

Project News

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AQUAEXCEL²⁰²⁰ is a €9.7 million research infrastructure project, funded under the EU's Horizon 2020 programme. The project aims to support the sustainable growth of the aquaculture sector in Europe through the integration of the European aquaculture community, and provides it with crucial tools, facilities, and novel services to conduct advanced fish research.



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WELCOME TO ISSUE 4 OF THE AQUAEXCEL²⁰²⁰ PROJECT NEWSLETTER

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AQUAEXCEL²⁰²⁰ News and Highlights

Transnational Access success stories: A platform for assessing health and welfare of the main fish species in European aquaculture

During 2017, the analytical platform of the Spanish National Research Council (CSIC) at the Institute of Aquaculture Torre de la Sal (IATS-ANA) hosted three AQUAEXCEL²⁰²⁰ Transnational Access (TNA) projects. They covered different topics of interest for three important farmed fish: Atlantic salmon, gilthead sea bream and European sea bass. The IATS-ANA platform, managed by the Nutrigenomics and Fish Endocrinology Group of IATS (www.nutrigroup-iats.org), provides simultaneous gene expression profiling of candidate genes and takes advantage of reliable and curated genetic information for the three fish species.



CSIC laboratory analysis. © Jaume Pérez Sánchez

PhD student Mar Marcos-López (Galway-Mayo Institute of Technology, Ireland) used the platform to assess the effects of experimental and natural infections with *Neoparamoeba perurans*, a primary cause of amoebic gill disease (AGD) in the gills of Atlantic salmon. The study highlighted an expression increase of genes related to mucus production and a decreased expression of those genes related to immune responses in the gills of AGD-affected fish. The same analysis demonstrated the effectiveness of freshwater treatment against the parasite, with a restoration of the host's immune, mucosal, structural and anti-oxidant status.



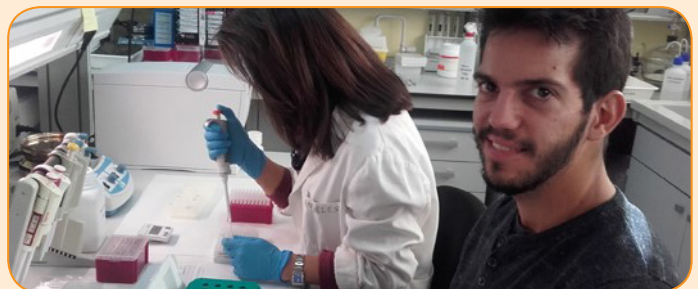
Mar Marcos-López (first on left) with CSIC colleagues. © Jaume Pérez Sánchez

PhD student Isabel Forner-Piquer (Marche Polytechnic University, Ancona, Italy) assessed the effects of two contaminants from plastic manufacturing, Bisphenol A and Diisononyl-phthalate (DiNp), on the metabolism of gilthead sea bream. Her research examined genes associated with obesity, reproductive capacity and central nervous system functioning to evaluate the effects of these contaminants in gonads, the brain and the liver. Initial results have highlighted the adverse effects of these contaminants on the brain's regulation of appetite, and a stimulation of gene expression on central nervous system components that increased lipid accumulation in the livers of gilthead sea bream.



Isabel Forner-Piquer (left) with CSIC colleagues. © Jaume Pérez Sánchez

PhD student Renato Ferraz (CIIMAR, Portugal) addressed the effects of dietary seaweed (*Gracilaria sp.*) supplementation on the response of European sea bass to a bacterial challenge involving lipid metabolism, mitochondrial function, oxidative stress and immune response, amongst other processes. Results on immune tissues (head kidney and spleen) evidenced the activation of the immune system in *Gracilaria*-supplemented feeds and a better immune profile when facing a bacterial infection. Additionally, dietary *Gracilaria* induced adaptive responses in the liver which reduced the risk of oxidative stress. The results support the use of seaweeds as promising fish feed additives.



Renato Ferraz with CSIC colleague. © Jaume Pérez Sánchez

The IATS-ANA platform has thus been revealed as a versatile molecular tool for the assessment of fish health and welfare in a wide range of experimental models and processes for European farmed fish.

Upcoming Events

AQUA 2018 takes place from 25-29 August 2018 in Montpellier (France) and aims to celebrate aquaculture as one of the most important food production sectors globally. The event is expected to be one of the largest aquaculture events ever hosted, and will comprise a scientific conference, trade exhibition, industry forums, workshops, student events and receptions. The event is expected to attract participants from over 60 countries and is co-organised by the European Aquaculture Society (EAS) and the World Aquaculture Society (WAS) every six years.

Sessions and workshops at AQUA 2018 will cover all aspects of global aquaculture and are expected to include the following themes amongst others: Sustainable Aquaculture Production & Management Systems; Aquaculture and Human Health; Animal Health and Welfare; Targeted Aquaculture Species; Genetics; Nutrition, Feeds and Feed Additives; Aquaculture Place in Society, and; Aquaculture, Environment, Biodiversity and Climate Change. Several **AQUAEXCEL²⁰²⁰** partners will present project results and promote the importance of the project at the event. Further information on the conference, including registration deadlines and details can be found here: bit.ly/2FNDW9t.

AQUAEXCEL²⁰²⁰ Past Events

Industry Brokerage

The first **AQUAEXCEL²⁰²⁰** industry brokerage event "From Research Innovation To Industry Application" was held as part of the Aquaculture Europe 2017 Industry Day. The event was jointly hosted by the European Aquaculture Technology and Innovation Platform (EATiP) and AquaTT in Dubrovnik (Croatia) on 19 Oct 2017. **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.

The core part of the brokerage event consisted of three presentations on selected outputs from **AQUAEXCEL²⁰²⁰**. Prior to the event, the outputs presented were selected by the project's Industry and Research Advisory Panel (IRAP) as being high-potential outputs for the aquaculture industry in Europe.

The IRAP consists of industry experts, **AQUAEXCEL²⁰²⁰** work package leaders and affiliates of the **AQUAEXCEL²⁰²⁰** project. Topics presented on the day included: Insect Meal to feed European Sea Bass (Prof. Laura Gasco); A Toolset to Assess Intestinal Health Benefits of Feed Additives (Prof. Jaume Pérez-Sánchez); and 3D Fish – 3D Monitoring of Fish for Aquaculture (Dr. Petr Čísař).

The event was well attended, with 54 people from 22 different countries present from a broad range of organisations, including private companies, universities and research institutes. A high proportion of individuals in attendance suggested that each of the three outputs had relevance to their work or company. Research is continuing on enhancing the features of each of the three outputs for potential transfer to industry. Further information on each of the three outputs can be found in the Project Catalogues section on the **AQUAEXCEL²⁰²⁰** website: www.aquaexcel2020.eu/about/results.



Presentation by Prof. Laura Gasco at the AQUAEXCEL²⁰²⁰ first brokerage event in Dubrovnik (Croatia). ©AquaTT

AQUAEXCEL²⁰²⁰ Past Events

Industry and Research Advisory Panel Meeting

Members of the **AQUAEXCEL²⁰²⁰** IRAP met in Brussels (Belgium) on the 18-19 April 2018 to discuss the latest outputs of the **AQUAEXCEL²⁰²⁰** project. The panel discussed and agreed on those project outputs which are likely to be most effective for transfer to the aquaculture industry at present. The



IRAP members discussing promising **AQUAEXCEL²⁰²⁰** outputs in Brussels, April 2018.
©AquaTT

selected outputs offer promising potential in several important aquaculture areas. These include: modelling of fish growth, feed intake and waste production in aquaculture production facilities; the ongoing development of a miniature biosensor for monitoring overall fish performance and well-being; and assessing the most effective handling procedures for reducing acclimation time in Atlantic salmon aquaculture production. Researchers involved in these outputs will now work towards further enhancement of the research outputs.

In addition to discussions on selected outputs, IRAP members also agreed on prioritised 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.**

AQUAEXCEL²⁰²⁰ Transnational Access (TNA) Programme

TNA Programme

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**. **AQUAEXCEL²⁰²⁰** TNA calls are advertised on an ongoing basis. Further information can be found here: www.aquaexcel2020.eu/transnational-access/call-access

Call for Access in 2018 - 2019:

Call #	Activity	Date
11	opens	06 July 2018
	deadline	10 August 2018
12	opens	12 October 2018
	deadline	16 November 2018
13	opens	28 January 2019
	deadline	08 March 2019
14	opens	29 April 2019
	deadline	07 June 2019

**Do you have a project idea but need help to find the right facility?
Please contact the **AQUAEXCEL²⁰²⁰** orientation committee at aquaexcel-OC@inra.fr**

TNA – Facilities under the Spotlight

TNA Facility: Centre of Marine Sciences (CCMAR), Portugal

Location: Faro, Portugal

Website: www.ccmар.ualg.pt

Contact: amamaral@ualg.pt

The Centre of Marine Sciences (CCMAR) is a non-profit organisation located on the Gambelas Campus of the University of Algarve, dedicated to Research and Development in the Marine Sciences. CCMAR laboratories are well equipped for biological research at various levels, including biochemistry, molecular biology, genetics, physiology, behaviour and ecology.

The centre consists of 4 hectares of a salt pan and marsh system and includes both indoor and outdoor tank facilities, which allow for the provision of tailored experimental setups under various conditions. Specifically, 300 m² of indoor tank facilities offer installations for phyto- and zooplankton culture. The facility also provides both wet and dry laboratories and isolated rooms for controlled experiments e.g. with larvae and juveniles of several fish species allowing for nutritional, behavioural, general and specific physiological experimentation. In addition, the 900 m² outdoor area offers use of larger volume tanks.

CCMAR provides access to researchers requiring tanks of different capacities: 100L (24); 500L (20); 1000L (21); 3000L (3); 9000L (5). All tanks are set in flow-through systems supplied with filtered natural sea water collected in the nearby lagoon channel. The facility offers 24 100L tanks with three different levels of CO₂ for simulating oceanic acidification scenarios. Tanks and space can be adapted to fulfil specific experimental

needs based on temperature control, photoperiod, light intensity or salinity requirements. Moreover, CCMAR can provide access to some fish species upon request, including sole (*Sole senegalensis*), gilthead seabream (*Sparus aurata*) and European seabass (*Dicentrarchus labrax*).



Some of the aquaculture facilities at CCMAR ©AquaTT

Fish'n Co.

Common/European Carp (*Cyprinus carpio*)

Common carp or European carp (*Cyprinus carpio*) is part of the Cyprinidae fish family, the largest vertebrate animal family, consisting of over 370 genera and comprising approximately 3,000 species. The common carp first originated in the Caspian Sea, before migrating naturally to the Black and Aral Sea basins. However, the Romans were the first Europeans to farm the species, and the spread of common carp throughout Europe, Asia and America is therefore a consequence of human practices.



Scaled carp (top); Mirror carp (bottom) © Marc Vandeputte

There are two primary scale variants of common carp: the (wild) scaled carp and the mirror carp. The scaled carp has a regular cover of small scales, while the mirror carp is mostly transparent with a few large scales. The mirror carp is the result of a single mutation, which was selected during the domestication of the species.

Historically, the fish was considered as a form of good luck and is a valuable commercial fish species in Europe and Asia. However, it is classified as a destructive invasive species in some of the countries where it has been introduced due to the threats it poses to native fish stocks and its damaging effects on fragile ecosystems.

Common carp is one of the most widely cultivated and commercially important freshwater fish species globally. Aquaculture production of common carp is primarily centred in Asia, with approximately 90% of global production occurring in China. The annual tonnage of common carp produced in China alone exceeds the weight of all other fish, such as trout and salmon, produced by aquaculture worldwide. The fish is consumed in many parts of the world, both as a wild and a farmed fish species. For instance, it is widely consumed in Central Europe, and is often eaten as part of celebratory feasts. Check out the recipe on the next page to try it for yourself.

Fish Quiz

Two mothers and their two daughters go fishing together. They each catch one fish and place it in a box. They do not lose any fish but when they return home they only have three fish in the box. How is this?

Send your answers to darren@aquatt.ie. The first correct answer we receive will feature in our next **AQUAEXCEL 2020** newsletter!





© Pure Ella

Satisfy your Tastebuds!

Tasty Recipe – Pan-fried carp with seasonal vegetables

INGREDIENTS (serves 4)

- 4 tbsp olive oil
- 1 large red onion, diced
- 2 sticks celery, finely chopped
- 200g carrot, coarsely grated
- 100g parsnip, coarsely grated
- 1½ tsp sea salt
- ¾ tsp freshly ground black pepper
- 3 tbsp tomato purée/harissa (if you like it spicy)
- ½ tsp sweet/smoked paprika
- 100ml passata
- 1 tsp allspice
- 2 bay leaves
- 2 carp fillets, skin on and boned
- 1 tbsp flour
- 1 lemon, juiced
- 2 tbsp parsley, finely chopped
- 1 tbsp dill, finely chopped

PREPARATION

1. Heat 2 tbsp olive oil in a heavy bottomed saucepan over a medium heat. Add the onion and cook for 5 minutes until slightly softened. Add the celery, carrot and parsnip, 1 tsp salt and ½ tsp freshly ground black pepper. Cook on a low heat for a further 15 minutes until very soft. Add the tomato purée/harissa, paprika and a splash of water with the passata, ground allspice and bay leaves and cook for a further 20 minutes. It should thicken but the vegetables should all be very soft.
2. Lightly season the carp fillets with the remaining salt and pepper and dust with flour. Heat the remaining olive oil in a large frying pan over a medium heat. Put the fillets in the pan skin side down and cook for 4-5 minutes, or until the skin is golden. Turn the fish over and continue to cook for 2 minutes until cooked through. Squeeze over half the lemon juice.
3. Just before serving, stir most of the dill and parsley through the sauce, reserving some to garnish. Stir through the remaining lemon juice and season to taste.
4. Serve the fish on top of the vegetables. This can be eaten straight away but can also be stored in the fridge overnight and eaten at room temperature the next day.



Tip: Change the vegetables depending on what is in season or what you prefer!

Enjoy with a good Czech beer, such as Budweiser Budvar, which has a light, refreshing taste and a mild bitterness (suggested beer pairing is compliments of AQUAEXCEL²⁰²⁰ coordinator and beer expert, Marc).

See more at: <https://bit.ly/2G1DnV7>

AQUAEXCEL²⁰²⁰ Recent Publications

Forner-Piquer, I., Mylonas, C.C., Calduch-Giner, J., Maradonna, F., Gioacchini, G., Allarà, M., Piscitelli, F., Di Marzo, V., Pérez-Sánchez, J., Carnevali, O. (2018). Endocrine disruptors in the diet of male *Sparus aurata*: Modulation of the endocannabinoid system at the hepatic and central level by Di-isononyl phthalate and Bisphenol A. *Environment International*. 119, 54-65. DOI: <http://doi.org/10.1016/j.envint.2018.06.011>.

Hu, H., Liu, J., Plagnes-Juan, E., Herman, A., Leguen, I., Goardon, L., Geurden, I., Panserat, S., Marandel, L. (2018). Programming of the glucose metabolism in rainbow trout juveniles after chronic hypoxia at hatching stage combined with a high dietary carbohydrate: Protein ratios intake at first-feeding. *Aquaculture*. 488, 1-8. DOI: <http://doi.org/10.1016/j.aquaculture.2018.01.015>.

Pérez-Sánchez, J., Kaushik, S., Corraze, G., Izquierdo, M., Torrecillas, S., Sitjà-Bobadilla, A., Estensoro, I., Piazzon, M.C., Conceição, L.E.C., Calduch-Giner, J., Nàcher-Mestre, J., Afonso López, J.M. (2018). *Fish Nutrition Research: Recent Advances and Perspectives*. CSIC: Spain. Available at: http://nutrigrup-iats.org/files/Training_course_on_fish_nutrition_research.pdf.

Glover, K.A., Hansen, T., Besnier, F., Solberg, M.F., Fjellidal, P.G., Eide, A.G.S., Dalvin, S., Nilsen, F. (2017). Cloned and outbred Atlantic salmon display equal parasite dispersion when infected with the salmon louse. *Aquaculture*. 480. DOI: <http://doi.org/10.1016/j.aquaculture.2017.08.008>.

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Liu, J., Dias, K., Plagnes-Juan, E., Veron, V., Panserat, S., Marandel, L. (2017). Long-term programming effect of embryonic hypoxia exposure and high-carbohydrate diet at first feeding on glucose metabolism in juvenile rainbow trout. *J. Exp. Biol.* 220, 3686-3694. DOI: <http://dx.doi.org/10.1242/jeb.161406>.



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