

Aggressive behavior of marine fishes

Psychology, Behaviorism



The notion of “survival of the fittest” of Charles Darwin denotes competition in the available life resources among living organisms. Biologists typically classify competition as exploitative or scramble competition and interference or defense competition (Reebs, 2008). In exploitative competition, the species explore every nook in the environment to search for the best niche, ample food supply or even the best mate.

On the other hand, defense competition results when a particular species defend their niche, food stuffs, offspring, and mate against invading animals (Reebs, 2008). With these, animals show aggressive behaviors to warn other species or to defend themselves.

Hierarchical Social Structure Among Fishes

Chasing and biting are commonly observed among fishes especially when a new one was placed in the group of fishes in a tank or an aquarium. Aggressive behaviors are shown by dominant fishes in the group until such time that a certain order was attained within the group where specific place for every fish has been defined (Reebs, 2008).

This is called as hierarchy among fishes for a single fish dominates other fishes in the group. Since fishes not only spend high energy in fighting but also suffer injuries (Reebs, 2008), the attainment of harmony within their group through hierarchical social structure benefits them all.

This phenomenon is observed among the school of salmonids, eels, centrarchids, catfishes, poeciliids, and other species (Reebs, 2008).

In the hierarchy, the dominant fish tends to limit the access of subordinate fishes to available life resources such as food. As commonly observed in

brown bullhead, salmon, cichlids, and medaka, the dominant fish chases subordinate fishes away from food resources (Reebs, 2008).

Thus, they are forced to occupy the barren part of the habitat. As a consequence, fishes in the lower ranks are prone to stress due to annoyance and bullies of dominant fishes.

This stress induces them to release metabolic hormones, as revealed by blood analysis of subordinate fishes (Reebs, 2008), that may affect then their physiological processes including growth and reproduction.

The stability of the dominant status depends on the type of fish species. For instance, rainbow trout can remember their hierarchical place. Even if there will be a reduction in the physical strength of the dominant fish, lower rank fish would not attempt to take advantage and stage a coup (Reebs, 2008).

On the contrary, catfishes in lower rank often look for an opportunity to dethrone the dominant fish as it shows weakness (Reebs, 2008). In the same manner, as the dominant males of cichlid guard the breeding areas, subordinate males always look for an opportunity of entreating females. These experimental observations proved the social dynamics among fishes.

Territorial Defense and Aggressive Behaviors

It was observed among *Cottus bairdii* and *Rhinichthys cataractae* that adults used to occupy the deeper part of their habitat while the young forages on the shallow part (Reebs, 2008). This condition not only exposes the young to the threat of predation but also limits their food access.

Meanwhile, in *Betta splendens*, the nest-holding males tend to display more aggressive behavior during the female laying of eggs and even more after the hatching of eggs (Jaroensutasinee and Jaroensutasinee, 2003). Also, black-belt cichlids, *Cichlasoma maculicauda*, assault egg predators more ferociously than non-egg predators (Reebs, 2008). They usually fry the enemy at a particular distance before launching an attack.

This territoriality in terms of food resources defense is effectively done over fairly small habitat. If food resources are in a vast area, the dominant fish can hardly provide efficient protection, hence, leading to non-display of aggressive behaviour (Reebs, 2008).

Trout and salmon have been observed to occupy and protect vast areas when food resources are limited. This means that territorial defense is absent if the ecological needs are distributed in vast areas and if the number of intruders is great as compared with the inhabitant fishes (Reebs, 2008).

Mating and Aggressive Behaviors

Fish may acquire aggressive behavior by merely just observing aggression between conspecifics (Clotfelter and Paolino, 2003). The presence of audience during fish fight may reason out for the increased behavioral display between fighting fishes (Doutrelant and McGregor, 2000).

In *B. splendens*, male-fight losers used gill cover to attract non-witness female while the winner displayed to both witness and non-witness females (Herb, Biron, and Kidd, 2003). After witnessing the two-male wrestle, the female fighting fish, *B. splendens*, spent time more often with the winner

while failure to witness the event, the female visited more often the loser (Doutrelant and McGregor, 2000).

Conversely, although size-advantage males of *B. splendens* species have more chance of winning male-fight but the winning does not affect female preferences of mate (Jaroensutasinee and Jaroensutasinee, 2001).

Dominant males of swordtails and guppies delve on the larger part of their habitat including the dwelling place of the females (Reebs, 2008). Due to dominant exclusion, the sexual activities of subordinate fishes tend to be suppressed.

This process of exclusion paves the ways for the subordinate male guppies to spontaneously develop a more robust body color that is more attractive for female guppies, thus, regaining the chance for mating (Reebs, 2008).

Biological Bases of Aggression

Aggressive behaviors among animals are typically attributed to the biochemical function of the androgens. Researches revealed that by androgen decrease in a number of animal male species through castration lessened aggression while injection of hormones to castrated males caused regained aggressions (Desjardins, Hazelden, Van der Kraak, and Balshinea, 2005).

Based on the findings of the group of John Wingfield, aggression can also be ascribed to physiological causes. They postulated through Challenge Hypothesis that aggressive encounters among males of the same species lead to production of androgens (Desjardins, Hazelden, Van der Kraak, and Balshinea, 2005).

Their notion resulted to the emersion of several studies relating aggressive behaviors with increase in androgen, urinary, plasma, and fecal level.