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This paper must be cited as:

Asturiano Nemesio, JF.; Horváth, Á.; Carnevali, O. (2017). 5th International Workshop on the Biology of Fish Gametes Evidences of a series growing in numbers and quality. General and Comparative Endocrinology. 245:1-4. doi:10.1016/j.ygcn.2017.03.004



The final publication is available at

<https://doi.org/10.1016/j.ygcn.2017.03.004>

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Additional Information

5th International Workshop on the Biology of Fish Gametes – Evidences of a series growing in numbers and quality

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Following the previous editions of this series of biennial Workshops, between the 6th and 11th of September 2015 the editors of this special issue had the opportunity to participate in the *5th International Workshop on the Biology of Fish Gametes* (<http://fishgametes2015.com/>). The meeting was held at the Polytechnic University of Marche (Ancona, Italy) and was organized by Prof. Oliana Carnevali and her team.

This 5th edition had the highest number of participants and communications recorded in this series of workshops, with 140 scientists from 28 different countries, who submitted a total of 47 abstracts for oral communications and 76 for posters (and presented during two poster sessions). The complete book of abstracts is available on-line: <http://aquagamete.webs.upv.es/abstracts-books/> (open access).

The present proceedings, published as a special issue of *General and Comparative Endocrinology*, includes a total of 16 papers, that were presented as oral communications during the Workshop.

The recently finished AQUAGAMETE COST Action (<https://aquagamete.webs.upv.es/>; *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*; COST Office FA1205) co-funded the Workshop, covering part of the costs for the attendance of researchers from the Action, invited speakers and early career investigators who participated actively during the sessions.

The next (6th) *International Workshop on the Biology of Fish Gametes* (<http://www.frov.jcu.cz/fishgametes2017/index.html>) will take place in České Budějovice and Vodňany (Czech Republic) between 4th and 7th of September 2017, coinciding with the 10th anniversary of the first edition organized there by the team of Prof. Otomar Linhart.

Below an outline is provided of the main ideas explored and the most important conclusions reached during the sessions included in the Workshop:

Spermatology: basic and strategic research leading to high quality sperm

Chairs: Viveiros A, Mylonas C.C.

Dr. Vanesa Robles opened the section with a superb communication entitled “MOLECULAR



BASIS OF SPERM QUALITY” where she concentrated on the importance of RNA-s in the control of sperm production and sperm quality, as well as on the new tools in molecular biology that assist in the determination of sperm quality. The session continued with 9 oral presentations and 23 Posters. Presentations concentrated on the effect of various factors (ions, environment) on sperm quality, proteomic changes in spermatozoa following activation, as well as specific traits of sturgeon sperm during maturation. The session also included presentations on methodological development such as the induction of spermiation using novel hormonal treatments, simplification of sperm quality determination using a portable flow cytometer and induced masculinization. Finally, an interesting talk addressed the hypothalamic regulation of gonadotropin release.

Anthropogenic contaminants in the environment: effects on fish gametes

Chairs: Weltzien F.-A., Kestemont P.

Dr Hamid Habibi opened the session with a fascinating presentation entitled “ANTHROPOGENIC CONTAMINANTS IN THE ENVIRONMENT: EFFECTS ON FISH GAMETES” focused on the risk posed by environmental contaminants on oocyte quality in aquatic organisms

The session continued with 4 oral presentations and 4 Posters. Of particular interest of this session were the presentations of the effects of pesticides on the gonadal development of embryos associated with changes in sex steroid profiles, and the effect of wastewater treatment plant effluents on the appearance of intersex, suggesting the use of novel biomarkers like 5S/18S rRNA index and tfiia.

Side Event

Chairs: Asturiano J.F., Vilella S.

A side event was organized during the workshop to address some of the key issues that are of interest for the scientific community, even if they were not part of any thematic session. This side event included a presentation by Dr. A. Borini on the use of zebrafish as a model in order to improve assisted reproductive technologies in human medicine. The second presentation was given by Prof. H. Rosenthal, stressing the importance of peer review and quality control in scientific publications and science in general. Finally, Dr. F.-A. Weltzien gave an introduction of the new Marie Slodowska Curie Action, the Innovative Training Network IMPRESS that addressed the issues related to the production of endangered freshwater fish species (eels, salmon and sturgeons) and contributes to the training of a new generation of scientists and professionals.

Oogenesis: the molecular basis behind oocyte growth, egg quality, fertilization and embryo development

Chairs: Lubzens E., Cancio I.

Dr. Chun Peng opened the session with an excellent overview entitled “PARACRINE REGULATION OF FOLLICLE DEVELOPMENT IN ZEBRAFISH” focused on local control of follicles development and showing that TGF- β superfamily plays important regulatory roles in fine-tuning the response of follicles to LH and MIH.

The session continued with 9 oral presentations and 17 Posters. Of especial relevance the results showing the different pattern of proteins uniquely detected in good versus poor quality eggs and the description of egg developmental competence. It was also shown that the stimulation by gonadotropin may mitigate the negative effects of cortisol in case of low release of some corticosteroid. The positive action of GnRH α injections on a higher recruitment of vitellogenic oocytes, and spawning were also described in different models showing the increase of the

potential annual fecundity of these species. Additionally, interesting data combining serum sex steroid and ultrasound images were presented to study fish gonadal development

Fish germ cell: from basic sciences to applied biotechnologies

Chairs: Cabrita E., Pšenička M.

Dr. Goro Yoshizaki opened the session with an extraordinary lecture entitled “PRODUCTION OF VIABLE TROUT OFFSPRING DERIVED FROM FROZEN WHOLE FISH” showing the possibility to produce functional eggs and sperm using type A spermatogonia (ASG) retrieved from frozen whole trout, suggesting that this method can be used to save endangered or extinct fish species if preserved in a deep freeze.

The session continued with 9 oral presentations and 9 Posters. Of relevance the results on the usage of early stages of germ cell for long term storage and restoration of genetic information of target species using surrogate production via close related species. Interesting the germ cell independent sex differentiation found in salmon gonads and the obtained “germ cell less” specimens by UV treatment. Techniques for obtaining gametes from surrogate species and for successful ablation of PGCs have been successfully reported.

Finally, in this symposium we had the best oral presenter (Dr. Andrea Miccoli) showing that the microbiota may affect normal maternal and zygotic control of the progeny.

Progress and perspectives on fish gametes cryopreservation

Chairs: Horvat A., Ciereszko A.

Dr Juan F. Asturiano opened the session with an overview titled: “PROGRESS, CHALLENGES AND PERSPECTIVES ON FISH GAMETE CRYOPRESERVATION” presenting the emerging biotechnological techniques for genome preservation and transplantation, and giving an insight on the perspectives for gamete preservation.

Later on, in this session several presentations were given on the latest development in sperm cryopreservation methodology and protocols, including those on sturgeons, salmonids, cyprinids, as well as tropical and neotropical species. Presentations also included topics on invertebrate sperm such as that of the Portuguese oyster.

Finally, one presentation was given on the topic of vitrification of fish sperm and one addressed the issues of cryopreservation of testicular cells in a cyprinid species.

Reproduction and development in ornamental fish and invertebrates

Chairs: Suquet M., Maradonna F.

Dr. Chiara Piccinetti opened the session with a remarkable overview titled: “MARINE ORNAMENTAL SPECIES CULTURE: THE PAST, THE PRESENT AND THE FUTURE”. Data on breeding and rearing protocols for most interesting marine ornamental species have been presented, and the possibility to use some of the studied species as laboratory experimental models was highlighted. The session continued with 5 oral presentations and 9 Posters.

In addition, an overview of the sequence of events leading to chemotaxis in spermatozoa of aquatic species, and the strategies employed to unravel fascinating and fundamental process called sperm guidance.

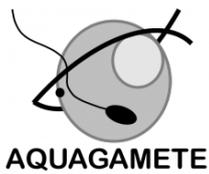
Epigenetic programming: from gametes to embryo

Chairs: Labbe C., Linhart O.

The session had 2 very interesting oral presentations, one evidencing the importance and the differences of miRNAs in eggs between different fish species. Few miRNAs have a conserved

expression among different species indicating that they might be very important for early embryo development.

The second presentation evidenced the epigenetic effects of low dose of bisphenol A (BPA) on *Danio rerio* oocyte growth and maturation. The negative effects of BPA on reproduction are due to an upstream capacity of such pollutant to deregulate the epigenetic mechanism.



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