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Breeding Behaviour of Ornamental fish

1Bhavesh Dewangan, 2Dr. Manoj singh, 3Urvashi Sharma

1Students , 2Guide, 3Guide

1Kalinga University ,

2Kalinga University ,

3Kalinga University

Abstract:- Ornamental fish exhibit a diverse array of mating systems, courtship behaviors, spawning techniques, and parental care practices as part of their reproductive strategies. This research aims to elucidate these behaviors to enhance the success of captive breeding, which is essential for both the aquarium industry and conservation initiatives. These fish display various mating systems, such as monogamy, polygamy, and promiscuity, each influencing courtship behaviors and reproductive outcomes in unique ways. Courtship often involves visual displays, intricate movements, and nest building to attract potential mates. Spawning methods vary significantly, from simply releasing eggs without further parental involvement to more complex behaviors like mouthbrooding and bubble nest creation. Parental care can range from complete absence to active participation by one or both parents, significantly impacting offspring survival rates. Environmental factors, including water quality, lighting, and food availability, are critical for successful reproduction. This study addresses the challenges of breeding ornamental fish in captivity, such as mate selection, breeding tank setup, and offspring management. Additionally, it explores the implications of genetic diversity and the study of animal behavior in relation to breeding practices. Gaining insights into these aspects of reproductive behavior in ornamental fish not only supports the maintenance of healthy captive populations but also strengthens conservation efforts in light of the threats facing these species.

Introduction:-

The practice of maintaining aquariums is a time-honored tradition that has evolved into a widely embraced hobby. Due to its high demand globally, the breeding and sale of ornamental fish for aquariums can serve as a viable source of income. Approximately a century ago, the domestication of goldfish began in China (Witte and Schmidt, 1992). The Romans were the first to utilize glass aquariums (Courtenay and Stauffer, 1990). In the 18th century, goldfish were introduced to England, and the ornamental fish trade originated in Germany. By the 19th century, countries around the world had adopted the practice of keeping ornamental fish. A decade ago, Chinese scientists successfully mutated goldfish, resulting in various new types. Most

ornamental fish species are of Asian descent and are commonly referred to as aquarium fish (Laha and Das, 2007). The cultivation of these species has emerged as a means of employment for rural communities. The breeding and production techniques for ornamental fish vary by species, influenced by their reproductive habitats and psychological conditions (Courtenay et al., 1984). While numerous techniques exist for breeding ornamental fish, the specific methods for certain species remain closely guarded secrets (With Worth, 1996). Farmers have largely relied on their own ingenuity, developing unique methods through years of experimentation (Ogilvie, 1969). Aquarium fish are generally categorized into two groups: egg layers, which lay eggs, and live bearers, which give birth to live young. Live bearers, known for their resilience and striking appearance, are particularly well-suited for home aquariums. Mollies, among the most favored fish in the aquarium hobby, are often kept by enthusiasts, with many having owned at least one of these gentle and appealing live bearers in their tanks. It is a common misconception that there is only a single species of molly available.(Das,S.K and Kalita.N(2003))

Guppy fish:-

Guppies have long been a fundamental part of the aquarium hobby. Hailing from the tropical waters of South America and the Caribbean Islands, these fish are now offered in an extensive array of colors, thanks to selective breeding practices at fish farms. Many enthusiasts may begin with just one or two guppies, but due to their live-bearing nature and ability to store sperm for extended periods, it is likely that your aquarium will soon be filled with them.(Ahmed et al.1985) Between December 2014 and March 2015, a team of researchers conducted an investigation into the breeding biology of the *Poecilia reticulata* guppy fish at the Government College for Women (A) Kumbakonam, affiliated with Bharathidasan University. The study revealed that guppies breed throughout the year, rather than being limited to a specific period from December to March. During the breeding season, these fish gave birth to fry multiple times, demonstrating their viviparous nature as repeat breeders. The gestation period for the guppies ranged from 20 to 35 days. This research focused on the various developmental stages of the *Poecilia reticulata* fry, with each brood containing between 10 and 70 fry. The newly born fry exhibited a translucent or slightly dark coloration, a slender physique, and well-formed jaws, and they were fully capable of feeding, swimming, and evading threats(A.ARUL JOSHPIN 2015).

**Characteristics:-****Family- Poeciliidae****Origin- Native to south America****Diet- Omniverse****Breeding- live Bearer****P.h.- 6.5-8.0****-(kaira et al.1967)****Molly fish:-**

The fish known as Molly derive their name from the original scientific classification of their genus, Mollienisia, established in 1846. Subsequently, the genus was reclassified as Poecilia, named after the family Poeciliidae. This genus includes some of the most striking and unique varieties of live-bearing fish (Perera&Lanka, 2023). Among them, the sailfin molly stands out as one of the most exotic fish across all genera. While other species of mollies may share similar physical traits, they lack the prominent dorsal sailfin. Mollies exhibit a wide range of color variations and are generally resilient, although they thrive in warmer aquarium conditions. When live-bearers experience cold temperatures or other forms of environmental stress, they may exhibit a condition commonly referred to as 'shimmies.' This condition is not an infectious disease but rather a manifestation of stress-related symptoms.

The commerce surrounding ornamental aquariums has led to the introduction of various non-indigenous species into freshwater ecosystems. This research reveals a significant population of non-native mollies residing in Lake Vouliagmeni, a tectonic brackish geothermal lagoon situated near Athens, Greece. The Vouliagmeni honey beetle has been accurately identified as *Poecilia latipinna* (Lesueur, 1821), commonly known as the true sailfin molly, through the meticulous counting of its scales.

Overview of Species:

Commonly referred to as the short-finned molly, sailfin molly, black molly, white molly, golden molly, lyretail molly, and dalmatian molly.

Scientific classification: *Poecilia* sp.

Maximum adult size: Approximately 5.5 inches.

Average lifespan: 5 years.

Characteristics:-

Family	poeciliidae
Origin	South&Central America, Maxico
Social	Peacfully
Diet	Omnivores
Ph	7.5-8.5



Betta fish (Siamese fighting fish):-

Betta fish (*Betta splendens*), commonly known as Siamese fighting fish, rank among the most favored freshwater aquarium species globally, celebrated for their vibrant colors, diverse fin shapes, and manageable care requirements. If you are considering the addition of ornamental fish to your collection, bettas present an excellent choice. There are more than 70 distinct varieties of bettas that have been selectively bred for particular characteristics, such as fin design, pattern, and color(Comizzoli&Holt,2019).

Overview of the Species:

Commonly known as Betta or Siamese fighting fish

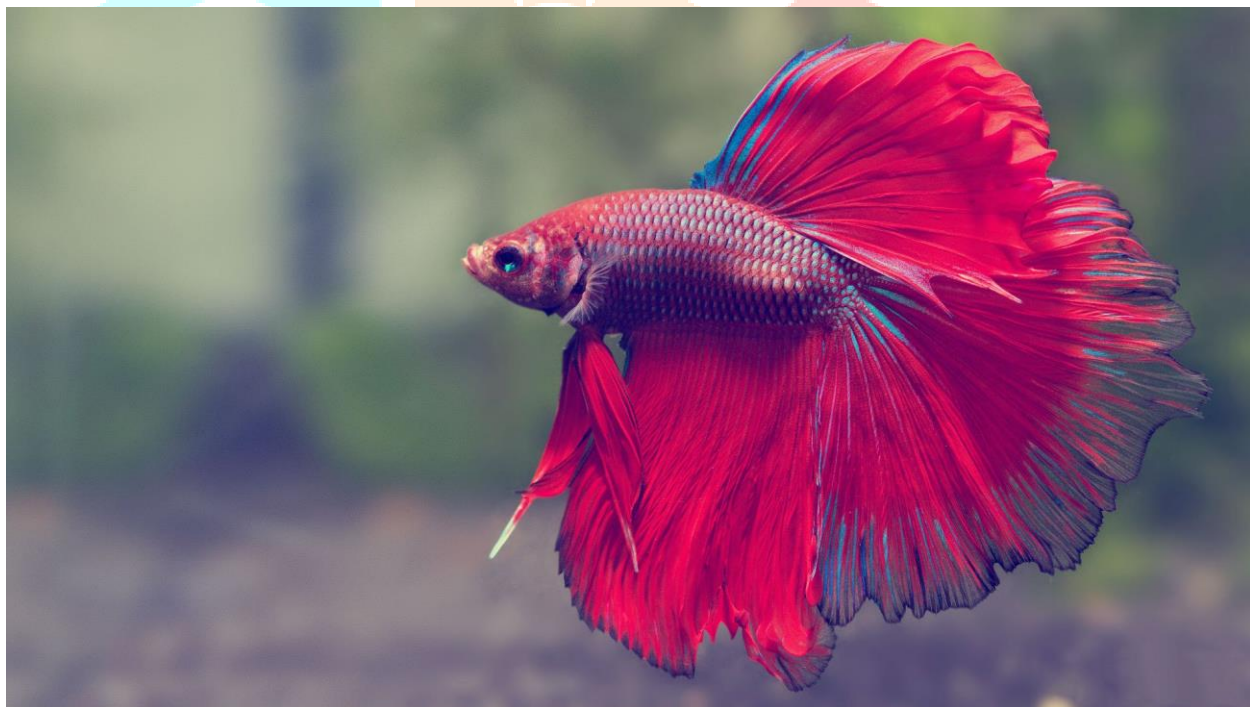
its scientific designation is Betta splendens.

The average adult size reaches 3 inches (7 cm),

its life expectancy ranges from 3 to 5 years.

Characteristics:-

Family	Belontiidae
Origin	Combodia, Thailand
Social	Males cannot kept together
Diet	Live foods, pallets, flakes and frozen foods
Breeding	Egglayer(male is bubble nest builder)
Ph	6.8-7.4



Methodology:-

Breeding behavior of guppy fish:-

1. Choose the fish you wish to breed, considering the desired quantity, their coloration, and tail shapes. If you select two fish with identical color patterns, their offspring will inherit those patterns. The same rule applies to fin shapes. For breeding, it is advisable to choose one male and two or three female guppies. A one-to-one ratio often leads to aggression from the male, who may chase the female. However, a one-to-three ratio allows the male to distribute his attention among three females, resulting in a less stressful breeding experience for them. Guppies exhibit various color patterns, including Wild (grey or olive), Albino (light or white with red eyes), Blonde (light with black pigment), and Blue (shimmering blue). Tail shapes in guppies vary from rounded to sword-like, with common types being the Delta (large triangular), Fantail (fan-shaped), and Round tail (small and round).
2. **Select the breeding tank.** You should select a 10 to 20 gallon tank with a heater and a gentle filter. You want the filter to be gentle because otherwise the baby guppies (which are called fry) could be sucked up the filter and killed. If you think your filter is too strong, cover the opening of the filter with sheer tights. The tights will allow the water to be filtered, but will also protect the fry.
3. Prepare the aquarium. Unfortunately, guppy parents may exhibit cannibalistic behavior, necessitating the provision of hiding spots for the fry once they are born. Guppy fry typically sink, so it is advisable to utilize low-floating plants for their shelter. Additionally, some elevated cover is essential, as healthy fry will swim upwards.
4. Modify the aquarium to accommodate the requirements of your fish. Maintain the temperature between 77-80°F (25 to 27°C) while both the males and females are present in the tank. Prior to introducing the guppies into the breeding tank, acquire food that is enriched with higher nutritional content to facilitate healthy breeding.
5. Transfer the guppies to the breeding tank. At this stage, the only action required is to wait for the fish to reproduce. Once you observe that the female(s) are pregnant, return the male to the main tank. You can determine if a female guppy is pregnant by checking for a dark spot on her abdomen, known as a gravid spot. All female guppies will exhibit this mark when pregnant, but it becomes significantly darker once the eggs have been fertilized.
6. Recognize the signs that your fish is nearing the time to give birth. Typically, the gestation period lasts between 26 to 31 days. When a female guppy is approaching labor, her abdomen will appear significantly enlarged, and her gravid spot will turn a deep black or dark maroon if you are breeding albino or blond guppies. Additionally, her abdomen will take on a squared shape, resembling a cardboard box, rather than becoming rounder. It is important to note that guppies give birth to live young rather than laying eggs. Therefore, you must closely observe your pregnant female to ensure you are present during the birthing process, allowing you to promptly remove her from the tank afterward, as she may consume her offspring otherwise.

Breeding behavior of molly fish

1. Facilitate the mating process among the fish. Mollies exhibit a hierarchical social structure, where the male with the largest fins and most vibrant colors assumes a dominant role. Consequently, the optimal pairing consists of one male and several females. It is common to observe the male positioned beneath the female during copulation. If the mating is successful, the offspring will typically be born within a timeframe of approximately 3 to 5 weeks.
2. It is advisable to remove the female fish from the aquarium prior to the onset of birthing. If feasible, transfer her to a separate 'nursery' tank. The male fish frequently pursues the female, eager to mate, which can induce stress during her pregnancy. A pregnant molly can be identified by her noticeably swollen abdomen. If a 'nursery' tank is unavailable, consider utilizing an aquarium net breeder, which is a mesh cube with plastic edges designed to safeguard both the mother and her offspring. Additionally, removing the mother from the main aquarium serves to protect the fry, as molly fish are known to cannibalize their young. It is important not to delay this process until the birthing date approaches, as stressed mollies may experience a higher incidence of aborted births and stillborn fry.
3. Reintroduce the female fish into the primary aquarium. It is advisable to relocate her with the other fish to ensure the safety of the fry, as she may consume her own offspring. Approximately once a month, it may be necessary to separate the mother again, as female molly fish can hold onto several fertilized eggs for nearly six months.

Breeding behavior of betta fish:-

1. Bubble nest construction

- Male bettas construct bubble nests at the water's surface utilizing saliva and air bubbles. This nest provides a safe environment for the eggs.

2. Courtship and mating

- The male will showcase his vibrant colors and fins to attract a female. Subsequently, he will attempt to lure the female beneath his bubble nest. Once they engage in an embrace, the female will release her eggs, which the male will then fertilize. This process of embracing and releasing eggs will be repeated several times.

3. Egg care

- The male will collect the eggs and position them within his bubble nest. He will safeguard the eggs and may incorporate additional bubbles if required. The male will oversee the eggs and fry for several days until they are sufficiently developed to swim on their own.

4. Aggression

- It is essential to recognize that betta fish, particularly males, may exhibit aggressive behavior towards other fish and even fellow bettas, especially during the breeding period. It is vital to oversee the breeding process and to separate the female if the male displays excessive aggression.

5. Compatibility

- It is essential to recognize that betta fish, particularly males, may exhibit aggressive behavior towards other fish and even fellow bettas, especially during the breeding period. It is vital to oversee the breeding process and to separate the female if the male displays excessive aggression

Conclusion:-

The cultivation of ornamental fish has emerged as a thriving industry in various regions of India. The breeding methods for livebearers are relatively straightforward, as they give birth to live young. It is essential to raise the offspring in separate glass tank systems to prevent cannibalism by their parents.

By ensuring that the appropriate physicochemical parameters are upheld in the glass tanks, it becomes feasible to successfully rear live bearers; however, these parameters must be monitored weekly to remain within the optimal range.

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