Natural selection constrains personality and brain gene expression differences in Atlantic salmon (Salmo salar) - DTU Orbit (19/12/2018)

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In stream-spawning salmonid fishes there is a considerable variation in the timing of when fry leave the spawning nests and establish a feeding territory. The timing of emergence from spawning nests appears to be related to behavioural and physiological traits, e.g. early emerging fish are bolder and more aggressive. In the present study, emerging Atlantic salmon (Salmo salar L.) alevins were sorted into three fractions: early, intermediate and late emerging. At the parr stage, behaviour, stress responses, hindbrain monoaminergic activity and forebrain gene expression were explored in fish from the early and late emerging fractions (first and last 25%). The results show that when subjected to confinement stress, fish from the late emerging fraction respond with a larger activation of the brain serotonergic system than fish from the early fraction. Similarly, in late emerging fish, stress resulted in elevated expression of mRNA coding for serotonin 1A receptors (5-HT1A), GABA-A receptor-associated protein and ependymin, effects not observed in fish from the early emerging fraction. Moreover, fish from the early emerging fraction displayed bolder behaviour than their late emerging littermates. Taken together, these results suggest that time of emergence, boldness and aggression are linked to each other, forming a behavioural syndrome in juvenile salmon. Differences in brain gene expression between early and late emerging salmon add further support to a relationship between stress coping style and timing of emergence. However, early and late emerging salmon do not appear to differ in hypothalamus–pituitary–interrenal (HPI) axis reactivity, another characteristic of divergent stress coping styles.

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