

**Assessing And Improving The Quality Of Aquatic
Animal Gametes To Enhance Aquatic Resources -
The Need To Harmonize And Standardize Evolving
Methodologies, And Improve Transfer From Academia
To Industry (AQUAGAMETE)**

FA1205

Start date: 29/11/2012

End date: 28/11/2016

Year: 4

Three International Workshops on the Biology of Fish Gametes (IWBFG)



Vodnany (Czech Republic, 2007)



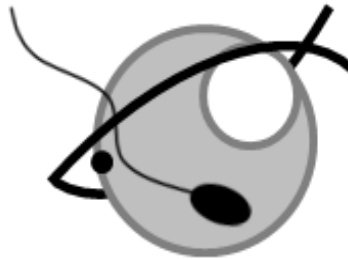
Valencia (Spain, 2009)



Budapest (Hungary, 2011)



Plenary session for COST Action proposal



AQUAGAMETE

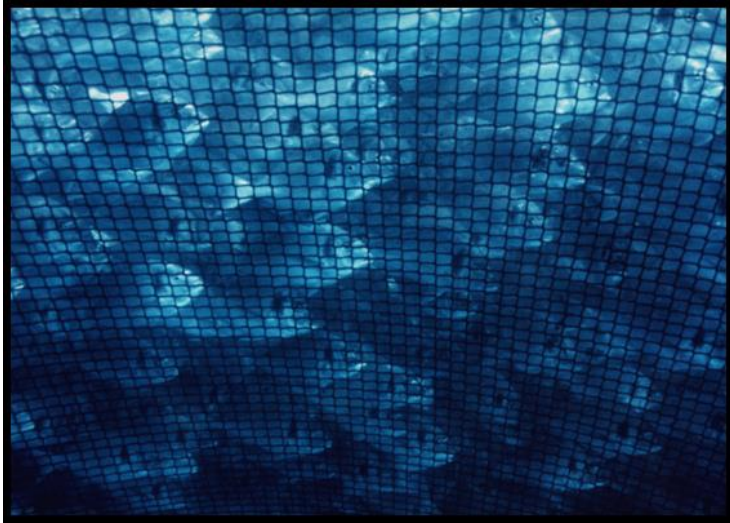
Á. Horváth, H. Rosenthal and J.F. Asturiano lead the session, finding the general interest of assistants, and starting to define precise objectives, WGs structure and nominating potential WGs leaders.

Scientific context

- **Background / Problem statement:**

- Europe needs aquatic animal species.
- The most evident... Aquaculture has compensated the reduction of captures, centered in controlled-reproduction species.

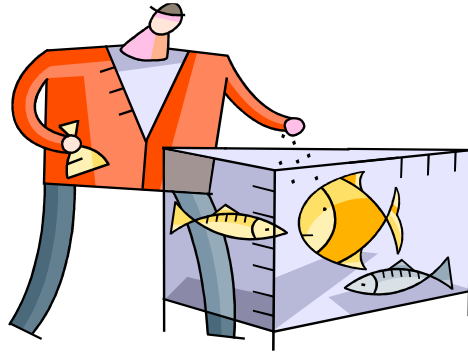




Aquaculture

- Rapidly developing technologies
- Increasing and intensifying production

STANDARDIZATION IS INEVITABLE



Until now we need...

Control of reproduction
Broodstock management

Gamete management

Larval quality

Fry survival

**THE ACTUAL AREA OF USE IS MUCH
BROADER THAN THAT!**

Aquaculture companies (hatcheries)

- Broodstocks management

 - Parents selection

 - Evaluation of sperm/egg quality

 - Identification of quality markers

 - Improvement of fertilization protocols

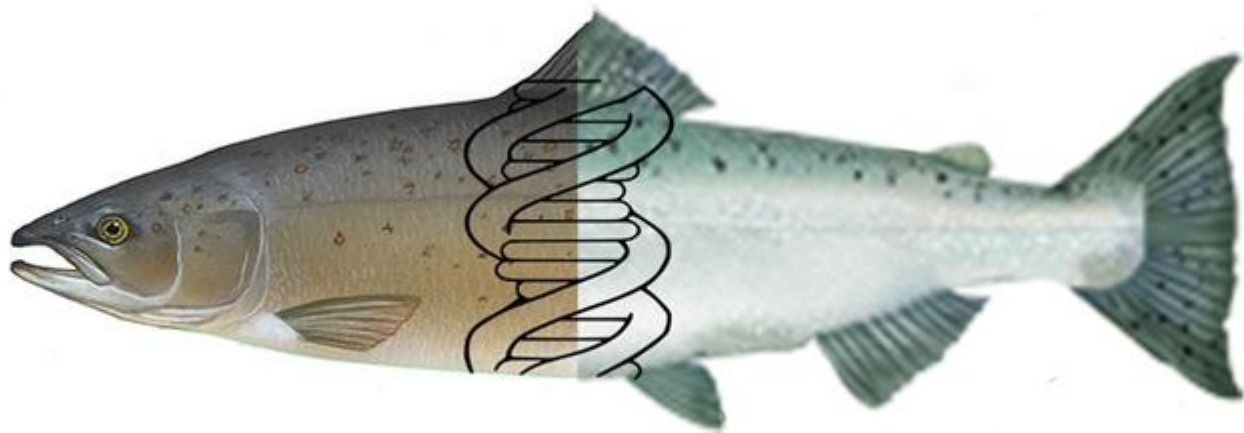
 - Development/improvement of cryopreservation techniques

- Genetic improvement (at its infancy in most of the fish species)





Fish species interesting for aquaculture
but having reproductive limitations

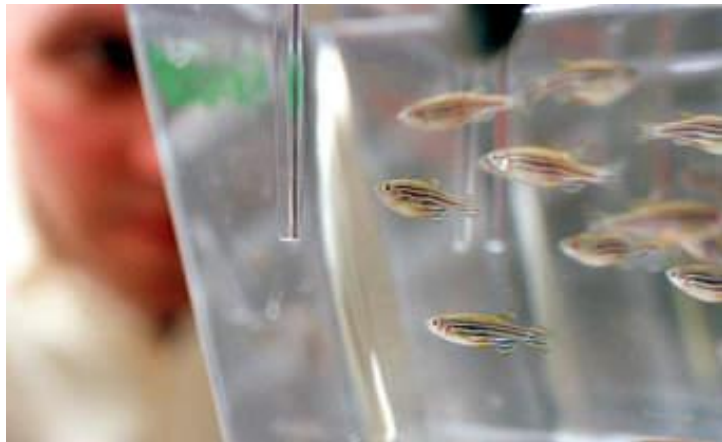
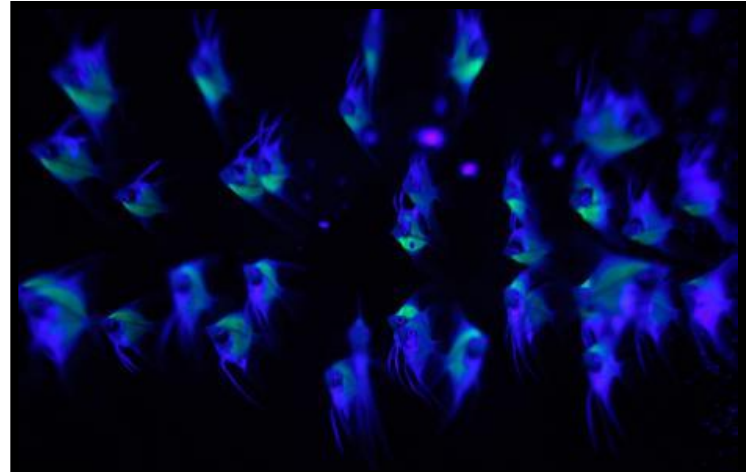
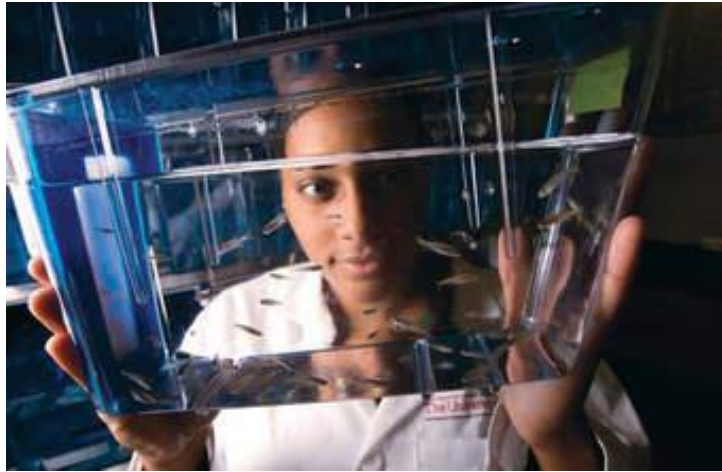


Genetically selected fish

Biotechnology companies (biomedicine, mammals/human reproduction)

Improvement of basic knowledge regarding physiological processes

Conservation of mutants, genetically-modified strains & transgenic lines



Developing countries/ countries developing Aquaculture

Extreme potential, many new species, high growth rate, low production costs, omnivorous diet, societal impact

Everything to be done (hormonal treatments to genetic improvement)



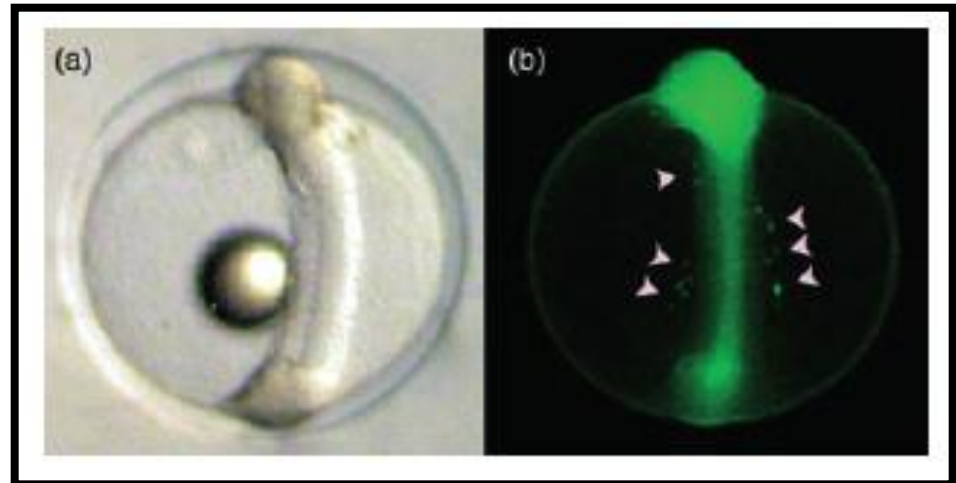
Ecology and Fisheries

Management of local fisheries resources (i.e.: for angling)

Management of endangered aquatic species

Cryobanking of local genetic resources

Use of PGCs transplantation technologies to improve artificial propagation



Fish sperm cryopreservation (as example)

Studies of near 300 species

Results vary widely

Even for similar protocols and species

Difficulty in repeating protocols

Controversies in many aspects

Pooled milt vs. separate males

Cryoprotectants and concentrations

Short vs. long equilibration time

“Fast” vs. “slow” cooling



No Standardization

Initial sperm quality

Sperm concentration

Cryopreservation procedures

Packaging, cooling, thawing

Fertilization procedures

Evaluation criteria

Experimental design

Reporting of results



The extreme diversity of fish species, evaluation techniques, cryopreservation protocols, etc. make necessary to standardize protocols and methodologies for reporting results.

Main objectives

Our main objective is to harmonize and standardize evolving analytical methodologies used in assessing the quality of aquatic gametes, improving their different uses, enhancing aquatic resources and transfer from academia to the industry.

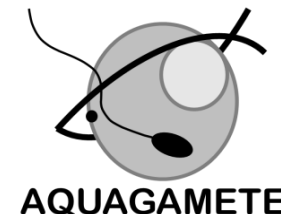


Objectives

- 1) To review the current state of knowledge on aquatic species gametes.
- 2) To coordinate activities dedicated especially to intercalibration and standardization of techniques of analysis, and to identify gaps in research and technology, to avoid overlapping research and to transfer to industry.
- 3) To reach a consensus on protocols and guidelines that permit the use of results in relational studies.
- 4) Maximize the dissemination of results.



Working groups



Chair: Dr. Juan F. Asturiano

ViceChair: Dr. Ákos Horváth

WG1. Techniques for evaluation of gametes quality

Leader: Dr. Julien Bobe (France); Vice-leader: Dr. Christian Fauvel (France)

WG2. Gametes storage and preservation

Leader: Dr. Elsa Cabrita (Portugal); Vice-leader: Dr. Vanesa Robles (Spain)

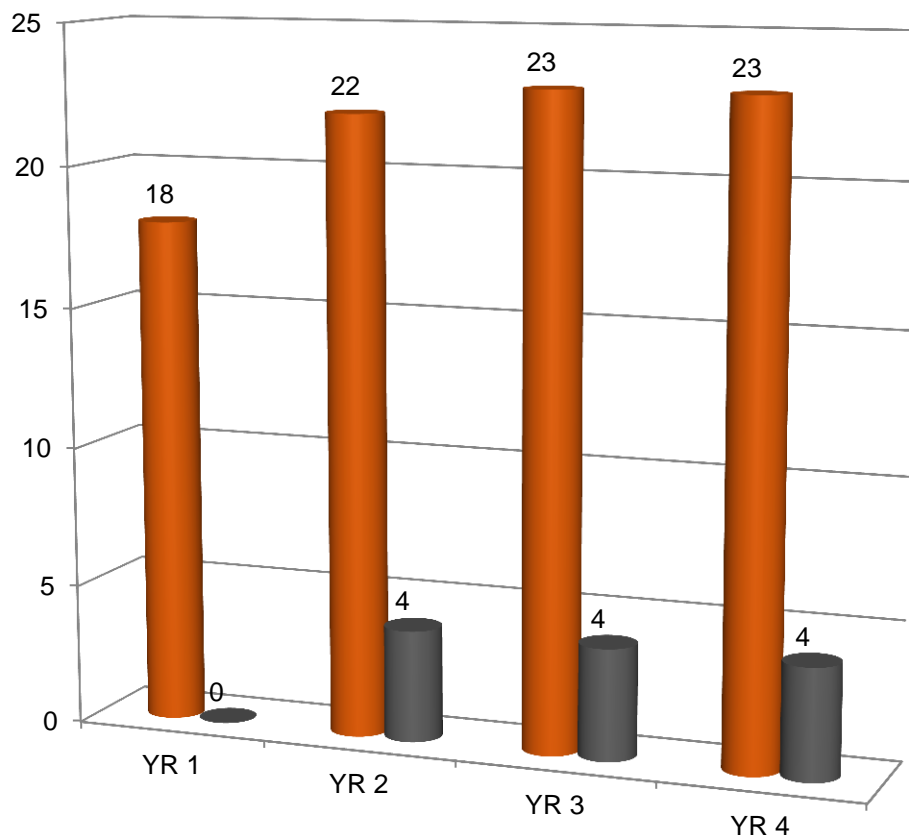
WG3. Basic and applied research on gametes biochemistry and physiology, including omics.

Leader: Dr Andrzej Ciereszko (Poland); Vice-leader: Dr. Catherine Labbé (France)

WG4. Organization of training courses, coordination meetings, and two editions of *International Workshop on Biology of Fish Gametes*

Co-leaders: Dr. Sonia Martínez-Páramo (Portugal) and Dr. Oliana Carnevali (Italy)

Action Parties

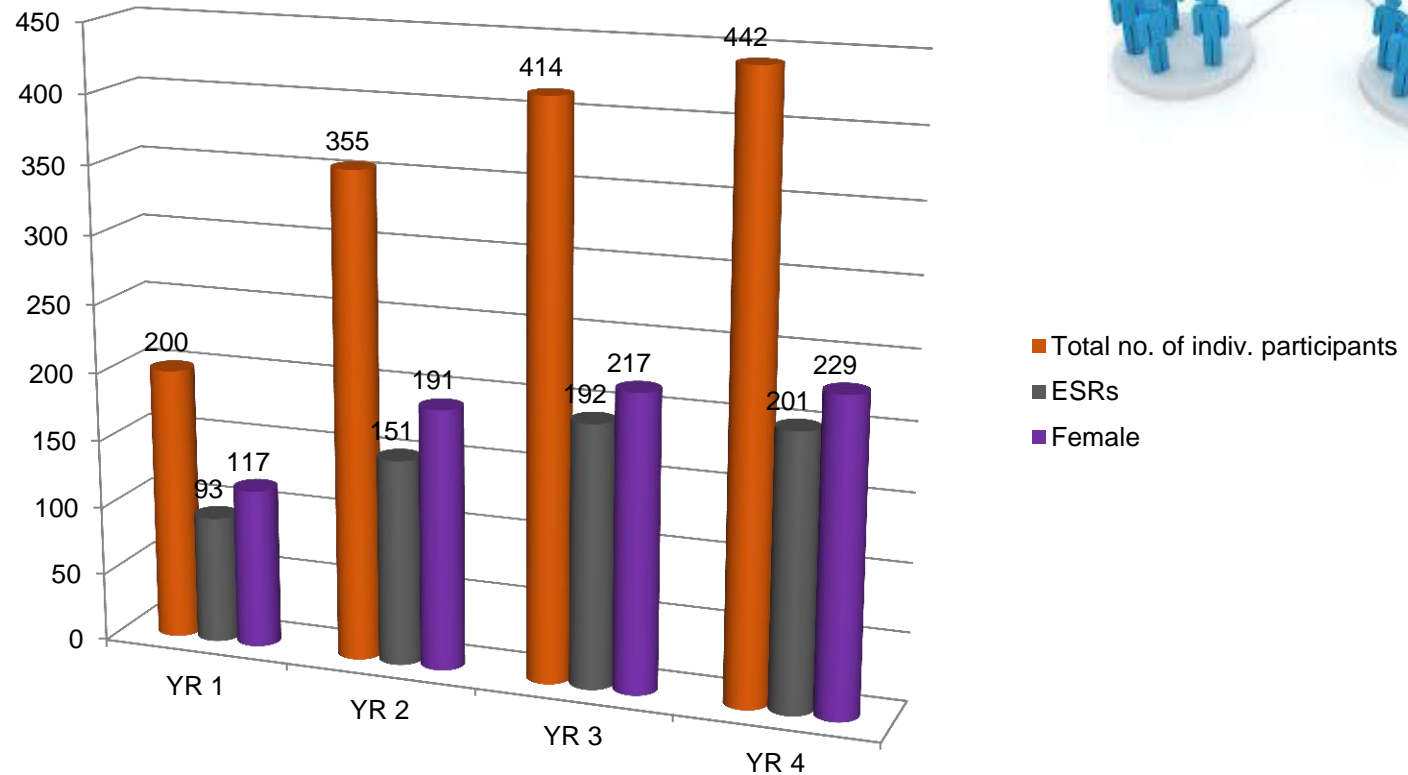


**27
countries**

■ Parties
■ Non-COST Countries

Brazil
Japan
Singapore
South Africa

Action participants



Ways to accomplish the objectives

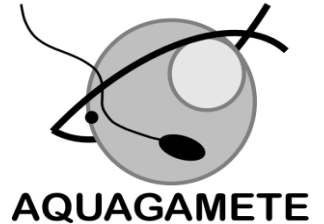
- Working group meetings
 - Training schools
 - Short-term Scientific Missions (STSM)
 - Workshops
 - Coordination meetings
-
- Funding: 181.000 € in the first grant period (15 months)
154.000 € in second grant period (12 months)
114.247 € in third grant period (11 months)
84.087 € in fourth grant period (7 months)

Total: 533.333 €





Results vs. Objectives



The main progress towards reaching the **Action scientific objectives** were:

- The **state of the art** on several aspects of aquatic species gametes is being reviewed (several review papers published and in redaction).
- **Intercalibration and standardization of techniques** of analysis were addressed in several of the **105 STSMs** supported.
- Standardization of CASA systems for sperm quality evaluation (involving PROISER, a software designing company)
- Development of protocols for PGCs transplantation (several spp)
- Development of new sperm cryopreservation protocols (i.e.: sturgeons) and standardization (after evaluation of epigenetic damages) of some others protocols (i.e.: European eel).
- Identification of main proteins in seminal plasma (several spp)
- Exploring the use of different additives (i.e.: anti-freezing proteins) to sperm freezing media

Significant Highlights in Science or Networking

- 7 Training Schools performed



1st TS: Cádiz (Spain), May 2013: Techniques for fish germline cryobanking



2nd TS: Rennes (France), Jun 2014: Molecular basis of fish gamete quality



3rd TS: Faro (Portugal), Jan 2015: Techniques in Reproductive Biology and Cryobanking



4th TS: Vodnany (Czech Republic), Mar 2015: Optical Microscopy and Image Analysis



5th TS: Valencia (Spain), Mar 2016: Cryopreservation of fish germ cells



7th TS: Olsztyn (Poland), Sep 2016: Fish proteomics

6th TS: Rennes (France), Jun 2016: Molecular basis of fish gamete quality: genomic tools



Significant Highlights in Science or Networking

- *4th and 5th International Workshop on the Biology of Fish Gametes*

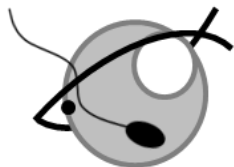


4th IWBFGB, Albufeira (Portugal, 2013)
118 participants from 24 countries; 107 communications.

5th IWBFGB, Ancona (Italy, 2015)
140 participants from 28 countries; 130 communications.



More in:



AQUAGAMETE



“AQUAGAMETE COST Action”
aquagamete.webs.upv.es

e-mail: aquagamete@gmail.com

