

Sundström, L. Fredrik. 2004. Effects of rearing environment on behavior and ecology of brown trout.

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ABSTRACT

An organism's phenotype is determined by interactions between its genes and the environment in which it develops. Two genetically identical individuals reared in different environments, or two genetically different individuals reared in the same environment, may therefore differ in behavior. The complexity of this interaction makes it difficult to estimate the relative importance of genes and environment in shaping behavior. I used genetically similar fish reared in a natural environment or in a fish hatchery to study the role of rearing environment on behavioral development in young anadromous brown trout (*Salmo trutta*). I also studied whether several generations of partial hatchery-rearing (sea-ranching) had led to genetically based differences in behavior compared to trout of wild origin. The hatchery-environment differs from the natural, for example in having higher density of fish, constant provision of abundant artificial food, and lack of structures and predators. My laboratory experiments show that much of the behavioral repertoire in brown trout is influenced by genetic as well as environmental factors. Trout with sea-ranched parents were bolder than those with wild parents, but in both types, bolder individuals were more likely to become socially dominant. Trout reared in the hatchery behaved similar to wild fish, but the behavioral expression differed quantitatively from that of the wild trout. Hatchery-reared trout were less concerned with predation threat, showed impaired feeding skills, social shortcomings, and inefficient territorial behavior compared to wild fish. After release in the natural environment, hatchery-reared fish grew less than wild fish, yet they had a negative effect on the growth of resident wild fish. In both wild and hatchery-reared fish, growth was density-dependent. Possible mechanisms responsible for these differences in performance between naturally reared and hatchery-reared trout are discussed.