



# 学位論文要旨

専攻名 生物圏生命科学

ナディア イスティクオマー  
氏名 Nadia Istiqomah 印

**題 目 Studies on vitamin B<sub>12</sub> supplementation to reduce turbidity stress on Cladoceran zooplankton**

(ミジンコ類の濁度変化ストレス軽減に対するビタミン B<sub>12</sub> の効果)

Turbidity is one of important water quality parameters in aquatic ecosystem, which can be contributed by both organic and inorganic particles, but sediment loading (clay, silt particles) often tops of the list of materials causing turbidity. Filter-feeder organisms, such as zooplankton, can negatively impacted by turbid water due to replacement of algal food by clay and/or silt particles, and affected their performance. Recent studies reported that bacteria have a role to maintain the fitness of zooplankton. Therefore, to investigate the link between bacteria-zooplankton, the role of vitamin B<sub>12</sub> as a chemical exclusively produced by bacteria was studied in the present study.

Two series of experiments was conducted to assess the effect of vitamin B<sub>12</sub> supplementation on the fitness of Cladocera when exposed by short-time (3 h) different turbidity levels. The first experiment, comparison of vitamin B<sub>12</sub> supplementation both within the food (using commercial *Chlorella*, which contained vitamin B<sub>12</sub> in the cell) and supplemental vitamin B<sub>12</sub> in the grown media (0, 5, 25 µg/l) were assessed to investigate mitigation possibility of damaged by turbidity exposure (0, 15, 50, 100, 600 NTU, using kaolin clay) to small Cladocera, *Moina macrocopa*. Supplementation of vitamin B<sub>12</sub> both in media and/or food have ability to maintain fitness of *M. macrocopa* compare to the one without vitamin B<sub>12</sub> supplementation. The absence of vitamin B<sub>12</sub> together with turbidity exposure had decreased lifespan, delayed the age at first reproduction, and decreased offspring number and size (P<0.05). The second experiment, vitamin B<sub>12</sub> (0, 5, 15, 30 µg/l) was added only in the grown media of *Daphnia magna* when exposed to different turbidity levels (0, 15, 50, 100, 600, and 1200 NTU). Supplementation of vitamin B<sub>12</sub> result significantly lower lifespan (P<0.05) compare to the group with absence of vitamin B<sub>12</sub> in the media. However, the average offspring produced by *D. magna* was significantly higher (P<0.05) in the highest dose of vitamin B<sub>12</sub> supplementation. Male and malformation neonates were recorded especially in the group with 0 and 5 µg/l of vitamin B<sub>12</sub>. Although it is found very subtle, the total ratio of male and malformation offspring was vitamin B<sub>12</sub> dose dependent. Both species were responds differently to the short-time turbidity change. *D. magna* were more tolerant when exposed to short-time turbidity by kaolin clay compare to small Cladocera, *M. macrocopa*. Overall, this study revealed that the presence of vitamin B<sub>12</sub> has a role to mitigate the damaged caused by short-time turbidity changed for Cladocera zooplankton.

(備考) 日本語 (2000 字以内) または英語 (500 ワード以内) にまとめて記載