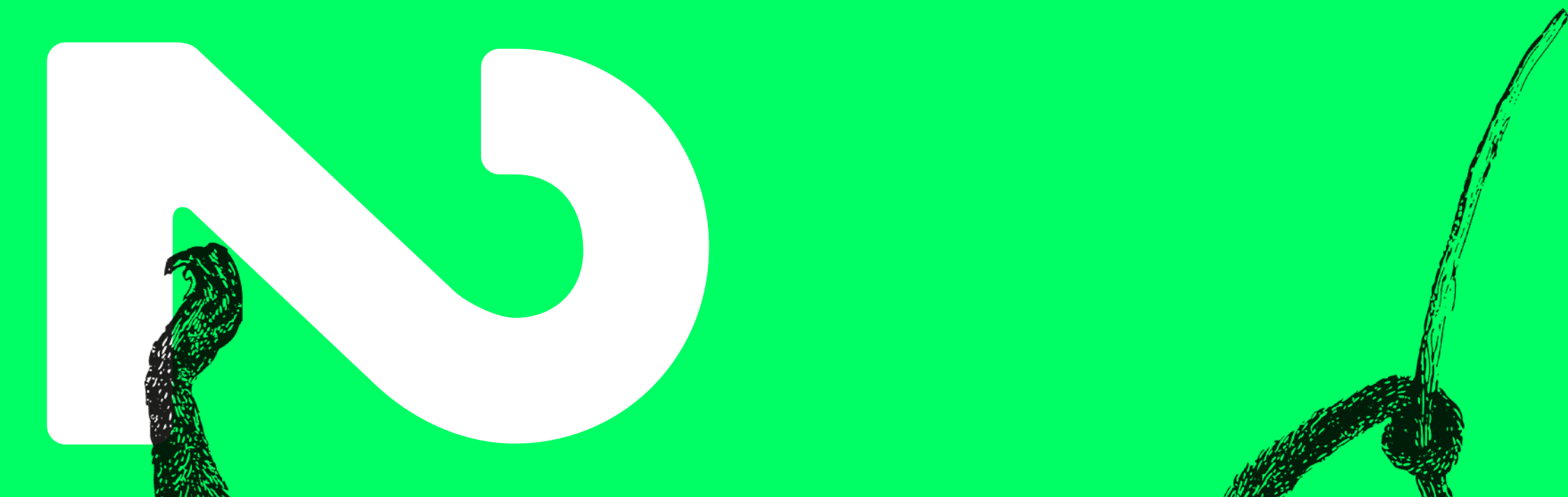
Stress coping style in European sea bass Dicentrarchus labrax: from genes to physiology and behaviour

Alfonso, Sébastien; Geffroy, Benjamin ; Sadoul, Bastien; Joassard, Lucette; Gesto, Manuel; Chatain, Béatrice; Bégout, Marie-Laure

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

ANIMAL BIOLOGY ABSTRACTS



A2.9 STRESS COPING STYLE IN EUROPEAN SEA BASS (*DICENTRARCHUS LABRAX*): FROM GENES TO PHYSIOLOGY AND BEHAVIOUR

WEDNESDAY 4 JULY, 2018 **15:30**

SÉBASTIEN ALFONSO (IFREMER, FRANCE), BENJAMIN GEFFROY (IFREMER, FRANCE), BASTIEN SADOUL (IFREMER, FRANCE), LUCETTE JOASSARD (IFREMER, FRANCE), MANUEL GESTO (DTU AQUA, DENMARK), BÉATRICE CHATAIN (IFREMER, FRANCE), MARIE-LAURE BÉGOUT (IFREMER, FRANCE)

@ SEBASTIEN.ALFONSO@IFREMER.FR

Stress coping styles (SCS) are defined as a coherent set of individual physiological and behavioural differences in stress responses consistent across time and context. This work aims at understanding the mechanisms underpinning SCS in European sea bass (*Dicentrarchus labrax*) through the combined measures of physiological and behavioural responses. Individually PIT tagged fish were challenged twice (four months apart) in a group risk taking test to assign an individual boldness score (n=1000). The risk taking test consists in grouping the fish into a sheltered area and measuring the latency to leave it for an open area. Fish going out of the shelter during the two tests were classified as proactive , whereas fish staying were described as reactive. One year later, 30 proactive and 30 reactive fish were challenged using an Open Field Test (OFT). The OFT consists in placing a single fish in an observation arena (75x75 cm) with a shelter. After 5 min of habituation, fish are free to exit the shelter and explore the arena. Behavioural variables (latency to exit shelter, time spent in shelter or distance travelled) were recorded. Directly after the OFT, blood and brain samples were taken to measure blood plasma cortisol concentration, neurotransmitter levels (serotonine, dopamine), expression of genes involved in stress regulation (gr1, gr2, mr, crf) and neurogenesis (egr1, neurod1, pcna). Correlations between behavioural responses, stress regulation processes, neurotransmitters and neurogenesis were evaluated to bring a better understanding of SCS in European sea bass, with ultimately applications for welfare issues in aquaculture.

A2.10 COPING WITH THE CLOCK – BIOLOGICAL CLOCK FUNCTION IS LINKED TO PROACTIVE AND REACTIVE PERSONALITY TYPES

WEDNESDAY 4 JULY, 2018 **15:45**

CHRISTIAN TUDORACHE (LEIDEN UNIVERSITY, NETHERLANDS), HANS SABBEKOORN (LEIDEN UNIVERSITY, NETHERLANDS), YURI ROBBERS (LEIDEN UNIVERSITY MEDICAL CENTRE, NETHERLANDS), JOHANNA MEIJER (LEIDEN UNIVERSITY MEDICAL CENTRE, NETHERLANDS), HERMAN SPAINK (LEIDEN UNIVERSITY, NETHERLANDS), MARCEL SCHAAF (LEIDEN UNIVERSITY, NETHERLANDS)

@ C.TUDORACHE@BIOLOGY.LEIDENUNIV.NL

Many physiological processes in our body are controlled by the biological clock and show diurnal (24-hour) rhythmicity. It is generally accepted that a robust diurnal rhythm is a prerequisite for optimal functioning of an individual, and that a lack of rhythmicity can contribute to the pathogenesis of various diseases. In the present study, we have observed a remarkable individual variation in diurnal rhythmicity in a wildtype zebrafish population. This was demonstrated for the expression of genes involved in the biological clock, the concentrations of the hormones cortisol and melatonin, and locomotor activity. Our data range from robust diurnal rhythms with large amplitudes and rhythm strength to a complete absence of rhythmicity. These biological clock phenotypes were shown to be correlated with different personality types (coping styles), which were assessed by determining risk-taking behaviour in an emergence test and validated by measuring aggressiveness. Coping styles varied along a continuum between proactive and reactive extremes, and proactive fish displayed a strong diurnal rhythm while reactive fish lacked any rhythmicity. When challenged with constant light conditions, the rhythmicity of only the proactive fish decreased whereas the rhythmicity of reactive individuals was not altered. These results shed new light on the role of the biological clock, and demonstrate that a lack of diurnal rhythmicity is not a pathological condition. We conclude that variation in diurnal rhythmicity is naturally present in wildtype populations, and should be considered as an integral part of a reactive coping style.

A2.11 HUNGER STATUS MODIFIES THE ASSOCIATION BETWEEN CONSISTENT VARIATION IN OXYGEN CONSUMPTION AND RISK TAKING IN SEA ANEMONES

WEDNESDAY 4 JULY, 2018 **16:00**

MARK BRIFFA (PLYMOUTH UNIVERSITY, UNITED KINGDOM)

@ MARK.BRIFFA@PLYMOUTH.AC.UK

Stress can modify how animals manage risk. In the presence of a predator, for example, avoidance may be prioritised over foraging, while hungry individuals may prioritise food capture over protection and individuals in a high risk situation might behave less predictably than those under low risk. As well as responding to extrinsic stressors, behavioural differences across individuals might also be associated with stable intrinsic differences, such as variation in metabolic rate. Beadlet sea anemones, *Actinia equina*, use their tentacles to trap prey but when disturbed they will retract these to avoid damage. Here, we investigate the effects of hunger state and resting oxygen consumption on means and variances of tentacle retraction duration, following disturbance. Individuals showed consistent differences in mean retraction times, they differed in variances around their means and oxygen consumption was also repeatable across individuals. The strongest influence on sample mean retraction time was observation number, indicating a clear habituation effect. Nevertheless, an interaction between oxygen consumption and hunger state indicated that individuals with high oxygen consumption recover from disturbance more rapidly than those with lower oxygen consumption but that this association between intrinsic state and risk taking is weaker in hungry individuals. Therefore, although consistent across individual differences in risk taking appear to be associated with consistent differences in underlying metabolic rate, this association is modified by hunger stress.