

**Introduction**

*Amphiprion percula* is a protandrous hermaphroditic species (Fricke & Fricke, 1977; Moyer & Nakazano, 1978) that exhibits a well-defined social structure. Within each group, there is a size-based dominance hierarchy (Buston, 2003; Buston & Cant, 2006); the female is the largest of the group, the breeding male is second largest, followed by the non-dominant breeding males. This sized-based hierarchy allows for queued breeding positions and the longevity of *A. percula* (Buston & Garcia, 2007).

The only way to become a female in a community of *A. percula* is to complete the entire hierarchy chain, allowing for complete dominance for the female *A. percula*.

Maturation of females may be manipulated in an enclosed and controlled environment via the addition of an estrogenic compound.

Runoff water containing estrogen will have an effect on *A. percula*.

Environmental influences and social behavior of *A. percula* may be better understood under the controlled manipulation of the hierarchal succession.

**Methods**

- Fish of ages 2+ years old were obtained from a captive breeder.
- Reared under a natural photoperiod and water parameters in twelve 20-litre tanks.
- 10 fish were added to each tank and subjected to either a high (≈1.33ppm), medium (≈0.66ppm), low (≈0.33ppm), or no concentration of natural estrogen for 2.5 months.
- Behaviors were observed in 5 minute intervals before euthanization for signs of increased aggression.
- MS-222 was used to euthanize fish, the specimens were then froze.
- Gonads were extracted and stained with Hematoxylin Solution and Eosin.
- Ovaries and Testes were examined and maturity stage was determined using a technique similar to Kokokiris’ method.

**Results & Discussion**

- Specimens subjected to higher concentrations of estrogen exhibited significantly more female-like qualities than those of lower concentrations.
- This study suggests that estrogenic compounds do inhibit male qualities.
- Female aggression increases with higher concentrations of estrogen.
- The production of spermatocytes is not inhibited in males by low amounts of estrogen.
- An increase of ovarian tissue is observed in experimental groups obtaining higher concentrations of estrogenic compounds.
- This study suggests that runoff water containing estrogen may impact sex change in hermaphroditic fish, but concentrations need to be at a significant level to do so.

**Literature Cited**


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**Figure 1.** Total observed behaviors of specimens within each estrogen concentration. Each behavior was compared to the control to determine a significant difference.

**Figure 2.** Stage of maturity in clownfish after two months of being exhibited to estrogen. 1 = Premature spermatocytes; 2 = Mature Spermatocytes; 3 = Degeneration of spermatocytes and an increase of ovarian tissue (See Figure 3).

**Figure 3.** Stages 1, 2, & 3 of the maturity of clownfish. Dots represent spermatocytes, dark purple represents ovarian tissues, and light purple exhibits testicular tissues.

**Figure 4.** Social hierarchy of *A. percula*.