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Development of strategies for integrated breeding, genetics and applied genomics for genetic improvement of aquatic organisms

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Two decades of aquaculture genomics research have brought us closer to the application of genomic technologies in aquaculture for the genetic enhancement of aquaculture organisms. The major achievements during this time were: 1) development of molecular markers for tagging and differentiation of fish and shellfish brood stocks (Wang et al., 2008, 2010; Liu et al., 2011; Ninwichian et al., 2012), 2) discovery and characterization of DNA markers with global coverage of the genome allowing thorough studies of genomes as well as aquaculture traits (Koop et al., 2008; Jiang et al., 2011; Liu, 2011; Lu et al., 2011); 3) sequencing and assembly of whole genomes for important aquaculture species such as carps, tilapia, catfish, and salmonid fishes; 4) discovery of the vast majority of genes in aquaculture species and characterization of their expression in processes relevant to aquaculture (Bowman et al., 2011; Quinn et al., 2011; Hori et al., 2012; Norman et al., 2012; Liu et al., 2013); and 5) development of technologies for the analysis of aquaculture traits using genome-wide markers. With such progress, aquaculture genetics research is poised to capitalize on these advances.

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