

fish reduces oxidative stress, and may be useful for the rearing of cultured fish.

7) An Infectious Marker in Intestine and Kidney of Japanese Flounder Challenged with *Edwardsiella tarda*

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TAKAYUKI ASHIDA<sup>1,2</sup> SATOMI TSUKAHARA<sup>2</sup> and EIJI OKIMASU<sup>2</sup>

<sup>1</sup>Manda Fermentation Co. Ltd,

<sup>2</sup>Department of Marine Biotechnology, Faculty of Life Science and Biotechnology, Fukuyama University

We examined the heat shock protein (hsp) 60 expression level by western blot analysis in the Japanese flounder tissues on the edwardsiellosis induced with *Edwardsiella tarda*. In the intestine, when fish were infected with this pathogen, the hsp 60 expression level showed significantly ( $p < 0.05$ ) lower than non-infected fish (control). In kidney, the expression levels in the infected fishes were significantly ( $p < 0.05$ ) higher than the control after infection. The hsp 60 synthesis are different depended on the tissue and the measurement of the level might be shown on a biomarker of infectious stress.

8) ヒラメ *Paralichthys olivaceus* における成長特性と成長ホルモン遺伝子の DNA 多型

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清水宏美, 沖増英治

DNA Polymorphism in the Growth Hormone Gene and its Association with Body Size in the Feminized Seedlings of Japanese Flounder, *Paralichthys olivaceus*

Hiroimi Simidzu, and Eiji Okimasu

Department of Marine Biotechnology, Faculty of Life Science and Biotechnology, Fukuyama University

Variation within the growth hormone gene and its association with growth trait in

Japanese flounder, *Paralichthys olivaceus*, was investigated. Based on microsatellite analysis, it was demonstrated that the distinct genetic divergence was not observed within the feminized seeding. Polymorphisms of various lengths were also detected by the digestion of the polymerase chain reaction (PCR)-amplified growth hormone gene fragment with *Sau3AI* restriction enzyme. To study the possible association between variation in the growth hormone gene fragment and body weight, 60 individuals of the feminized seedlings of three various size (large, medium, and small weight) were selected and the entire genetic structure of the growth hormone gene was analysed. Significant heterogeneity of the growth hormone gene with haplotype and genotype frequencies was detected among the different-sized groups.