - qPCR for *Sphaerospora molnari* and *T. kitauei* (Owner: BCAS)
- KO #18 - Immunostimulants against *Amyloodinium ocellatum* (Owner: UNIUD)
- KO #19 - Alternative treatments for *Ceratothoa oestroides* (Owner: IOR)
- KO #20 - Point of care for *E. leei* sea bream (Owner: CSIC, INGENASA)
- KO #21 - Infection models for *E. leei* (Owner: CSIC)
- KO #22 - Immunostimulants for *Ich* (Owner: KU)
- KO #23 - Alternative treatment strategies for Ich (Owner: MTA)
- KO #24 - Alternative treatment strategies for Ich (Owner: KU)
- KO #25 - Vaccines for *Saprolegnia* (Owner: UNAB)
- KO #26 - New monoclonal antibodies for PKD (Owner: VAL)
- KO #27 - Point of care tests for *Enteromyxum* spp. (Owner: CSIC, INGENASA)
- KO #28 - Alternative treatments for *Philasterides dicentrarchi* (Owner: USC)
- KO #29 - Vaccines for *Philasterides dicentrarchi* (Owner: USC, CSIC, INIA)
- KO #30 - Point of care test for *P. perurans* (Owner: Cefas)
- KO #31 - Repository of diagnostic methods (Owner: CSIC, DTU, UNIBO, IOR, UoS, UNAB, Cefas, BCAS, MTA, USC, KU)
- KO #32 - SHIELD new diet for sea bream (Owner: SKRET)
- KO #33 - Strategy to block the interaction of BAFF with its receptor as a treatment against proliferative kidney disease (PKD) (Owner: INIA-UNAB - Patent in progress)
- KO #34 - Challenge model for *Amyloodinium ocellatum* (Owner: UNIUD)
- KO #35 - Sequencing of *Amyloodinium ocellatum* (genome) (Owner: UNIUD)
- KO #36 - Vaccine for *Amyloodinium ocellatum* (Owner: UNIUD)
- KO #37 - Two different qPCR protocols for detection of *Neoparamoeaba perurans* (AGD) (Owner: DTU)
- KO #38 - qPCR and ICH protocols for detection of *Tetracapsuloides bryosalmonaeis* (PKD) (Owner: DTU)
- KO #39 - qPCR for *Enterospora nucleophila* (Owner: CSIC)
- KO #40 - Methods for detection, quantification and discrimination of genotypes/serotypes of *P. dicentrarchi* (Owner: USC).
- KO #41 - Tools for detection and identification of zoonotic metacercariae (Owner: UNIBO)
- KO #42 - Sequencing of *Enteromyxum leei* (genome) (Owner: CSIC)
- KO #43 - Sequencing of *Enteromyxum scophthalmi* (genome) (Owner: CSIC)
- KO #44 - Sequencing of *P. dicentrarchi* (genome/ transcriptome) (Owner: USC).
- KO #45 - Sequencing of *Sphaerospora molnari* (genome/transcriptome) (Owner: BCAS).
- KO #46 - Sequencing of *Paramoeba perurans* (genome/transcriptome) (Owner: Cefas, UoS).
- KO #47 - Sequencing of *Sparicotyle chrysophrii* (genome/transcriptome) (Owner: IOR, HCMR, CSIC).

Today you will get details on some of them

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ENVIRONMENTAL IMPACT OF FISH FARMING: wild-farmed fish interaction

ALTERNATIVE TREATMENTS

ANIMAL WELFARE

FOOD SECURITY

……Generating a more positive public perception……

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VACCINES
IMMUNOPROFILAXIS

BIOSECURITY PLANS
& IPMS

DIAGNOSTIC TOOLS:
Diagnostic repository,
ISH, qPRC, Mabs, Kits,
POCs

EPIDEMIOLOGICAL
MODELS & TOOLS

Promoting preventive measures to diseases and adverse health conditions

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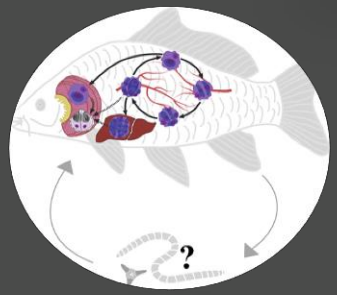
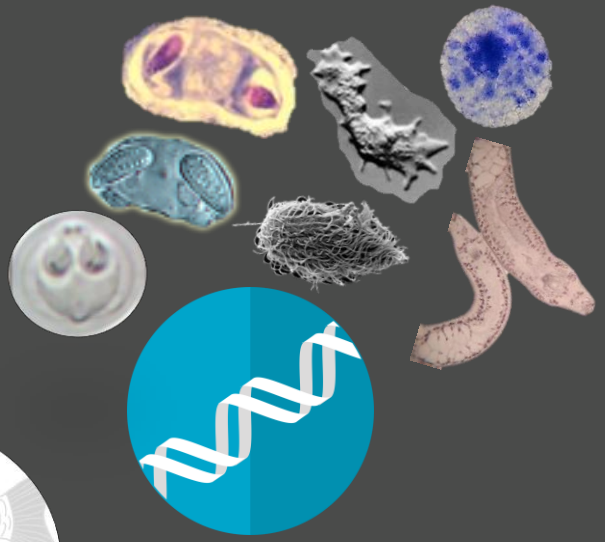
SOP
25
PARASITES

5m

- ✓ *IN VITRO* CULTURE
- ✓ EXPERIMENTAL TRANSMISSION



LIFE CYCLES DECIPHERED



GENOMES & TRANSCRIPTOMES SEQUENCED: virulence factors, genes, proteins, scape pathways, antigens, etc.

PATHOLOGY & FISH IMMUNE RESPONSE: Tissues, cells, metabolites, molecules, genes, microbiota

.....Knowing the parasites and the hosts.....

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4 Our legacy

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FILLING THE GAP BETWEEN SCIENCE & INDUSTRY

Training courses

Some of the lecturers

25 participants from 13 countries
(more than 100 applicants)

Teachers and attendants - ParaFishControl Training Course

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Industry Corner

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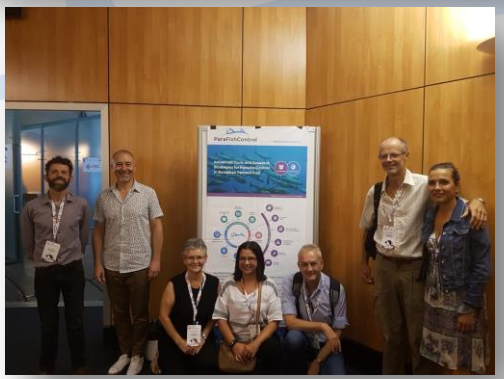

www.parafishcontrol.eu

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Our figures

200 Participations in Conferences, workshops

>57 Peer review articles

4 PhD thesis

866 Twitter followers

175 Linkedin members

4 videos

2 books

14 Training courses & workshops

1 VCS

3 Industry forums

4 IPMS, guides

2 Patent

ParaFishControl

EU aquaculture priorities

Aquaculture is a key component of both the Common Fisheries Policy and the Blue Growth agenda. In consultation with stakeholders, the Commission has identified the main priorities to facilitate its sustainable development:

Simplify administrative procedures

Ensure access to space through coordinated spatial planning

Enhance the competitiveness of EU aquaculture

Promote a level playing field for EU operators

Communication & Press

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- emma@aquatt.ie

Management

- Dr. Enric Belles-Boix
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Coordination

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Thanks for your attention

@parafishcontrol.eu

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Open discussion & Feedback