

【Grant-in-Aid for Scientific Research(S)】
Biological Sciences (Agricultural sciences)



Title of Project : Development of mass production technique of glass eel for aquaculture based on recent advancement in ecology, physiology and behavior

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Research Area : Agriculture

Keywords : Aquaculture, Seed Production

【Purpose and Background of Research】

In order to help recover declining eel resources and keep a stable supply of glass eels for aquaculture, research on the development of seed production techniques has been carried out for more than 40 years, but it has not been well established. We aim to develop a practical method for mass production of glass eels based on a new concept. By involving newly obtained ecological/physiological information from field research, such as about the environmental conditions of the spawning area, adults caught in the spawning area, and early life history of larvae etc., we will (1) establish a technique of induced maturation of adults, (2) improve the quality of eggs produced by artificial spawning and (3) develop a new method for larval rearing.

【Research Methods】

We will carry out both intensive field surveys and laboratory experiments to develop new and effective glass eel mass production techniques for providing seedlings for aquaculture.

(1) Maturation process: Using a cDNA subtraction technique, we will obtain a differential cDNA library of genes that are expressed in the eel ovary, and built a microarray for comparison of gene expression in the ovaries of both wild and artificially matured eel females.

(2) Spawning process: To improve a spontaneous spawning method for obtaining high quality eggs, we observed the spawning behavior of adults in a large tank using a night-view infrared video camera system. The triggering mechanism for spawning will be investigated.

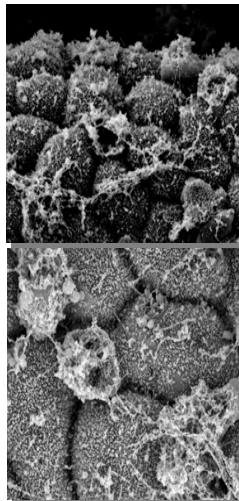


Fig. 1. SEM photos of the gut epithelium of wild eel larvae.

(3) Ontogenetic process: The development and physiological mechanisms of osmoregulation in eel larvae will be studied by detecting chloride cells on the body surface using an antibody specific to Na⁺K⁺ATPase. We also will develop a new diet for larvae based on intestinal contents of wild larvae and will design a rearing system that enables mass production of glass eels.

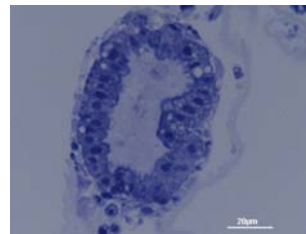


Fig. 2. Early larval gut epithelium (5.2 mm TL).

【Expected Research Achievements and Scientific Significance】

Using a new diet for larvae, high growth and survival rates of larvae will be obtained. The first practical mass production of glass eels can be expected without using exogenic hormones.

【Publications Relevant to the Project】

- Tsukamoto, K., Spawning of eels near a seamount. *Nature*, 439 (7079), 929, 2006.
- Kaneko, T., S. Watanabe & K. M. Lee, Functional morphology of mitochondrion rich cells in euryhaline and stenohaline teleosts. *Aqua-BioScience Monographs*, 1, 1-62, 2008.
- Aoyama, J., Life history and evolution of migration in catadromous eels (Genus *Anguilla*), *Aqua BioScience Monographs*, 2, 1-42, 2009.

【Term of Project】 FY2009-2013

【Budget Allocation】 156,300 Thousand Yen

【Homepage Address and Other Contact Information】

<http://www.fishecol.ori.u-tokyo.ac.jp/homepage.data/Components/top.html>