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Conference Report

"Embryo engineering" of small laboratory fishes — The Eighth Medaka Symposium — (October 5, 1994, held at Nagoya University, Nagoya)

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The program of the present symposium was organized by Professor Ozato of Nagoya University. In the proceedings of the meeting, he clarified the aim of the present program, which can be summarized as follows.

In order to clarify the underlying mechanisms of the normal embryonic development, experimental methods including the manipulation of embryos have long been performed. We had been referring to this research field as "experimental morphology", which has recently been replaced by the term of "embryo manipulation" or "embryo engineering". This is not only because the techniques of molecular genetics and cell biology have been introduced into this field, but also because the techniques and methodology of embryonic manipulation have become applicable for biomedical purposes.

Sea urchins and amphibians have made a great contribution to the development and establishment of the experimental morphology, and the mouse opened the path toward the embryo engineering. During the last decade, the researchers in this field have directed more attention to small fish such as the zebrafish and medaka. Studies on fate map, cell-lineage analysis, chimera fish, and transgenic fish have been conducted, and the attempt to establish a pluripotent cell line (ES-like cell line) of fish is in progress. In the present symposium, three lectures described recent progress in this field using small fish.

With 56 in attendance, presentations and discussions were carried out under the chairmanship of Professor Ozato.

An analysis of the mechanism underlying the commitment of cell fate in early zebrafish embryos. (H. Takeda, Nagoya Univ. and T. Miyagawa, Tsukuba Univ.)

Transgenic orange-red variety of medaka with mouse tyrosinase gene. (J. Matsumoto, Keio Univ.)

Establishment of a plurioptent cell line derived from a medaka blastula. (Y. Wakamatsu, Nagoya Univ.)

Dr. Takeda presented the results of experiments on the commitment of cell fate in early zebrafish embryos, and emphasized the potential of the zebrafish as a model system in the investigation of the functions of genes during early developmental processes. Takeda and his colleagues investigated the expression of *pax[b]* gene which is differentially expressed in cells of central nervous system according to their position on the antero-posterior axis, and clarified that cells in CNS are committed to differentiate regionally just about the time of the differentiation of hypoblast into mesoderm and endoderm. They also demonstrated that *pou2* gene product (transcription factor) is possibly involved in the pluripotency of cells in early embryos as well as in the mechanism of the differentiation of epiblast and hypoblast.

Dr. Matsumoto introduced the mouse tyrosinase gene into the so-called hi-medaka (orange-red variety of medaka), which cannot make the deposition of melanin granules in their melanophores. He got some transgenic medaka in which apparent deposition of melanin granules was noted, indicating that mouse tyrosinase gene has been successfully introduced and can be expressed with cell-type specific mode. Analysis of the progeny of transgenic fish demonstrated that the gene introduced can be transmitted through germ cells.

Dr. Wakamatsu reported the characteristics of an ES-like cell line (OLESI) which she has established from a medaka blastula. OLESI cells can be kept undifferentiated on a feeder layer, cultured medaka fibroblast. They have an undifferentiated appearance and high alkaline-phosphatase activity. When letinoic acid is added, they differentiated into various types of cells, including melanocytes, nerve cells (dopa-positive cells), or muscle cells (troponin-positive cells), which evinced the pluripotency of OLESI cells. The injection of OLESI cells into medaka blastula is in progress. Her results implied the possibility of the establishment of the system of gene targeting in medaka.

Preceding the symposium, a special lecture to introduce the "World Medaka Aquarium" in Nagoya Higashiyama Zoo was presented by Mr. K. Matsuyama, the chief breeder of the aquarium. He explained the systems of exhibition and the breeding facility of fishes. The intention is that all fish exhibited should be bred within the aquarium as a matter of principle. He also emphasized the necessity of the cooperative activity between the aquarium and medaka researchers, in respect to the maintenance of strains as well as the information about the fish. Attendees of this meeting had the pleasure of visiting this unique aquarium under the guidance by Mr. Matsuyama the following day.