

STUDIES THE EFFECT OF EXOGENOUS
THYROXINE (T₄) ON MARBLE GOBY
(*Oxyeleotris marmoratus* BLEEKER) LARVAE

ASMANELLI

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Abstract of thesis presented to the Senate of Kolej Universiti Sains dan Teknologi
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**STUDIES THE EFFECT OF EXOGENOUS THYROXINE (T4) ON
MARBLE GOBY (*Oxyeleotris marmoratus* Bleeker) LARVAE**

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August 2005

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A study on the effect of the thyroid hormone, thyroxine (T4) on marble goby (*Oxyeleotris marmoratus*) during the early larval development was carried out in hatchery unit, Kolej Universiti Sains dan Teknologi Malaysia. Thyroid hormones in the marble goby were detected at hatching even though the thyroid follicles were not yet developed. The first T4 cells were not recognized as follicles but appeared as domain of non follicular cells that appeared dark brown on anti T4 staining section. The first thyroid follicles in marble goby were observed at 13 days after hatching (DAH). T4 was detected in the larvae at hatching, and increased till 2 DAH indicating the onset of endogenous thyroid hormones production. T4 level started to decrease from 3 DAH till 7 DAH, and then increased again from 10 DAH onwards. The decrease of T4 level was consistent with the mortality pattern of marble goby larvae occurred at this stage, and showed that the larvae endocrine organs were not yet fully functional, even though production of THs has began. The increased of T4 level at 10 DAH onwards indicated that the endocrine organs began to function again but T4 level remained low. The appearance of thyroid follicle at 13 DAH resulted in

progressively increased T4 levels and confirmed that the endocrine organs of marble goby larvae are by now fully functional.

Application of exogenous T4 significantly increased endogenous T4 level ($p < 0.05$) in marble goby, 3-6 times higher than the control group. Histological examination revealed that follicle structure in T4 treated larvae were different from untreated (control) larvae. The follicles of the T4 treated larvae had less abundant colloid, lacked peripheral vacuoles, large and flat follicle cells with squamous epithelium. Whereas the control contained a large amount colloid vacuolated. T4 immunostaining gave a strength signal especially on the follicular epithelium.

The highest rate of yolk sac and oil globule absorption occurred in larvae treated with high dose (1.0 ppm for 1h) and long immersion (0.1 ppm for 24h and 0.1 ppm for 4h). However, it did not significantly ($p > 0.05$) increase total length and daily growth of larvae after 3 days of treatment. The significantly increased ($p < 0.05$) on total length and daily growth occurred for the larvae treated with T4 at 0.1 ppm for 1h and the control only. At 2 DAH, all larvae treated with the high dose and long immersion had completely absorbed their yolk sac and oil globule (100%). Whereas at 0.1 ppm for 1h of treatment and the control, absorbed amount of yolk volume were 88.48% and 50.62% respectively. At 10 DAH, the highest total length and growth rate of larvae treated with T4 at 0.1 ppm for 1h T4 were 4.32 ± 0.08 mm and 0.10 mm day⁻¹, respectively and followed by the control groups which were 3.80 ± 0.07 mm and 0.05 mm day⁻¹ respectively.

Treatment with T4 at 0.1 ppm for 1h stimulated the gastric gland formation earlier at 13 DAH. The number of gastric glands increased and were functional at 23 DAH in the treated group, whereas in the control group the gastric glands started to function at 30 DAH. It showed that the stomach was functional, as proven by the mucous layer lining the epithelium of the stomach. T4 treatment also enhanced intact protein ingestion by pinocytosis in the rectal epithelium and fat absorption in the intestinal epithelium. Another change was the high accumulation of glycogen in the liver cells. Based on these findings, it was concluded that exogenous T4 stimulated gastric gland formation, enhanced the gut absorptive functions especially in the intestine, and glycogen accumulation in the liver of marble goby larvae.