



UMR1313

## GenAqua

### Animation

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### Overall activity

Mixing genetics and physiology to obtain robust and efficient fish in various and fluctuating environments

Since 2016, we also work on the bee.

### Outstanding results -

Estimation of economic and environmental breeding values for selected traits

- Genetic architecture of key traits for sustainable aquaculture: knowledge production and transfer to stakeholders.

- Coordination of the European infrastructure project AQUAEXCEL2020

### Paris-Saclay University member

université  
PARIS-SACLAY

### Doctoral schools : ABIES

(Agriculture, Food Science, Biology, Environment, Health)



SAPS Member  
(Animals Sciences  
Paris-Saclay)

## Animal Genetics and Integrative Biology (GABI) Genetics and aquaculture

### Scientific questions

#### 1- Genetic architecture of efficiency traits

We focus on efficiency traits that will improve the economic pillar of sustainable development but also environmental and societal pillars.

##### - Feed efficiency

*Linked projects: H2020 Embric, PerformFish, AqualImpact.*

##### - Disease resistance: genetic and functional bases of viral and bacterial disease resistance.

*Linked projects: H2020 Aqua-Faang ; FEAMP SG-Truite and Gènesea.*

##### - Fatty acid profile in muscle

*Linked project: FEAMP OmegaTruite*

##### - Resource allocations: interactions between efficiency traits and functional traits (health, immunity, stress response, behaviour, reproduction ...). Theme being developed.

#### 2- Physiology and genetics of responses to environmental and rearing stress

We combine physiological, behavioral, genetic and epigenetic approaches to study responses to different stressors.

##### - Adaptation to new diets, especially plant-based diets.

*Linked projects: FUI Ninaqua, FEAMP AntiOb*

##### - Adaptation to temperature, environment sensitivity and epigenetics, genetic variability of epigenetic marks.

*Linked projects: H2020 AQUAEXCEL2020, FEAMP Epicool.*

##### - Long-term consequences of early events: consequences, including transgenerational, of exposition to thermal stress or pollutants.

*Linked projects: Sushifish, Ephemare, PlasticSeine*

##### - Genetic and environmental determinism of sex: genetics of spontaneous maleness (trout), identification of neo-males with genomic predictions ; links sexual phenotype-expression/modification of candidate genes or epigenetic marks (seabass)

*Linked projects: FEAMP Neobio, 3S, ERANet Sushifish, H2020 AQUAEXCEL2020*



Centre

Île-de-France - Jouy en Josas - Anthony



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Suivre nos actualités

<https://www6.jouy.inrae.fr/gabi>

Twitter : @UMR\_GABI



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#### Research facilities:

- INRAE experimental facilities: PEIMA (Sizun) and IERP (Jouy en Josas), Ifremer Palavas
- Original genetic resources developed by the team.
- Bioinformatics team of GABI, Sigene and genomics core facilities: GeT-Plage, @BRIDGe, Gentyane

#### Collaborations and partners

Professionnal partners for fish and bee selection: SYSAAF (French syndicate of poultry and fish breeders), ITSAP- Institut de l'Abeille (bee institute), breeders  
INRA scientists, specialists of biological functions (nutrition, physiology, immunology ... )  
Ifremer, CIRAD  
Wageningen University, South Bohemia University (Czech Republic), Luke (Finland)

### 3 – Management of selected populations:

- **Genomic selection:** interest and optimisation of genomic selection for different traits and different species (trout, seabass and seabream)  
*Linked projects: FEAMP SG-Truite and GèneSea, two 'CIFRE' PhD*
- **Modelling of breeding programs for bees:** setting up efficient breeding programs to improve production (royal jelly, honey), bee behavior and health.  
*Linked project: Beestrong*
- **New technologies for reproduction:** transplantation of stem cell and cryoconservation.  
*Linked project : FEAMP Biogerm*

We are also still developing genomic resources.

#### Expertises :

Aquaculture ; Quantitative genetics ; Modeling ; Physiology ; Behaviour ; Selection ; Trout ; Seabass ; Seabream ; Carp ; Bee.

Recent publications: All publications : <https://www6.jouy.inrae.fr/gabi>

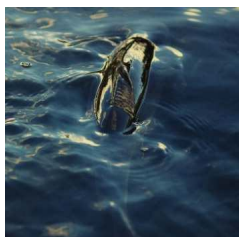
Alfonso S et al.. 2019. Examining multi- and transgenerational behavioral and molecular alterations resulting from parental exposure to an environmental PCB and PBDE mixture. *Aquat Toxicol.* 208, 29-38

Besson M. et al. 2019. Combining individual phenotypes of feed intake with genomic data to improve feed efficiency in sea bass. *Frontiers in Genetics*, 10-219.

Callet T, et al. 2018. Detection of new pathways involved in the acceptance and the utilisation of a plant- based diet in isogenic lines of rainbow trout fry. *PLoS One.* 13, e0201462.

D'Ambrosio J. et al. 2019. Genome-wide estimates of genetic diversity, inbreeding and effective size of experimental and commercial rainbow trout lines undergoing selective breeding. *Genet Sel Evol.* 51, 26

Fraslin C et al. 2018. Quantitative trait loci for resistance to *Flavobacterium psychrophilum* in Rainbow.



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