

Ornamental Fish

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It has been estimated that 1.5 to 2 million people worldwide keep marine aquaria with 600,000 households in the United States alone (Lewbart *et al*, 1999). Estimated value of marine ornamental trade is 200-330 million US\$ per year (Chapman and Fitz-Coy, 1997; Larkin and Degner, 2001). Unlike freshwater aquaria species, where 90 per cent of fish species are currently farmed, the great majority of marine aquaria are stocked from wild caught species (Andrews, 1990). According to data held in Global Marine Aquarium Database a total of 1,471 species of marine ornamental fishes are traded globally. Most of these species are associated with coral reefs although a relatively high number of species are associated with other habitats such as seagrass beds, mangroves and mudflats. Generally the ornamental fishes found in mangroves represent marine species along with inclusion of freshwater species. During the rainy season, the increased flow of freshwater results in the appearance of freshwater species. However, the majority of dry season species cannot survive in these low salinities and migrate to higher salinity areas offshore. Mangroves are valuable ecosystems that act as nurseries and feeding grounds for many fish and crustaceans and non-resident fish that enter the mangroves to feed at high tide. These brackish waters are home to an amazingly diverse and unique group of fishes, some of which are commonly available to keep in the home aquarium. These fish include perch, archers, scats, monos, certain livebearers, gobies, and others. The present article provides information on available ornamental species of Parangipettai mangroves and explain their aquarium maintenance.

Collection, Identification and aquarium behavior of mangrove ornamental fishes

Generally the ornamental fishes are selected based on their body color (preferably attractive), body shape (unique shape compared to food fishes), and aquarium suitability. Based on these general characters the present article identifies some of the ornamental fishes from the Parangipettai mangrove areas. The ornamental fishes are collected by

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the help of dugout canoes or boat seines. The gears are bag nets, scoop nets and cast nets. The collected fishes are transported by the help of buckets with battery aerator. They are initially acclimatized to the tank environment. The healthy fishes are transported to the marine research aquarium for aquarium studies.

Ornamental fishes collected from Parangipettai mangrove waters

Scatophagus argus - Scat

The body is disc shaped, deep and compressed. Head very small, bluntly pointed and triangular in shape, with a deep concavity just above the eye. Very small terminal mouth. The lateral line is distinct, complete and curved. The body color varies with age, when young it is quite dark, but from size of about 5 cm becomes greenish, bluish or brownish with a silver sheen. Most part of the body especially posterior and dorsal region covered with large rounded brown spots which extend on to dorsal, anal and caudal fins. Abdominal region silvery. Fins grey-brown. Generally it spawns in the sea, but the larvae and young stages occur in mangroves and estuaries.

Distribution

Found in Japan to the Indo-pacific region including the South China Sea.

In aquarium

Active, peaceful, shoaling. It is best to get the mature fish accustomed to seawater as they can then be kept with other fishes. In aquarium it will eat anything, so called as dung eater.

Monodactylus argenteus - Silvery Moony

Body deep, strongly compressed, rhomboid in shape. Eye moderately large, longer than snout length. Anterior dorsal profile slightly convex or steep originating from dorsal fin origin to snout. Small terminal mouth. Lateral line complete and strongly arched. Pectoral fin very short, Pelvic fin minute and close to anus. Anal fin base longer than dorsal fin base. Both anterior lobes slightly falcate. Caudal fin emarginated; dorsal fin dusky yellow with blackish tip; narrow black bar on head through eye, another behind over gill cover. Body silvery. Juveniles more colorful with yellow over most of the dorsal fin and two vertical black bands over the head. Commonly found in mangrove estuaries, often entering creeks. Juveniles solitary or in small aggregations.

Distribution

Found in southern Japan, Malaysia, Indo-west Pacific and Red Sea.

In Aquarium

It always swims within its group but compatible with other fish like scats. Previous records showed that this species can spawn in aquaria. It is a popular aquarium fish.

***Hemiramphus far* - Halfbeak**

Body elongate and subcylindrical with slightly flattened abdomen. Large terminal mouth greatly prolonged, beak-like lower jaw; upper jaw short, triangular and without scales. Dorsal and anal fins set far back nearer to caudal fin base. pectoral fins short, not reaching past nasal pit when folded forward; with 3-9 (usually 4-6) vertical bars on the sides. Lower lobe of caudal fin longer than upper lobe. Dark- bluish on dorsal region and silvery below, with a dark or black band from above pectoral fin origin to caudal fin base. About 4 dark vertical bars along upper region of body. Tip of lower jaw bright red. Upper lobe of caudal fin bright yellow, the lower lobe dark.

Distribution

Found in Indo-West Pacific Region, from South Africa northward along the east African coast, Red Sea and also India, Pakistan, Sri Lanka, Bangladesh, Southeast Asia and Japan.

In aquarium

It always swims near the surface of the aquarium and therefore it can be kept with schooling fishes occupying the middle and lower strata of the tank. It is one of the good looking fishes in the public aquarium because of its long beak like lower jaw.

***Therapon jarbua* - Crescent perch**

Body slightly deep and oblong, height longer than head length and less than one third of total length. Head naked anteriorly and dorsal region. Snout obtuse. Large terminal mouth. Dorsal fin with a deep median notch dividing dorsal fin nearly into 2. Pectoral fin shorter than pelvic fin, its base is in front of pelvic fin origin. Anal fin origin below the dorsal notch. Caudal fin forked. Body color is fawn above, cream below, nape dark; head, body and fins with and iridescent sheen. Three or four curved dark brown bands run from the nape to the hind part of the

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body, the lowermost continuing across the middle of the caudal fin. The middle stripe confluent with the longitudinal band on the body. This fish inhabits coastal waters, mangroves and estuaries in abundance, often venturing far up rivers almost to freshwater. It has reportedly been seen to spawn in shallow places in the rivers.

Distribution

Found in Japan, western Pacific, South China Sea, the Straits of Malacca, the Indian Ocean and the Red Sea.

In aquarium

The juveniles are peaceful but active in aquarium but as they mature become more solitary and aggressive and therefore less popular for aquaria. It is a predatory in nature also it will eat all the marine foods in aquarium.

Leiognathus splendens - **Splendid ponyfish**

Body oval and strongly compressed. Dorsal profile more convex than ventral profile. Head small with concave head profile. Snout obtuse. Mouth horizontal, pointing slightly downward when protracted; line of closed mouth passing below eye; a narrow brown band around end of snout. Lower edge of operculum and margin of supraorbital serrated. Caudal fin forked. Upper region greyish with dark wavy vertical lines along the body originating from dorsal profile. Lower region silvery. Snout tip dark or black. Lateral line scales, pectoral fin base and dorsal and anal fins margins bright yellow. Black blotch on tip of anterior dorsal fin lobe.

Distribution

Found in Indian ocean, the South China sea and western central Pacific, Australia and Fiji.

In Aquarium

It is a very active fish in brackishwater aquarium. It feeds on fish and prawn meat. The protrucible mouth becomes good-looking during their feeding in aquarium.

Platax orbicularis - **Roundfin Batfish, Orbiculate batfish**

Body orbicular and strongly compressed, its depth more than twice length of head and 0.9 to 1.4 times standard length. Snout profile of large adults (above 40 cm total length) concave, with bony swelling

between eyes. Pectoral fins short and rounded, pelvic fin longer. The juvenile mimics a dead leaf at this initial stage of its life, and in nature it can be seen lying on its side in shallow water to promote this deception. A round body of reddish brown and large round fins contributes to the commanding presence of this fish. Adults (above 20 cm) yellowish silvery or dusky, dark bar through eye and another bar just behind head. Occasionally with a few small, scattered black spots on body. Median fins yellowish, with black margins posteriorly. Pelvic fins black. Small juveniles reddish brown, with irregular black spots and blotches and small white (black-edged) ocelli on body. Small black spot at base of last 3 dorsal- and anal-fin rays. Caudal fin transparent except for base, which is reddish brown.

Distribution

Found in the Red Sea and east coast of Africa to India and also through the Indian Ocean to China, Malaysia and Australia.

In aquarium

Their mimicry from light brown to black is well known in aquarium conditions. It can potentially grow to an adult size of 15 inches in aquarium, measuring from the tip of the dorsal to the tip of the anal fin. It is peaceful and hardy but grows very quickly. The 15 inches fish will consume food of almost 100 grams of frozen fish in a single time.

***Siganus javus* - Rabbit fish**

Body oval, deep, strongly compressed and slightly elongated. Head small. Snout pointed. Small terminal mouth. Lateral line nearly parallel to dorsal profile. A procumbent spine before origin of dorsal fin, usually embedded in thick skin. Caudal fin emarginate. Body bronze above, white on belly and thorax. The numerous round pale- grey spots on the body which lengthen and coalesce to form long, wavy lines on the lower side of the body. Spines and rays of dorsal anal and pelvic fins golden with either dusky or golden membrane. Pectoral fin golden hyaline and caudal fin dusky, sometimes with faint vertical bars.

Distribution

Found in India, Bangladesh and Sri Lanka, and from the Indo-Malayan Archipelago to New Guinea.

In Aquarium

It always swims in groups. It also accommodate with the surgeon fishes in the marine reef aquaria. It mostly prefers vegetable feed.

***Ambassis gymnocephalus* – Naked head Glassy- Perchlet, Cardinal fish**

Body compressed and elongate. Mouth terminal and oblique. Lower jaw longer than upper jaw. Pelvic fin abdominal, set below the origin of pectoral fins. Pectorals longer than pelvic. Lateral line interrupted below 8th dorsal spine. Caudal fin deeply forked. Body transparent with silvery reflections on sides of head and body. A dark stripe in the middle of the body which is not always distinct. A black spot posteriorly on fin membrane between 2nd, 3rd and 4th dorsal spines. Tips of caudal and base of pectorals dusky.

Distribution

Found in Malaysia, Singapore, Indonesia, India, the Philippines, China and northern Australia.

In Aquarium

It is more attract in aquarium for its glassy nature. It is moderately acclimatized in aquarium. Once it is set in aquarium environment, it can tolerate the change of aquarium water quality. It can adopt to live in freshwater aquaria also.

***Periophthalmus barbarus* - Mudskipper**

Eyes protruding and close together with lower eyelid fold, snout deep, mouth horizontal. Two separate dorsal fins, the first high, with 11 flexible spines, the second lower, its base longer than the distance from end to caudal fin origin, pectoral fins with a long muscular lobe, pelvic fins united across bases. Caudal fin with lower rays short, and stout. Color is brownish with oblique dark bars, belly lighter; dorsal fins with a broad distal longitudinal dark band and pale edge. Inhabits exposed intertidal mudflats and mangrove swamps and spawns in burrows.

Distribution

Found in West African coast and Asian countries.

In aquarium

It always stands in the bottom of aquarium with the head projecting above the bottom. This habit attracts hobbyist. Some time it burrows into under gravel filter in aquarium. It will take fish meat.

***Arothron sp* – Puffer fish**

Body oblong and nearly cylindrical in cross section (globular when inflated). Dorsal profile of body convex. Entire head and body, except for lips, caudal peduncle and fins, covered with prickles. Eye moderate, situated above level of mouth and below head dorsal profile. Moderate terminal mouth. Lateral line conspicuous, strongly curved anteriorly. Dorsal and anal fins situated far back on body. Anal fin originating behind dorsal fin. All fins rounded. Head and body uniformly brown to dark grey above and white below. A dark blotch at base of pectoral fin. Caudal fin with dark outer margin.

Distribution

Found in Indo-pacific, South China Sea and Indian Ocean.

In aquarium

It is attractive when it balloons on being disturbed. It feeds on all marine animals chopped animals. It can tolerate other companions like scat, therapon but does not swims together.

***Chelanodon patoca* - Milk-spotted Pufferfish.**

Dorsal profile slightly convex. Head and body naked except for a spiny patch on back, originating from nape and ending in front of dorsal fin, and another patch on ventral side of body, originating below anterior margin of eye and ending in front of anus. Eye moderate, situated below dorsal profile of head. Head dorsal profile convex, snout blunt. Moderate terminal mouth with fleshy lips. Dorsal and anal fins situated far back behind body. Anal fin originates below middle region of dorsal fin base or slightly behind. Caudal fin slightly rounded. Head and body with round white blotches and also with 4 broad dark transverse bands. Lower part of head and body white. Caudal fin brownish with white spots anteriorly. Other fins white or yellow.

Distribution

Found in Indian ocean to Southeast Asia and extending North to southern Japan and South to Australia.

In aquarium

It is well adopted in the brackishwater aquarium. It looks like a helicopter in aquarium and an attractive fish in public aquarium. It feeds on all the chopped marine animals.

***Mystus gulio* - mangrove cat fish**

Body elongate and sub-cylindrical with broad, rounded and depressed head. Eye moderate. Three pairs of barbels, situated around mouth. Lateral line complete and distinct, anterior part granulated. Caudal fin forked. Body dark grey-blue above and milky white on the abdominal region. Maxillary barbels blackish. Sometimes when young it can exhibit pale stripes along the body. It is easily differentiated from the other species by the combination of its greyish silver colour and small adipose fin.

Distribution

Bangladesh, India, Indonesia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Viet Nam

In aquarium

This species lives in both fresh and brackishwater aquarium. It always swims above the bottom and feeds by olfactory sense rather than sites. It feed on pieces of fishes.

Some basic glimpses of brackishwater aquarium keeping

Brackish water aquariums are unique and are easy to maintain since the fish from brackish waters are designed to withstand frequent salinity and water parameter changes unlike both fresh and saltwater fish. The equipment for a brackish water tank is similar to a freshwater tank but with a few additions. Generally 70 gallon or larger aquarium is required for brackish water aquaria. The best filters for a brackish tank are basic mechanical filter and canister filters. The undergravel filters will not work properly with a sand substrate. Brackish water evaporates faster than fresh water and therefore the tank should be covered by wood or plastic. Atleast 1.5 watts of light per gallon is suitable for this aquarium. The suitable substrates are sandy, silty, muddy or crushed shell material. Among these sand is the best option for a brackish water aquarium. The synthetic salts are also contributes moderately to the success of brackishwater aquarium.

Tank

The size of the tank depends on the species to be kept but they should be allowed quite a generous amount of space because water with salt dissolved in it will contain less oxygen. There should be nothing metallic

in the tank or any of the equipment because the salt will cause it to corrode.

Filtration

An external power filter is probably the best option and easiest to maintain. It should be set up to deal with mainly biological filtration, and importantly the water returning to the aquarium should be made to agitate the surface in order to increase the oxygen levels in the tank.

Substrate and aquascape

Aquarium sand or gravel will do for the substrate, but it should also have a few handful of either Aragonite sand or coral sand included to help buffer the water. The decor can be made up from stones and/or driftwood along with some salt tolerant plants, although plastic plants may prove to be the best option long term. A decoration made up of mainly driftwood arranged into thick tangles will give the most natural look because it will look like the roots of mangroves.

Water condition and Chemistry

This is crucial and it must be right if the fish are to thrive in the long term. Temperature of 76 to 80 F, pH - 7.6 to 8.4 and Specific Gravity - 1.002 to 1.007 is optimal. Using marine synthetic salt will improve the success in the brackishwater setup compared to marine setup. The synthetic salt contains all the trace elements and buffers required to give the correct pH. The salt should be mixed at half the recommended strength.

Feeding

Most of the fish are carnivores and their diet should reflect this. In most cases, lots of live food will be required but this depends upon the species to be kept.

Keeping Mangrove plants in aquarium

Generally the freshwater aquarium hobbyists are interested to maintain plants in their aquarium as also the marine hobbyists. Consequently, some of the marine macroalgae are commercialized in the aquarium trade. The attraction of these algae was less compare to the freshwater plants because of their non-rooted nature. Due to this the hobbyist have turned to the marine flowering plants i.e. seagrass and mangroves. The seagrasses grow mostly in good water quality conditions only in the

pure marine aquaria (not in brackishwater aquarium) and therefore the maintenance of the seagrasses in aquarium needs more care in water quality maintenance. As a result maintaining the small size mangroves in the aquarium remains the only option and one more advantage with regard to brackish water aquaria. Mangrove grows quite slowly, which is one of its good qualities as otherwise they would fill up the whole room quickly. The roots of the mangroves are more an attraction than the leaves for the reason that it's branched. The only limitation to keeping mangroves in aquariums is their need for enough room to grow upward. This generally means that a closed cover should be avoided in the aquarium. In a marine aquarium mangrove can be used to create an entire aquascape.

Only three genera are commonly recognized in the aquarium trade of the world. They are *Avicennia* (*A. germinans*) - The Black Mangrove, *Laguncularia* (*L. racemosa*) - white mangrove and *Rhizophora* (*R. mangle*) - Red mangrove and amongst these particularly the Red Mangrove is the first species likely to be encountered by aquarists. It has an attractive appearance due to its magnificent aerial prop roots (the arched and exposed knobby knees plunging into the coastline and shallows). It is the most hardy and adaptable species for aquarium use if given some very simple maintenance. At the same time this red mangrove is not distributed worldwide.

Set up

Propagules for aquarium purposes

Mangrove species have developed different strategies for propagation. Those species growing on more elevated areas near the land which falls dry during ebb tide develop propagules instead of seeds, e. g. *Rhizophora* and *Bruguiera* species. When it falls down from the mangrove tree at ebb tide, it can bore itself deeply into the muddy ground. Other mangrove species inhabiting other areas of the shoreline develop other strategies of propagation and form seeds, mostly in the size of a hazelnut. These propagules as well as the seeds can be used in an aquarium. The seeds grow into a plant with a thin stem that can perfectly adjust its growth to the light conditions of the aquarium, but are sensitive if the halide lamps emit too much heat. Propagules seem to be hardier, but they are also larger and in a very small reef tank they might look unsuitably large, while a mangrove plant that has grown from a seed may have a more natural tree-shape, giving the scene a more natural appearance.

Planting

Generally in natural environment, mangroves do not only root in mud, but also in sand and lime rock. Consequently, in aquarium the porous lime rock in upper area of the tank could support the roots. The simplest way is to push the propagules between two or three porous rocks, allowing their roots to grow into the pores. The seeds may be planted into pieces of foam - the seeds are planted in a way that the roots are at rest in the water.

Practically, an opened aquarium is suitable for growth of mangrove, however the recent development of lighting technology gives considerable possibility to keep it even in the closed aquarium. In an ideal study point of view this can hardly be satisfying without the natural sunlight.

The seedlings or propagules may be tied gently to a post (PVC pipe, rigid airline tubing, etc.) with flexible tape. This type of planting elaborates even in the aerial root systems. Roots will sprout before leaves. Elaborate and extensive root systems that develop can be formidable and cause stress or damage to glass or acrylic aquariums. Mangroves may be planted in containers that are as large as possible (removable pots), thereby reducing future conflict. Fertilizing the substrate may be helpful in new or dry sand beds, but unnecessary in aged aquariums where levels of dissolved organics are typically high.

Illumination

The simplest illumination for the mangroves is the light emitted at the side of a halide lamp. The direct emission of heat from the light should be avoided and maintained at a distance from the light source to avoid heat. Based on the previous reports, the best light for mangroves is a daylight lamp at 6,000 Kelvin since they are land plants. With a lamp of 10,000 Kelvin it may also be possible to grow mangroves, but a 20,000 Kelvin lamp will probably make it harder to satisfy the physiological needs of mangrove plants.

Water exchange

Regular partial water changes, however, may be the simplest means to improve overall water quality and support vigorous mangrove growth. The nutrients that the mangroves need are obtained from the water and therefore fertilize the mixture of microelements in the water.

Advantages

Besides the exotic feeling, they are a great filter for the water; absorb the organic material, phosphates, nitrates etc. from the water. Obviously mangroves work very effectively in removing nitrates-phosphates, which are the main cause of the algae problems in aquarium. When mangroves are grown in the aquarium, the water begins to turn clean and the algae decreases in numbers.

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Scatophagus argus



Monodactylus argenteus



Chelanodon patoca



Mystus gulio



Hemiramphus far



Leiognathus splendens



Siganus javus



Arothron sp.



Periophthalmus barbarus



Ambasis gymnocephalus



Platax orbicularis



Therapon jarbua