

## WHY THE SENEGALESE SOLE (*Solea senegalensis*) REARED IN CAPTIVITY DOES NOT KNOW HOW TO REPRODUCE NATURALLY?

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### Introduction

The culture of Senegalese sole (*Solea senegalensis*) has attracted investment during the economic crisis (Howell et al., 2011). However, expansion has been limited as broodstock reared in captivity, G1 generation, present a complete reproductive failure and absence of successful spawning. The failure has been attributed to G1 males, which were observed to not participate in the courtship to fertilise eggs (Carazo, 2012). One of the hypothesis is that G1 males must learn the complicated courtship behaviour. Another Hypothesis is the olfaction is compromised in cultured males compared wild males and, therefore, chemical communication is absent in cultured males.

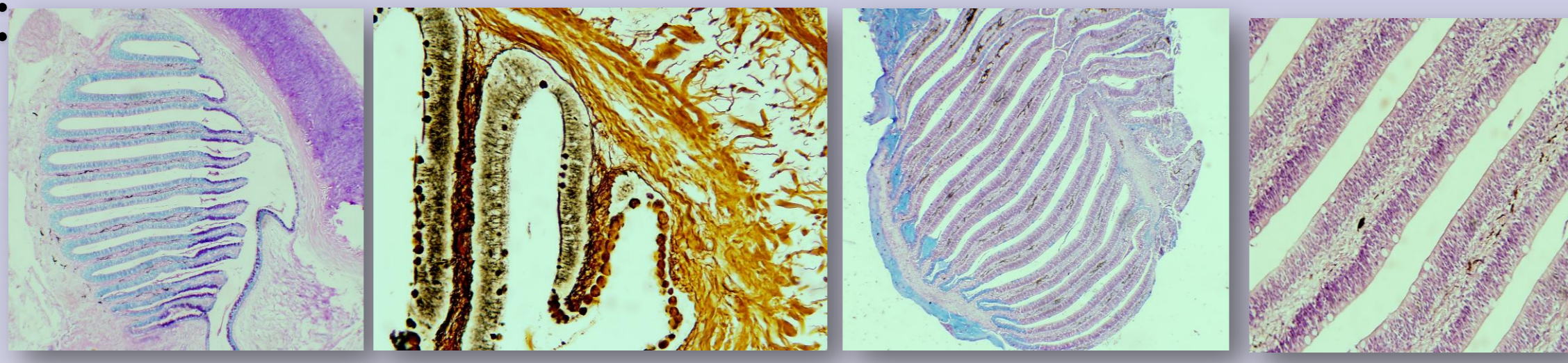
**The main aim of this thesis is to know why Senegalese sole hatched and reared in captivity do not reproduce naturally and propose solutions.**

### OBJECTIVES AND DIFFERENT STEPS OF THE THESIS

#### CHEMORECEPTION and PHYSIOLOGY

**OLFACTION AS AN ASYMMETRIC FISH** (Upper and Lower Olfactory Rosettes):

- Histology
- Molecular Biology (RNAseq: comparison between mature wild and cultured males)
- EOG (Electro-Olfatogram) of G1 broodstock



**REPRODUCTIVE HORMONES PROFILES (ELISA) OF G1 BROODSTOCK**

- FSH (Follicle-stimulating Hormone)
- LH (Luteinizing Hormone)

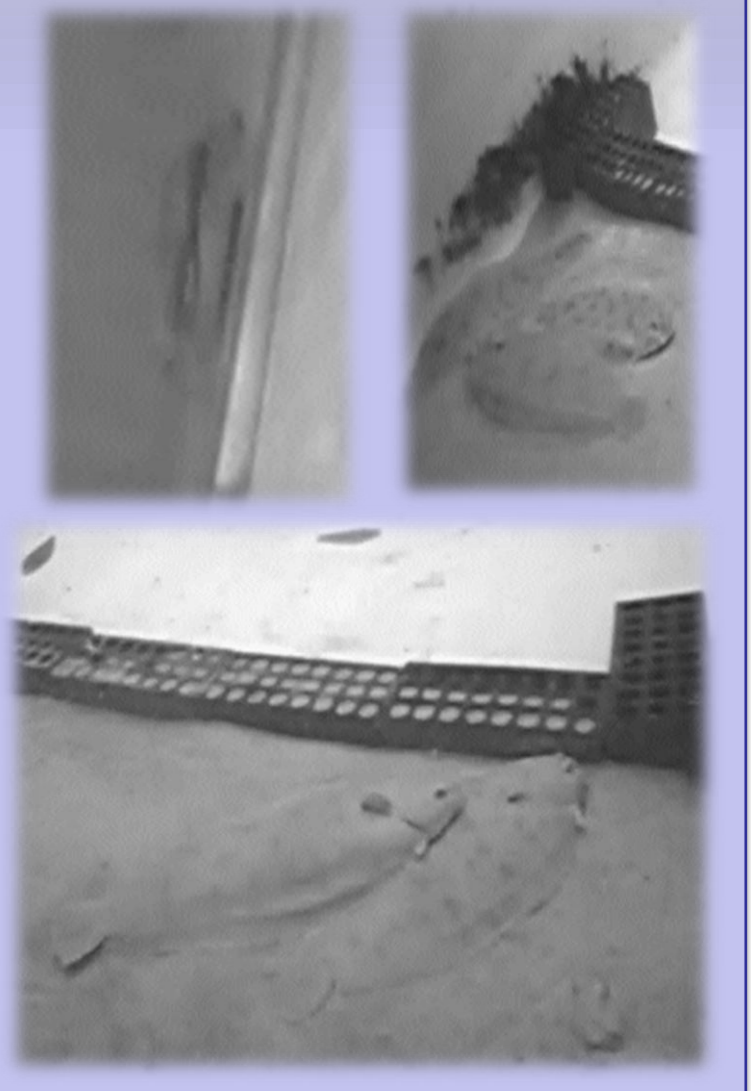
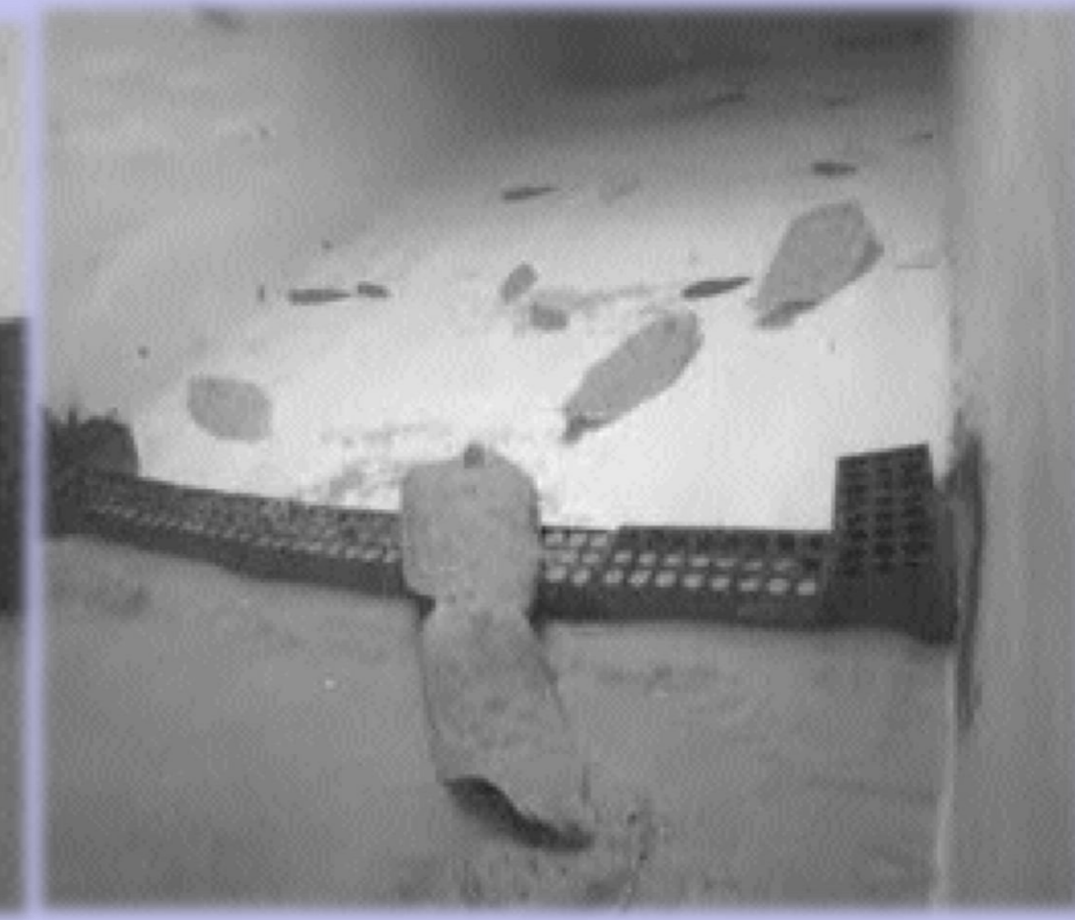


#### BEHAVIOUR

**DOMINANCE** (Senegalese sole is a hierarchical fish, but is considered as a not-aggressive species) → Dominance parameters.

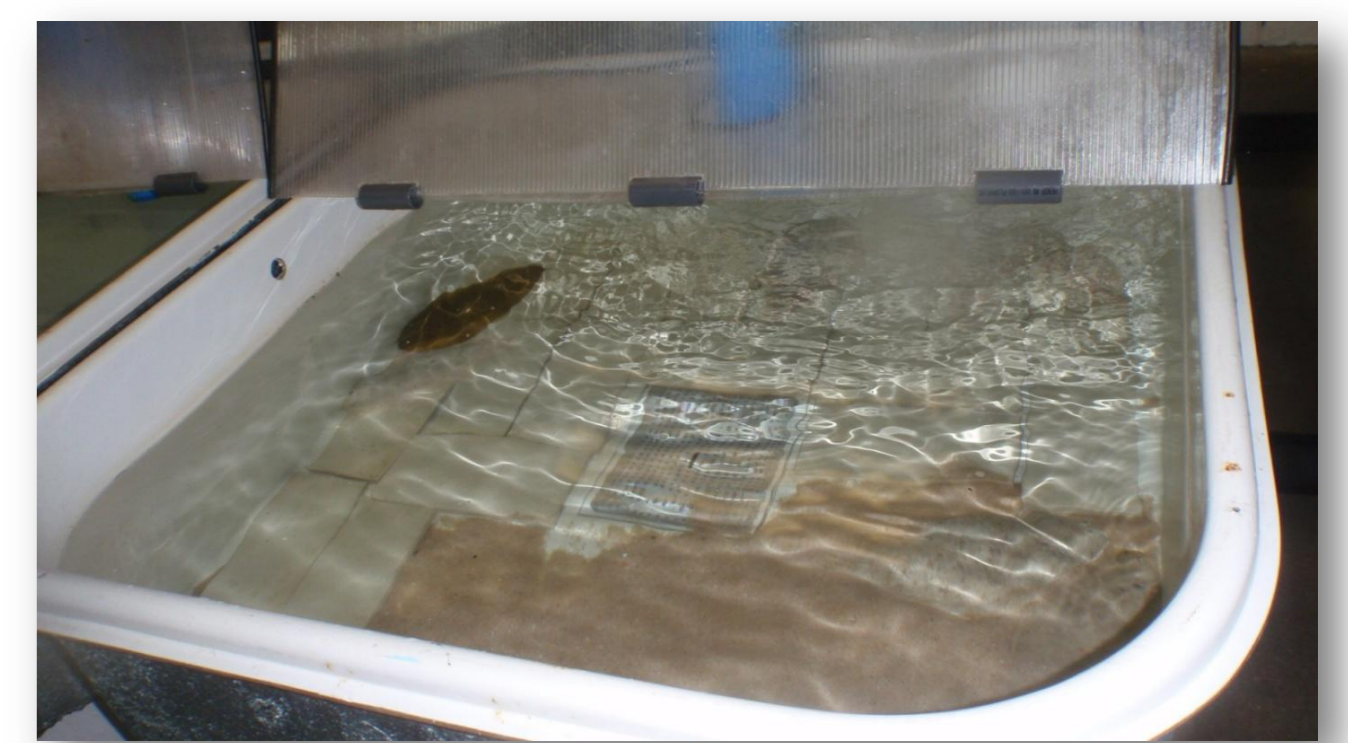
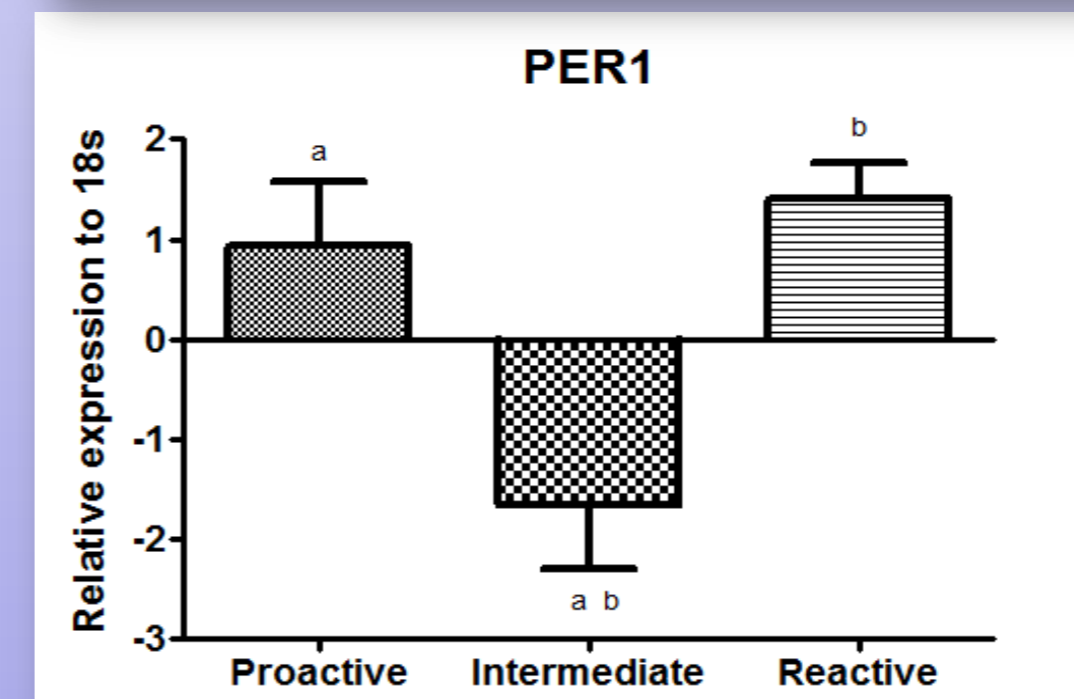
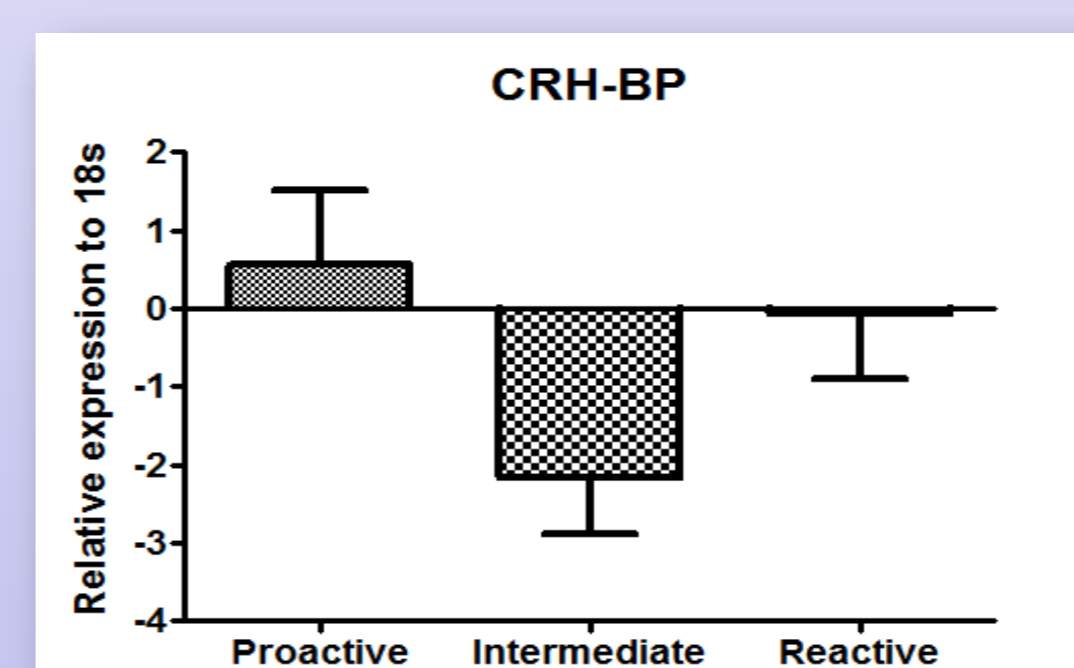
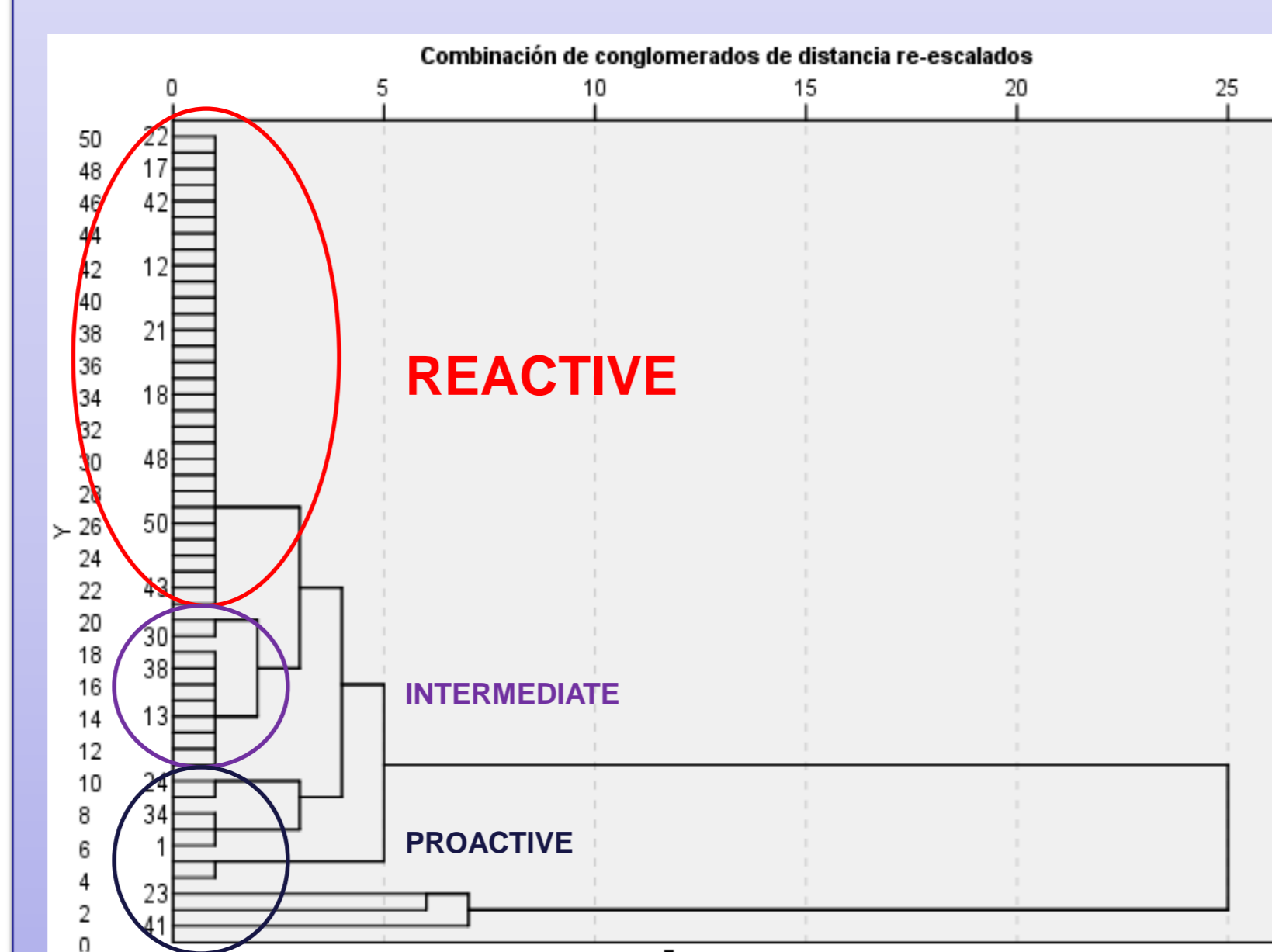


**LEARNING** (G1 males must learn the complicated courtship behaviour from wild individuals)



#### GENE EXPRESSION

**“STRESS COPING” and “DOMINANCE”** → Finding genes as biomarkers in different groups of fish classified by their behaviour.



### Results and Applications

**Dominance parameters** have been described in juveniles of Senegalese sole (feeding and space motivation). The next step is to apply these parameters to the broodstock and adding the reproductive dominance → success in the spawning. The **G1 males appear to be learning from the wild males** → Spawning season of 2013-14: G1 males observed to participate in courtship. Spawning season of 2014: first success in cultured spawning (parents were G1 origin). Analyzing the differences between wild and cultured Senegalese sole olfaction. There were not differences in the structure of the olfactory rosettes between different origins, but genes expression does appear to be different → RNAseq and EOG. The **expression of genes** related to metabolism, growth and reproduction **appear to be different** depending on the behavioural profile of the individual.



**This thesis tries to solve the control of reproduction of Senegalese sole which is one of the main bottle necks in the commercial culture of this species.**

### Acknowledgements

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