

STUDIES ON MORPHOLOGY AND DIGESTIVE TRACT  
DEVELOPMENT OF TOMATO CLOWNFISH,  
*Amphiprion frenatus* UNDER  
CAPTIVE CONDITION

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## ABSTRACT

The project was investigated on the growth, morphology and digestive tract development of *Amphiprion frenatus* larvae under captivity condition. A total of 15 larvae were sampled from 1 DAH to 20 DAH for measurement of total length (TL), head depth (HD), eye diameter (ED), body depth (BD), Head Length (HL) and Standard Length (SL). For data analysis, Total Length (TL) was used as variable with respect to other morphometric characters to plot relative growth curve. The relative growth equation of SL, ED, BD and HH, HL was established by using Regression. A total of 15 larvae were sampled daily from 1 DAH to 7 DAH for histology procedure. Result showed that *Amphiprion frenatus* hatched at the advance stage with fully developed and functional eye, mouth and fins. Pectoral fin formed at 3 DAH. Notochord flexion occurred at 5 DAH. The complement of the notochord was characterized by the orientation of the caudal fin rays at 4 DAH. The reddish colouration appeared on 17 DAH. At 20 DAH, two white bends were formed and bordered by melanophores along the bend. The total length (TL) has significant relationship with Standard length, Head Length, Head height, Body depth and Eye diameter. Histology of digestive tract of *Amphiprion frenatus* larvae at 24 hours after hatching showed alimentary tract is evident, with gut and liver are differentiated. At 2 days after hatching, an alimentary tract was evident, with distinct stomach, midgut and hindgut. Liver and pancreas are differentiated. On the 5 DAH mouth cavities were well developed. The mouth and pharynx were lined with cubic epithelial cells of irregular shape. It can be concluded that after 8 days of incubation, *Amphiprion frenatus* hatched at the advance stage with fully developed and functional eye, mouth and fins. Relative growth concluded that the total length (TL) has significant relationship with Standard length (SL), Head Length (HL), Head height (HH), Body depth (BD) and Eye diameter (ED). Histology of digestive tract of *Amphiprion frenatus* larvae showed that the *Amphiprion frenatus* larvae have a straight tube closed at the mouth and histologically differentiated along its length at newly hatching. There were also found several functional organs such as liver, midgut and stomach at 1 DAH. It was indicated with the appearance of complete and functional digestive tract at first day hatching larvae. Therefore, live foods such as rotifer are suitable to be fed at early larvae after hatching.

## ABSTRAK

Projek ini difokuskan untuk menyiasat perkembangan morfologi, pertumbuhan dan saluran pencernaan larva *Amphiprion frenatus* melalui pandangan histologi. Sampel diambil daripada induk *Amphiprion frenatus* yang matang dan disenyawakan dalam peliharaan. Setiap pasang induk itu disimpan secara berasingan dalam 90 liter tangki kaca yang dilengkapi dengan paip PVC sebagai tempat pembiakan dan pelet protein 50% sebagai pemakanan. Kesemua tangki dilengkapi dengan sistem air kitaran yang sederhana dan parameter bagi air adalah: suhu 27-28 ° C, kemasinan 30-36,6 ppt, kepekatan oksigen terlarut 5,00-5,94 mg/l, pH 7,9-8,24, fotoperiod 12D: 12L dan kepekatan ammonia 0,0015 - 0,0020 mg/l. Sebanyak 15 larva akan disampel dari 1 hingga 20 DPH untuk pengukuran panjang keseluruhan (TL), kedalaman kepala (HD), diameter mata (ED), tinggi badan (BD), Panjang kepala (HL), dan Panjang Standard (SL). Mikroskop Kamera Lucida digunakan untuk melukis morfologi bagi larva. Untuk analisis data, Panjang keseluruhan (TL) digunakan sebagai pembolehubah bersandar yang berhubung dengan ciri morfometrik lain untuk memplot lengkung pertumbuhan relatif. Persamaan pertumbuhan relatif SL, DE, BD, HH, dan HL dibentuk dengan menggunakan Regresi. Sebanyak 15 larva disampel dari 1 hingga 7 DPH untuk prosedur histologi. Hasil penyelidikan menunjukkan bahawa *Amphiprion frenatus* menetas pada peringkat yang lebih tinggi dengan perkembangan sempurna mulut, mata dan sirip yang berfungsi. Sirip dada terbentuk pada 3 DAH. Fleksi Notokod terbentuk pada 5 DAH. Pembentukan sempurna notokod dicirikan melalui orientasi sinar sirip ekor pada 4 DAH. Warna kemerahan muncul pada 17 DAH. Pada 20 DAH, dua jalur putih terbentuk dan dibatasi dengan melanofor sepanjang jalur itu. Panjang keseluruhan (TL) mempunyai hubungan yang signifikan dengan beberapa parameter morfometrik seperti panjang Standard, Panjang kepala, tinggi Kepala, kedalaman badan dan diameter mata. Histologi saluran pencernaan larva *Amphiprion frenatus* menunjukkan bahawa larva tersebut mempunyai peringkat larva yang lebih tinggi. ( peringkat post larva) .Pada 24 jam selepas penetasan, saluran pencernaan terbukti tidak lengkap, dengan usus dan hati dapat dikenalpasti. Dua hari setelah penetasan, saluran pencernaan terbukti berkembang baik, dengan perbezaan pada perut tengah, perut dan perut belakang. Hati dan pankreas dikenalpasti. Pada 5 DAH rongga mulut berkembang dengan baik. Mulut dan faring digarisi dengan sel epitelium kubik yang bentuknya tidak sama.