GMR Genetics and Molecular Research
Online Journal
ISSN:1676-5680

Involvement of the *mitfa* gene in the development of pigment cell in Japanese ornamental (Koi) carp (*Cyprinus carpio* L.)

J.H. Liu[1]*, S. Wen[1]*, C. Luo[1], Y.Q. Zhang[1], M. Tao[1], D.W. Wang[2], S.M. Deng[2] and Y.M. Xiao[1]

[1]Key Lab of Protein Chemistry and Developmental Biology of Education, Ministry of China, College of Life Sciences, Hunan Normal University, Changsha, China
[2]Hunan Fisheries Research Institute, Changsha, China

*These authors contributed equally to this study.
Corresponding author: Y.M. Xiao
E-mail: yameix@126.com

Genet. Mol. Res. 14 (1): 2775-2784 (2015)
Received February 25, 2014
Accepted August 18, 2014
Published March 31, 2015
DOI http://dx.doi.org/10.4238/2015.March.31.7

ABSTRACT. A colored phenotype is an important feature of ornamental fish. In mammals, microphthalmia-associated transcription factor (MITF) was found to regulate the development of melanocytes. In this study, the *mitfa* cDNA was first cloned from the Japanese ornamental (Koi) carp (*Cyprinus carpio* L.), an important ornamental freshwater fish. The full-length cDNA of the *mitfa* gene contains 1634 bp, coding for 412 amino acids in Koi. The identity degree of *mitfa* amino acid sequences between the Koi carp and zebrafish is 92.9%. We tested the expression of the *mitfa* gene in several varieties of Koi using reverse transcription-polymerase chain reaction and found that the *mitfa* gene is highly expressed in the skin tissues of the *Taisho sanke* and the *Procypris merus*. Interestingly, the *mitfa* gene was also expressed in the *Kohaku* and *Yamabaki ogon*, although melanocytes were not observed in the skin. Koi carp embryos were transparent and colorless, while

after hatching, different types of pigment cells successively emerged in a fixed order. In *Taisho sanke*, melanocytes first appeared in the trunk at approximately 12 days of age. Subsequently, there was a large area of melanocytes by 30 days of age. The expression level of the *mitfa* mRNA was low in early embryos and newly hatched larvae, and increased to high levels in 30-day-old fry. The results show that the *mitfa* gene is involved in regulating fish body color in the development of both melanocytes and pigment cells.

Key words: Japanese ornamental (Koi) carp; Melanocyte; *mitf* gene; Pigment cell

