

琉球大学学術リポジトリ

ベラ科魚類の繁殖戦略における神経ペプチドとステロイドホルモンの相互作用に関する研究

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Abstract

Interactions of neuromodulators and steroid hormones in reproductive strategies of
wrasses

(ベラ科魚類の繁殖戦略における

神経ペプチドとステロイドホルモンの相互作用に関する研究)

Teleost fishes provide a wide spectrum of variant reproductive phenotypes that differ in physiology, morphology and endocrine strategies. Alternative reproductive phenotypes are the product of the interaction between environmental pressures, genetic influences and hormonal pathways. The aim of the present study is to combine the investigation of target neuromodulators to tend to a better understanding of reproductive strategies of wrasses. Wrasses are protogynous hermaphrodites and their sex and role are socially controlled. They are the more active during the day and they spawn daily during the breeding season. The following work firstly highlights the importance of environmental cues such as tide, temperature and circadian rhythms. Tide-related changes in mRNA abundance of aromatase and estrogen receptors were investigated in the ovary and brain of the threespot wrasse *Halichoeres trimaculatus*. It was demonstrated that oocyte maturation is affected by tidal cycle and that a spawning rhythmicity exists with high tide preference. Also, effects of temperature and melatonin on day-night expression patterns of arginine vasotocin (AVT) and isotocin (IT) mRNA were studied in the diencephalon of a temperate wrasse *Halichoeres tenuispinis*. It was shown that a day-high and night-low fluctuation of *pro-AVT* and *pro-IT* mRNA abundance persists annually in the diencephalon of *Halichoeres tenuispinis*, and that melatonin may act as a regulator of AVT. The second half mainly focuses on the dopaminergic system and other actors that take part in the sexual dimorphism of wrasses. The genes of a dopamine receptor and the enzyme tyrosine hydroxylase were cloned and its expression in neural and peripheral tissues of *Halichoeres tenuispinis* were studied. Tissue distribution of both *AVT* and *IT* mRNAs have been also explored in different parts of the brain. *D2R*, *TH*, *AVT* and *IT* showed a different expression pattern regarding the brain area and according to three different sexual phenotypes (Female, IP male, TP male). Finally, possible interactions between the dopaminergic system and estrogen physiology were investigated by mimicking the start of a female-to-male sex change through the administration of an aromatase inhibitor and an estrogen receptor antagonist. Associated to a decrease in estrogen production and estrogenic response; brain *D2R* mRNA levels decreased, whereas gonad *TH* mRNA levels increased. It is concluded that the reproductive activity of wrasses is strongly impacted by environmental cyclic changes. A high dopaminergic activity as well as high *AVT/IT* mRNA abundances might be involved in courtship and territorial behaviors for individuals that go through a sex reversal or have already a high social status. Catecholamines and *AVT/IT* appeared to work closely with sex hormones to ensure the transduction of external factors and guarantee appropriate sociosexual behaviors in wrasses.

Keywords: *Halichoeres*, sex change, dopamine, aromatase, *AVT/IT*, estrogen receptors

Name Selma Bouchekioua