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Correlation between egg quality and stage of meiotic division in ovulated eggs of artificially matured Japanese eel, *Anguilla japonica*

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Introduction

The Japanese eel, *Anguilla japonica*, is an important species in the aquaculture industry of Japan, China and Korea. The supply of eel larvae for stocking farm is entirely dependent on glass eels captured from the wild. Therefore, it is important that an establishment of reliable supply of larvae. Recently, it succeeded finally in rearing eel larvae to glass eel. However, the techniques for producing glass eels are not yet firmly established. The fertilization and hatching rates are highly variable. Thus, egg quality was inquired for consistent mass production of glass eels.

In teleost fish, after germinal vesicle breaks down (GVBD), the cell resumes meiosis and the yolk-globules coalesce. The entry into and exit from the first metaphase is accompanied by such morphological changes as GVBD, chromosome condensation, spindle formation and the first polar body extrusion. Oocyte, which progressed to the second meiotic metaphase, is fertilizable.

In this study, histological observation was tried whether the stage of meiotic division can be used as maturational indicator in ovulated eggs of Japanese eel or not. And then, correlation between stage of meiotic division and viability was investigated.

Materials and Methods

Seventeen cultivated Japanese eels (683-1103 g) were received weekly intramuscular injection of SPH (40 mg/kg BW). To induce ovulation, 17α -hydroxyprogesterone (17α-OHP: 2 mg/kg BW) was injected about 15 hours before the ovulation. At the time of ovulation, eggs were obtained

from each fish. Fertilization and hatching rates were calculated. Eggs were fixed with Bouin's solution. For observations of the chromosome status by light microscopy, serial paraffin sections were cut by routine methods and stained with hematoxylin and eosin.

Results

In this chapter, various stages of meiotic division were observed in ovulated eggs of Japanese eel. Stages of meiotic division were divided into 7 categories: 1. GVM egg, 2. Chromosome condensation and prometaphase I, 3. Metaphase I, 4. Anaphase I and Prometaphase II, 5. Metaphase II, AN; Abnormal meiotic division, and OR; Overripe egg.

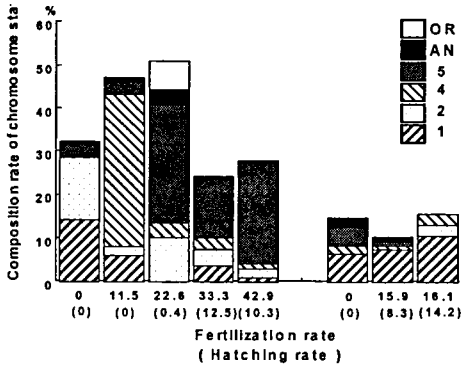

Figure 1. Frequency of chromosome status and fertilization rate (or hatching rate)

Figure 1 indicated that low fertilizable eggs were composed of category no. 1 (GVM egg) or no. 2 (prometaphase I). On the other hand, high fertilizable eggs were composed of category no. 5 (Metaphase II). Abnormal meiotic division and overripe egg affected viability. There were also unexceptional results. For example, although Metaphase II was not noted, hatching rate was 14.2%. That possibly was due to aberrations of meiosis during 17α-OHP-induced oocyte maturation

From the result of this study, stage of meiotic division can serve as indicators of egg quality for artificially matured Japanese eel.

References

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