Characterization of microsatellites and Uncoupling Protein 2 (UCP2) gene in rainbow trout

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Abstract:

As part of our efforts to develop markers for rainbow trout (Oncorhynchus mykiss), we performed a comparison of allelic variation between 37 microsatellite markers developed from expressed sequence tag (EST) data and 33 anonymous markers identified from repeat-enriched libraries constructed from genomic DNA. Polymorphism information content (PIC) was higher in dinucleotide EST-microsatellites than in anonymous markers (72.7% vs. 54.0%). In contrast, dinucleotide repeat numbers were higher for anonymous microsatellites than for EST derived microsatellites (27.4 vs. 18.1). A higher rate of cross-species amplification was observed for EST microsatellites. Genomic microsatellites proved more useful than EST derived microsatellites in discriminating among the salmonids.

Uncoupling proteins (UCPs) are anion transporters of the inner mitochondrial membrane that dissociate the respiratory chain from ATP synthesis. UCP2 gene was found in two copies in rainbow trout genome, UCP2A and UCP2B. These genes are 93% similar in their predicted amino acid sequences and display the same genomic structure (8 exons and 7 introns) spanning 4.2 kb and 3.2 kb, respectively. Both genes were mapped on different chromosomes. UCP2A and UCP2B were widely expressed in all tissues of the study. Both UCP2 duplicates were highly expressed in rainbow trout early embryo stages. They appeared differentially regulated in response to fasting in juvenile fish muscle; UCP2A mRNA was decreased while UCP2B expression was increased. Phylogenetic analysis including other genes from the UCP core family located rainbow trout UCP2A and UCP2B with their orthologs and suggested an early divergence of vertebrate UCPs from a common ancestor gene.