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Orientation: Sustainable Use of Marine Resources
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Research Area: 2.9 Feeding and nutrition in aquaculture

PhD project: Role of brain monoaminergic systems (catecholamines and serotonin) in feeding behaviour and the influence of stress in teleost fish

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Summary: The regulation of intake is one of the most interesting aspects to be studied from the point of view of aquaculture in order to improve aquaculture practices and optimize yields. This process involves a central regulatory system of appetite and a peripheral one, which regulates satiety. The hypothalamus integrates peripheral signals and controls ingestion by orexigenic (NPY, AGRP) and anorexigenic neuropeptides (CART, POMC, CRF). In addition, monoaminergic neurotransmitters (catecholamines -noradrenaline, dopamine-, serotonin) are known to modulate food intake by acting on hypothalamic neuropeptidergic neurons. However, the action of monoamines in regulating feeding is very extensive, as it affects aspects such as social and hierarchical behavior, aggressiveness, reward effect of food and regulation of appetite and satiety. Previous studies have shown that monoamines basically exert an anorexic action, with the participation of some specific receptors mediating the responses to dopamine and serotonin. On the other hand, feeding is organized rhythmically over time so that fish adapt their diet at certain times of the day, which adds complexity to the neuroendocrine regulation of intake.

The situations that generate stress in fish are another of the negative conditioning factors of food intake. The stress response involves two endocrine axes (hypothalamus-sympathetic system-chromaffin cells and hypothalamus-pituitary-interrenal cells) that produce the release into the blood of the hormones catecholamines and cortisol, which trigger strong physiological and metabolic changes. Previous work by the UVI group in which the doctoral thesis will be developed have shown that the cerebral monoamines play an essential role in the onset of the stress response, being able to act on the anorexigenic neuropeptides to trigger the inhibition of the food intake. However, knowledge is lacking in fish on how these functional relationships between monoaminergic neurotransmitters, stress and regulation of feeding behavior are established.

Taking into account this background, the objective of this doctoral thesis will be to deepen the role of brain monoaminergic systems in regulating feeding behavior in teleost fishes and in the negative influence of different types of stress.

