（学位第３号様式）

学　位　論　文　要　旨

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題　目	Studies on development of monitoring technique of the culture phase transition of microalgae for enriching the initial feed for marine finfish larvae （微細藻類の新規培養相判定技術による 海産魚類仔魚用初期餌料の高付加価値化に関する研究）

In larval rearing of marine finfish, live feed should be enriched with highly unsaturated fatty acids (HUFA) in form of polar lipids (PL-HUFA) essential for the larviculture performance. *Nannochloropsis oculata*, one of microalgale rich in HUFA, has been used for HUFA enrichment of rotifer. HUFA contents of microalgae change with time during the cultivation. However, the culture phase when HUFA content is higher is difficult to determine in the larval rearing field due to lack of the monitoring technique. Also, it remains unclear when is the optimum harvest timing of microalgae for PL-HUFA enrichment of rotifer. In this study, the monitoring technique for HUFA-possessing microalgae, especially *N. oculata* was established. The goal of this study was to efficiently enriching PL-HUFA of rotifer with microalgae harvesting at the aiming timing using the above technique.

In Experiment 1, absportion spectra of *N. oculata* was analyzed and it was assessed on applicability of spectrophotometry to estimate changes in biochemical composition of the cells and ambient nutrient salt concentrations. *N. ocualta* showed absorption peaks at 440 nm, 490 nm, and 680 nm during the cultivation period. Absorption ratio at 490 nm and 680 nm (Abs_{490}/Abs_{680}) showed a decreasing phase (D-phase) followed by an increasing phase (I-phase). At the turning point of Abs_{490}/Abs_{680}, phosphate was starved in the culture medium and fatty acid composition changed as well. This experiment suggested that the culture phase of *N. oculata* is distinguishable based on the trend of Abs_{490}/Abs_{680}.

In Experiment 2, contents of eicosapentaenoic acid (EPA) in PL (PL-EPA) of *N. oculata* were compared between D-phase and I-phase. When *N. oculata* reached I-phase, EPA was accumulated in phospholipids, one of PL. Mitochondria morphologically changed in I-phased cells, which can be related to EPA accumulation in phospholipids. Rotifer feeding trial revealed that rotifers fed I-phased cells showed higher content of PL-EPA than those fed D-phased cells.

In Experiment 3, it was assessed on applicability of monitoring technique of algal culture phase using spectrophotometry to docosahexaenoic acid (DHA)-possessing microalgae *Isochrysis* sp. Tahiti strain. Based on Abs_{490}/Abs_{680}, Tahiti strain showed D-phase and I-phase alternately with time. When compared with the results of nutrient salt concentrations, Abs_{490}/Abs_{680} of Tahiti strain responded not only to phosphate starvation but also to nitrate-nitrogen starvation. Rotifer feeding trial revealed that rotifers fed the cells harvested at 2nd I-phase under phosphate starvation alone, showed highest viability and PL-DHA among the culture phases. These feeding results were equivalent to those with commonly used enrichment diet, suggesting that Tahiti strain is practical for DHA enrichment of rotifers.

The experiments of this study suggested that the culture phase of two species of HUFA-possessing microalgae are distinguishable using spectrophotometry, and that PL-HUFA can be efficiently enriched in rotifer by feeding the cells harvested at the aiming phase.