Intraspecific variation in expression of candidate genes for osmoregulation, heme biosynthesis and stress resistance suggests local adaptation in European flounder (Platichthys flesus) - DTU Orbit (05/06/2017)

Intraspecific variation in expression of candidate genes for osmoregulation, heme biosynthesis and stress resistance suggests local adaptation in European flounder (Platichthys flesus)

Despite the recent discovery of significant genetic structuring in a large number of marine organisms, the evolutionary significance of these often minute genetic differences are still poorly understood. To elucidate the adaptive relevance of low genetic differentiation among marine fish populations, we studied expression differences of osmoregulatory and stress genes in genetically weakly differentiated populations of the European flounder (Platichthys flesus), distributed across a natural salinity gradient. Flounders were maintained in a long-term reciprocal transplantation experiment mimicking natural salinities in the North Sea and the Baltic Sea. Applying real-time quantitative PCR and microarray analysis we studied expression of four candidate genes (hsp70, angiotensinogen, Na/K-ATPase-alpha and 5-aminolevulinic acid synthase (ALAS)) in gill, kidney and liver tissues. Genes involved in osmoregulative processes (Na/K-ATPases-alpha and angiotensinogen) showed highly plastic but similar expression in the two populations dependent on environmental salinity. However, we observed a unique sixfold up-regulation of hsp70 in kidney tissue of flounder from the North Sea following long-term acclimation to Baltic salinities. Similarly, significant differences between North Sea and Baltic flounders in expression of ALAS in response to different salinities were found in gill and liver tissue. These findings strongly suggest that gene expression in flounders is shaped by adaptation to local environmental conditions. This identification of adaptive differences in high gene flow marine organisms adds a new dimension to our current understanding of evolutionary processes in the sea and is of paramount importance for identification, protection and sustainable management of marine biodiversity.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Population Ecology and Genetics
Authors: Larsen, P. F. (Intern), Eg Nielsen, E. (Intern), Williams, T. (Ekstern), Loeschcke, V. (Ekstern)
Pages: 247-259
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Heredity
Volume: 101
Issue number: 3
ISSN (Print): 0018-067X
Ratings:
BFI (2017): BFI-level 2
BFI (2016): BFI-level 2
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.118 SNIP 1.253
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.106 SNIP 1.258
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.015 SNIP 1.166
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.09 SNIP 1.374
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.293 SNIP 1.288
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.381 SNIP 1.252
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.249 SNIP 1.268
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.981 SNIP 1.239
Scopus rating (2007): SJR 1.744 SNIP 1.209
Scopus rating (2006): SJR 1.353 SNIP 1.102