

Project News

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AQUAEXCEL²⁰²⁰ is a €9.7 million European Union-funded Horizon 2020 Research Infrastructure project that aims to support the sustainable growth of the aquaculture sector in Europe. It does so by integration of the European aquaculture community, and providing it with crucial tools, facilities, and novel services to conduct advanced fish research.

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Welcome from the AQUAEXCEL²⁰²⁰ Coordinator



Dr. Marc Vandeputte
AQUAEXCEL²⁰²⁰ coordinator
French National Institute for
Agricultural Research (INRA)

AQUAEXCEL²⁰²⁰ started three and a half years ago, and all its components are in full operation now. The key offer to the wider research community, TransNational Access (TNA), is on track to achieve 150 projects at the end of the project in September 2020. We will be selecting this spring, with our Industry-Research Advisory Panel, successful projects to showcase in an industry-directed brokerage event

in Berlin during the next EAS conference in October 2019. Several of our partner infrastructures are already "sold out", but there remain many opportunities to perform excellent research in TransNational Access in our infrastructure network. Do not wait until the end of the project, because the offer will narrow down with less and less infrastructures available! Apply to the next call which will open in April, with June 7 as the next deadline, and join the growing group of happy TNA users, such as Catarina Moreira (p. 2/3 of this newsletter) and many others!

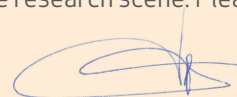
As our Joint Research Activities are in good progress to

provide new knowledge and tools for aquaculture research in the infrastructures, 2019 will also be the year where a lot of **AQUAEXCEL²⁰²⁰** training events will happen, both face-to-face and distance learning, as you will see in this newsletter. For the face-to-face training courses; do not wait until the last moment to register, we know that these courses are very much demanded, and not everyone will have the chance to have a seat there! Luckily, we also provide three distance learning courses, with unlimited participation! Please check out our full programme here.

If you have some aquaculture research infrastructures, and are not part of the **AQUAEXCEL²⁰²⁰** consortium, you can increase your visibility by registering here on our online map, which is the most complete and documented inventory of aquaculture research structures in Europe, with more than 100 entries.

Finally, I would like to thank all our **AQUAEXCEL²⁰²⁰** partners, the researchers of course, but also the research infrastructure managers and technicians, for their excellent spirit of cooperation and their dedication to make the AQUAEXCEL network a lasting key instrument on the European aquaculture research scene. Please go on, we need your enthusiasm!

Marc Vandeputte



News and Highlights

Transnational Access (TNA) Research Project in the Spotlight

As part of the highly successful TNA programme, which allows external teams to access **AQUAEXCEL²⁰²⁰** partners' facilities, Catarina Moreira, a PhD student from Normandy University (France) made use of the IATS-CSIC facilities in her Transnational Access (TNA) research project. She presented a poster on the results of her TNA project at the 31st Congress of the European Society of Comparative Physiology and Biochemistry held on the 9th - 12th September 2018 in Porto, Portugal.

The study entitled **"Effects of Xenoestrogen exposure during immune system ontogenesis of the European sea bass, *Dicentrarchus labrax*"** is a collaborative and multidisciplinary work involving several research groups from IATS (Fish Pathology group and Live preys in aquaculture, larviculture and ecotoxicology group), Centro de Ciências do Mar, Universidade do Algarve (Portugal) and the Department of Microbiology and Ecology, University of Valencia (Spain). This proved a stimulating TNA project, since it involved the

use of different IATS units and required fish being reared from very early stages until they reached the adequate size for the bacterial challenge. However, it was also a great opportunity for collaboration between the groups with the expertise available including pathology, microbiology, immunology, toxicology, ontogeny, etc.



Catarina Moreira and Senior researcher Inmaculada Varó (Supervisor of Catarinas TNA at CSIC) at the IATS facilities. Photo Credit: Ariadna Sitjà (CSIC)

News and Highlights

Short description of the project:

Oestrogens, such as Oestradiol, are well-known endocrine disruptors present in natural forms in fish farms because non-degraded hormones are released by the fish into the water body. Oestradiol is involved in the regulation of numerous physiological functions, including the modulation of immune system function and performance. As a result, this project explored the long-term consequences of exposure to environmentally relevant concentrations of oestradiol on fish immunocompetence.

European Sea Bass of 47 and 60 days of age (post-hatch) were exposed to 20 ng/L of oestradiol for 7 days and one month, respectively, in the ecotoxicology facilities of the IATS. Following each exposure, fish were sampled to assess the impacts of oestradiol on the ontogenesis of the thymus, the primary lymphoid organ responsible for lymphocyte T cell differentiation important in immunity. After a depuration phase, fish were transferred to the fish pathology unit of IATS and intracoelomically injected with *Vibrio harveyi*, and the cumulative mortality was recorded. This pathogen challenge was performed to determine if the previous exposure to oestradiol at different windows of the development of the fish was affecting their capacity to fight bacterial infection.

From the results of the bacterial challenge, it seems that oestradiol has immunostimulating or immunosuppressive effects depending on the critical window of development.

The relationship between these immunomodulatory effects, thymus development and associated peripheral T cells is currently being further investigated by gene expression and immunohistochemistry.

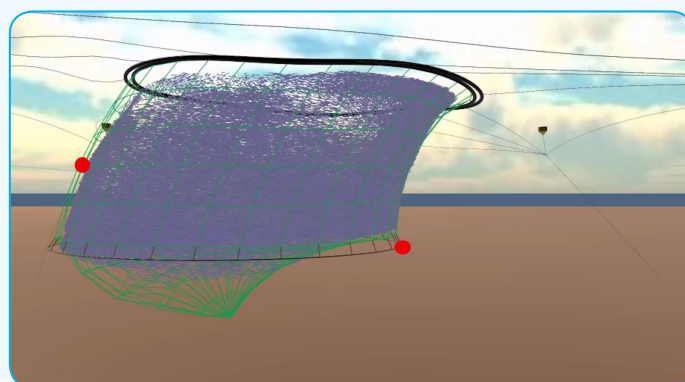
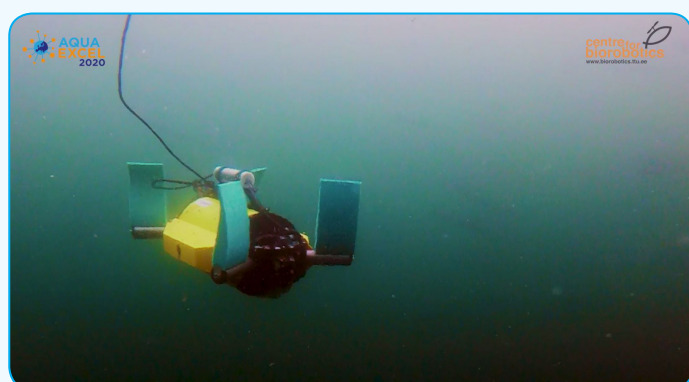
You can find more exciting stories about the interesting TNA research being carried out, on a range of aquaculture topics, as part of AQUAEXCEL²⁰²⁰ on the website at <https://aquaexcel2020.eu/transnational-access/tna-projects>.



From left to right: Matthieu Paiola (PhD student), Catarina Moreira (TNA researcher), Ariadna Sitjà-Bobadilla (senior researcher at IATS-CSIC and head of the Fish Pathology Group) and Thiphaine Monsinjon (PhD supervisor of Catarina) at the IATS entrance.

New Research on How Robots Can Increase Fish Welfare in Cages

The webzine Gemini recently published an article detailing interesting research carried out by SINTEF ACE which included the **AQUAEXCEL²⁰²⁰** TNA trials with the UCAT robot from Tallinn University. This new research looks at the interaction between fish and robots being used to collect high quality data, continually looking for holes in nets that can lead to fish escapes



and monitoring a range of things from temperatures to the fish's condition. Research shows that fish are more influenced by their surroundings than previously thought, therefore robots must be designed and operated in a way which does not disturb fish.

To read the article and watch a video explaining which shows the robot in action see - <https://gemini.no/2019/02/skal-sjekke-fiskevelferden-i-merdene-med-robotskilpadde/>

Screen grabs shown from video link

Past Events

AQUA2018 – Montpellier, France

AQUA2018, the yearly aquaculture event organised by the European Aquaculture Society (EAS), was held in the beautiful French city of Montpellier from the 25th – 29th August. The event highlighted the latest aquaculture research and innovation underpinning the continued growth of this exciting food production sector through scientific conferences, trade exhibitions, industry forums, workshops, student events and receptions. AquaTT promoted the **AQUAEXCEL²⁰²⁰** project and its materials at their exhibition booth while project coordinator Marc Vandeputte gave two talks/discussions. These included a discussion on the facilitation of scientific exchange for food and value creation in the Atlantic Ocean (EC workshop) and another on maximising the impact from aquaculture research as part of the EATIP EU Day 'Feed Globally – Produce Locally'.



Project coordinator Marc Vandeputte presenting at WAS2018 (credit Catherine Pons)

Keep an eye on the **AQUAEXCEL²⁰²⁰** website and Twitter for details on AQUA2019 in Berlin (Germany), where **AQUAEXCEL²⁰²⁰** will organise the next industry brokerage event!

AQUAEXCEL²⁰²⁰ Annual Meeting – Cartagena, Spain

The **AQUAEXCEL²⁰²⁰** annual meeting 2018 took place in Cartagena, Spain from the 3rd -5th October 2018. Partners came together in this fascinating historical city to discuss the overall progress of the **AQUAEXCEL²⁰²⁰** project and the direction of the project for the coming year. **AQUAEXCEL²⁰²⁰** partner the Instituto Español de Oceanografía (IEO) hosted the meeting and on the last day of the meeting attendees had the opportunity to visit their two Research Infrastructures based in the area: the 'Marine Aquaculture Plant (MAP)' and the 'Infrastructure for Controlling the Reproduction of Bluefin Tuna (ICRA)'. IEO's ICRA facility is one of a small number of facilities worldwide pioneering research into bluefin tuna farming. The species is notoriously difficult to farm due to the



Project partners group at annual meeting 2018 (credit Marieke Reuver)

low survival rate of their eggs, and their need for live fish feed. Partners got to see some of the young bluefin tuna in action and learn some of the latest aquaculture techniques.

Upcoming Events

AQUAEXCEL²⁰²⁰ IRAP Meeting, 26 April 2019

Members of the **AQUAEXCEL²⁰²⁰** Industry and Research Advisory Panel will meet in Paris on the 26th of April 2019. This is the 4th IRAP meeting and members will mainly focus on the new Knowledge Outputs from the project and the Outputs which are likely to be most effective for transfer

to the aquaculture industry at present will be discussed. In addition, this meeting will give IRAP members the opportunity to prioritise research areas for forthcoming Transnational Access (TNA) calls under the **AQUAEXCEL²⁰²⁰** project. Find out more about current and future TNA calls on the **AQUAEXCEL²⁰²⁰** website:
<http://aquaexcel2020.eu/index.php/transnational-access/call-access>.

Please support the promotion of the important activities of the **AQUAEXCEL²⁰²⁰** project, including the many free training courses and TNA opportunities, by distributing this newsletter among your colleagues, organisations and wider networks.

Upcoming Events

AQUAEXCEL²⁰²⁰ Industry Brokerage Event, October 2019

The next **AQUAEXCEL²⁰²⁰** industry brokerage event is to be held in Berlin at the AE2019 on the 9th October 2019. **AQUAEXCEL²⁰²⁰** industry brokerage events are aimed at creating a forum for engagement and exchange between researchers and potential beneficiaries of the research results, in particular industry stakeholders. Keep an eye on our website and Twitter for further info!

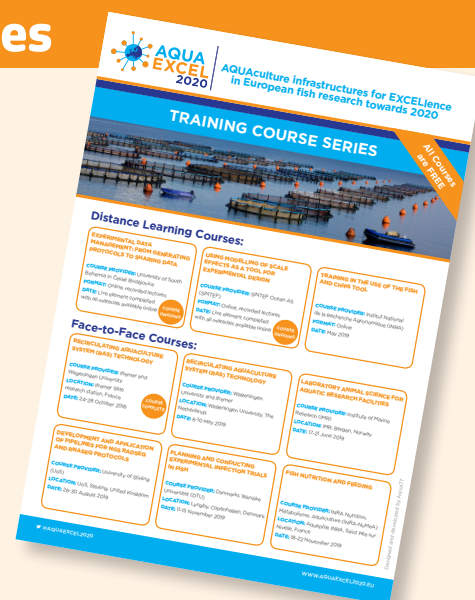


Upcoming AQUAEXCEL²⁰²⁰ Training Courses

AQUAEXCEL²⁰²⁰ training courses aim to educate a new generation of aquaculture researchers and industry stakeholders to develop new knowledge, skills and tools to advance innovation and sustainability in aquaculture. In total, nine state-of-the-art online and face-to-face training courses are being offered between April 2016 and September 2020.

Course registration and attendance is **FREE of charge**, but participants are expected to cover their own travel and subsistence costs. All courses are open to anyone interested in the subjects offered. For an overview of all courses, further details and registration guidelines please visit the **AQUAEXCEL²⁰²⁰** website: **www.aquaexcel2020.eu**. Registration for each course opens approximately two months in advance of the specified start date.

Details on ongoing and upcoming courses in 2019 are listed on the **AQUAEXCEL²⁰²⁰** website: **www.aquaexcel2020.eu/training-courses/aquaexcel2020-training-courses**.



Transnational Access (TNA)

TNA Program

A defining feature of **AQUAEXCEL²⁰²⁰** is its TNA programme, allowing external teams to access the partners' infrastructures via submission of research proposals, which are funded based on the evaluation of an independent selection panel. Access is offered to 39 unique research infrastructures of participating institutes, with experimental costs, travel and subsistence supported by **AQUAEXCEL²⁰²⁰**.

TNA – Calls for Access

AQUAEXCEL²⁰²⁰ calls for TNA are advertised on a regular basis. Applications are encouraged from European scientists who wish to avail of facilities available at any of the participating 39 aquaculture research infrastructures associated with the project. For more information, see: **www.aquaexcel2020.eu**

Table 1. Upcoming calls for access:

Call no.	Activity	Date
14	opens	29 April 2019
	deadline	07 June 2019
15	opens	29 July 2019
	deadline	13 September 2019
16	opens	28 October 2019
	deadline	06 December 2019

TNA – Facilities under the Spotlight

TNA Facility: Parque Científico Tecnológico Marino (PCTM-ULPGC)

Location: Taliarte, Telde, Gran Canaria (Canary Islands)

Website: <http://www.giaqua.org> or <http://ecoaqua.ulpgc.es/en>

Contact: Juan Manuel Afonso López

Email: juanmanuel.afonso@ulpgc.es

Located in Taliarte, Gran Canaria (Canary Islands, Spain), PCTM-ULPGC is a research building and European Excellence Aquaculture Complex linked to the University of Las Palmas de Gran Canaria (ULPGC). Known internationally for its research and development in marine science, and for the high quality of



Parque Científico Tecnológico Marino de Taliarte © ULPGC

its research facilities, it is the ideal place for researchers, not only for its facilities, but also for its climate, quality of life and available services.

The PCTM building (6,000m²) has eight specialized wet labs which are e-infrastructures with monitoring and control systems (MIRANDA) for flow control, temperature, oxygen (including an emergency system), photoperiod, feeders and self-feeders. The PCTM is also supported by the University of Las Palmas de Gran Canaria (ULPGC), through the Aquaculture Research Group (GIA-ECOQUA) which has several dry labs for Biochemistry and Chromatography, Marine Genetics, Histology and Health, Quality, Bacteriology and Virology.

The PCTM facility has great logistical support in terms of administration, technicians for automatisms and fish rearing, postdoctoral and senior researchers in genetics, nutrition, pathology, stress, fish and meat quality, and new species. It is also ideally located next to the port of Taliarte, the National Bank of Algae and the Canary Islands Institute of Marine Sciences.

The ULPGC promoted the creation of a centre in Taliarte to promote research in marine sciences, and most importantly to create synergies that allow for multidisciplinary work between different research groups, as well as the creation of seed companies. All of this is part of the Tricontinental Atlantic Campus programme, which is considered a Campus of International Excellence at the European Regional Level.

Services offered by the infrastructure

- In its **Aquaculture Research and Training Facility** (990m²), the marine fish rearing area has three tanks of 2000 L, 43 tanks of 1000 L and 73 tanks of 500 L. Its Cephalopod rearing area has six compartmentalized tanks of 2000 L for nutritional studies on these species. The Abalone rearing area has tanks for maintenance of broodstock, an area of induction to spawning, larval rearing tanks, and breeding tanks for post-larvae. Live foods (microalgae and macroalgae) are produced in-situ, in tanks designed to produce benthic diatoms and biofiltration units suitable to produce macroalgae. There are also three individual rooms of larval breeding, each equipped with a system of independent mechanical filtration (1 µ), additional sterilization by UV, photoperiod and feeders, automatic control systems.
- In the **Warm Water Species Selection Unit (WWSSU)**, the GIA has carried out selection programmes on three species of marine fish: sea bream (*Sparus aurata*), red sea bream (*Pagrus pagrus*) and meagre (*Argyrosomus regius*). The Warm Water Species Selection Unit (WWSSU) offers several tanks, all of them equipped with automatic feeders, automatic control of photoperiod and water renewal, and temperature, oxygen and pH control. There are two circular tanks available of 2 m³, 24 circular tanks of 1 m³ and 56 circular tanks of 0.5 m³.
- The **Marine Biosecurity Station (MBS)** was designed for experiments of bioassays, including pathology. It is composed of three independent RAS rooms, fully equipped to test up to three pathogens either in larvae, juveniles, or broodstock of marine fish, simultaneously. Each RAS includes 18 tanks of 500 L, each equipped with automatic water renewal, oxygen, temperature, pH, and feeding system.
- The **Feed and ingredients-additives Testing Unit (FITU)** includes one laboratory equipped for the processing of ingredients, one laboratory equipped for the development of diets, two series of 15 tanks for digestibility trials (200-500 L), three rooms with 170 tanks of 100, 200, 500 and 1000 L for marine fish rearing trials, and two lines of tanks to perform commercial-scale studies, equipped with automatic feeders and collectors of leftovers (the ingestion control). Rearing tanks are available to test diets or ingredients in larvae, juveniles, or broodstock of marine fish species. Photoperiod control is available in tanks of 100, 200 and 500 L.
- The facilities of the Aquaculture Research Group (GIA-ECOQUA) also include a space in Taliarte Harbour for **floating cages**, as well as collaborations with fish farms, having a total of 5500 m³ for rearing experiments at industrial level. There are two circular flexible floating cages for marine fish, two rectangular floating cages for marine fish, two rectangular floating cages for cephalopods and one rectangular benthic cage for cephalopods.

Fish'n Co.

Fish profile

The Atlantic salmon (*Salmo salar*) is a species of ray-finned fish in the family Salmonidae. They are the largest and only "salmon" species in their genus, *Salmo*, which primarily includes the trout species. The species range extends across the North Atlantic from Europe (Portugal to Russia) to North America (Cape Cod to Labrador). As an anadromous species, they have numerous life stages in both fresh and salt water environments. Atlantic



Atlantic salmon © Peakpx

salmon spend their juvenile years (2-5 years as "fry" and then "parr") in freshwater feeding on insect larvae and small fish until they undergo seawater adaptation and become "smolts" migrating downriver to sea, heading for deep water feeding grounds to grow and mature. They spend up to four years in

deep-sea feeding grounds feeding on pelagic species such as herring, sprat and squid. At the onset of maturation, fish cease feeding, and return to their rivers of origin to spawn in upstream gravel beds known as "redds". Wild freshwater smolts are normally around 20-30 g while fish in seawater can reach large sizes but are typically 8-13 kg when they start their spawning migration.

A long-held staple of human diets across the North Atlantic, wild Atlantic salmon have been heavily fished throughout their range for centuries. However, due to declining wild stocks, farmed Atlantic salmon now constitutes >90 percent of the farmed salmon market, and >50 percent of the total global salmon market, exceeding 1,000,000 tonnes worldwide.

Atlantic salmon aquaculture first began in the 19th century in the UK in freshwater as a means of stocking waters with parr to enhance wild returns for anglers. However commercial aquaculture including sea cages was first implemented in the 1960s in Norway to raise Atlantic salmon to marketable size. The early Norwegian success reflected the excellent deep sheltered sites available, favourable hydrographic conditions (stable temperatures and salinities), natural salmon strains that mature late, and heavy governmental support and investment. This prompted the development of salmon aquaculture in Scotland, Ireland, the Faroe Islands, Canada, the USA, Chile and Australia.

Source - http://www.fao.org/fishery/culturedspecies/Salmo_salar/en

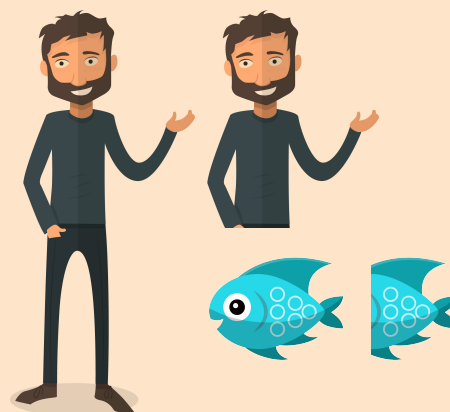
Brain Teaser: Fish Quiz

If a man and a half can catch a fish and a half in a day and a half...

How many fish will six men catch in seven days?

Send your answers to marieke@aquatt.ie.

The first correct answer we receive will feature in our next AQUAEXCEL²⁰²⁰ newsletter!



ANSWER TO QUESTION IN NEWSLETTER 5:

Harry caught the tuna at 9:30. Sam caught the bass at 9:00. Alicia caught the mackerel at 8:45.

Satisfy your Tastebuds!

Tasty Recipe – Super healthy salmon burgers

INGREDIENTS (serves 4)

- 4 boneless, skinless salmon fillets, about 550g/1lb 4oz in total, cut into chunks
- 2 tbsp Thai red curry paste
- Thumb-size piece fresh root ginger, grated
- 1 tsp soy sauce
- 1 bunch coriander, half chopped, half leaves picked
- 1 tsp vegetable oil
- Lemon wedges, to serve

For the salad

- 2 carrots
- Half large or 1 small cucumber
- 2 tbsp white wine vinegar
- 1 tsp golden caster sugar

PREPARATION

1. Tip the salmon into a food processor with the paste, ginger, soy and chopped coriander. Pulse until roughly minced. Tip out the mix and shape into four burgers. Heat the oil in a non-stick frying pan, then fry the burgers for 4-5 mins on each side, turning until crisp and cooked through.
2. Meanwhile, use a swivel peeler to peel strips of carrot and cucumber into a bowl. Toss with the vinegar and sugar until the sugar has dissolved, then toss through the coriander leaves. Divide the salad between four plates. Serve with the burgers and rice.



© BBC GoodFood



Marc's Wine Tip: A young, semi-dry Gewurztraminer from Alsace in France will perfectly match the sweet-sour curry, ginger and coriander spice mix, with its citrus, rose and litchi perfumes and its full aromatic body.

Recipe thanks to BBC Good Food: <https://bit.ly/2l743Ka>

AQUAEXCEL²⁰²⁰ Recent Publications

Veron, V., et al. DNA methylation of the promoter region of *bnip3* and *bnip3l* genes induced by metabolic programming. *BMC Genomics* (2018), 19:677. <https://doi.org/10.1186/s12864-018-5048-4>

Maouche, A., et al. New insights into the evolution, hormonal regulation, and spatiotemporal expression profiles of genes involved in the *Gfra1/Gdnf* and *Kit/Kitlg* regulatory pathways in rainbow trout testis. *Fish Physiol Biochem* (2018) 44: 1599. <https://doi.org/10.1007/s10695-018-0547-4>



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