



# Conscientious Aquarist

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## Editorial

*Conscientious Aquarist* has been away for a little while, but behind the scenes we've been discussing how to move the magazine forward. We hope you approve of the changes we've done to make the magazine easier to read.

If you fancy writing for *Conscientious Aquarist*, scroll down to the last page to read our instructions for authors. The aim of the magazine is to publish articles that explain and extend the hobby in a responsible, ethical manner. We particularly welcome contributions from aquarists who've not (yet!) been published in the mainstream fishkeeping press.

Comments or criticisms? Get in touch at the usual address, [crew@wetwebmedia.com](mailto:crew@wetwebmedia.com).

*Andrew Nixon & Neale Monks*  
*Co-Editors*

# Safeguarding their future: Alloparental care in clownfishes

For more articles on breeding marine fish, go [here](#).

**Binu Varghese**

Marine Products Exports Development Authority, Kochi, India

Parental care in clownfishes is well known, mouthing and fanning are the important behaviours apart from defending eggs from predators. They fan the egg mass using pectoral and caudal fins and thus provide necessary water movement to the densely packed clutch and thus help in faster



**Figure 1: Parental care in sebae clownfish**

removal of metabolic wastes (Figure 1). Clownfishes also remove unfertilized and unhealthy eggs from the clutch (egg batch). The care is mostly done by male, and on the day of hatching eggs were vigorously fanned after sunset which helps larva to break open the thick walled egg capsule. This activity also make sure that the hatching is complete, which is not the case in artificial incubation.

The description given above is the normal parental care behaviors in clownfishes. However, the alloparental care i.e., care given to non-descendant egg or young one is rarely observed in fishes. In a study using true sebae *Amphiprion sebae* selected from the earlier broodstock nutrition experiment, where different feeds were used to find its influence on the egg and larval quality. Two clutches spawned on the same day with distinctly different pigmentation were used (Table 1 and Figure 2).

The pairs fed deep-sea prawn gave pinkish red eggs and the formulated diet imparted yellowish colour to eggs. The egg colour typically reflects the dietary pigment and the initial colour of egg remains only for first two days and later it turns dark with the embryo development. On the day of spawning the clutches were allowed to be with original parents and on the second day noon the clutches were interchanged.

After interchanging the PVC pipes with clutch the fishes were observed for their behaviour. After few minutes the male partner came to inspect the clutch from distance and returned immediately without fanning. There was no activity for a while, after about half an hour he came close to the clutch and retreated. This continued for a while and after this initial hesitation surprisingly the pair accepted the clutch. The pairs cared for the clutch as normal and the clutches hatched completely and the larvae were also found normal and healthy.

This behaviour might be an adaptation to ensure the survival of species governed by their social instincts. As the clown parents care for their eggs continuously it's difficult to assume that the fishes were unaware of the change. Moreover the egg colour itself was continuing for the past six consecutive spawnings i.e. more than two months. This may be the case in nature also where the threats from predators and lose to either or both the parents are high. Step fathering in clownfishes were observed in natural habitat which owes greatly to their tight social hierarchies. More studies are required to bring insights into the amazing behaviours in these beautiful fishes.

### Suggested reading

Binu Varghese (2004). Nutritional studies on the sebae anemonefish, *Amphiprion sebae* Bleeker 1853, with special reference to protein and lipid requirements. **Thesis** submitted to CIFE/ICAR, Mumbai, India.

Brian D. Wisenden (1999). Alloparental care in fishes, **Reviews in Fish Biology and Fisheries** 9: 45-70.



**Figure 2: Sebae clownfish eggs on the PVC stand pipe**

Parent tank	BST IV	BST VI
Feed given	Formulated diet	Deep sea prawn
Date of spawning	20 Dec 2003	20 Dec 2003
Time of spawning	11:00 to 12:30	12:00 to 13:00
Spawning substrate	PVC airlift pipe	PVC airlift pipe
Colour of eggs	Pale yellowish	Pinkish red
Date of hatching	27 Dec 2003	27 Dec 2003

**Table 1: Alloparental care experiment**

# Some swampy plants for lazy gardeners

To find out more about stocking and maintaining garden ponds, go [here](#).

## Daniela Rizzo

Having a pond is a dream for a lot of people, a corner of aquatic wilderness at how where you can enjoy plants, fishes, frogs, birds—the whole amazing show of nature. For aquarium hobbyists, a pond is a natural expansion of their hobby, an outdoor extension of their indoor tanks. I'm a Central American cichlids fan, and in my tanks I have to limit myself to the toughest species such as *Anubias* and *Vallisneria*. But in my pond I love to maintain everything I can get to grow in it!

Talking with other pondkeepers I've noticed the problem is always the same: the lack of time. We all have to fight with the work, the family management, and after there are sports, hobbies, take walks with dogs, change the aquarium water... Where can we find the time to dedicate to the pond and the energies to work in it, transplanting, fertilizing, caring for the naughty rare tropical *Nymphaea* who doesn't produce any leaves?

The answer is simple, obvious: as the dullest part of pond-keeping is caring for the plants, let's choose species without a lot of demands; species that are easy to cultivate and to see blooming, reproducing. We haven't a lot of time to waste, so no exotic and delicate *Nymphaea* or plants that need special care over winter.

Here are some useful tips when selecting pond plants: Buy the plants only in the right season; if you've read (reading **before** buying is a wise behaviour) that *Sagittaria* need to be planted in September, then don't get them in December! When you arrive at home with the new specimen, usually sold in plastic pots, don't unpot and settle them in immediately, but across the next two or three days check if the chosen position is really the best and if necessary move them about.

But which are the species without a lot of demands? Here's some of my favourite plants for lazy gardeners!

*Alisma plantago-aquatica* (**Alismataceae**) is widespread across the European temperate zones. This bog plant offers a weak resistance to the intense cold, during the winter the aerial part disappears but in the early spring new leaves sprout again. You can plant *Alisma* in a mix of sand, coarse and soil at a depth between 5 and 25 cm, in a mid-sunny position, but possibly far from fountains, strong surface movement can burn the leaves. To reproduce you can subdivide the plants, paying attention to the roots and making sure each plantlet has some healthy roots of its own.



***Nymphaea escarboucle***

**Hedychium (Zingiberaceae)** species originate from India and Southeast Asia. They have beautiful sweet smelling flowers like orchids, but don't tolerate temperatures below 7°C. Not really swamp plants, they are best settled on the banks in a rich soil. In the autumn is important to cut off floriferous stalks. These plants reproduce by stolons but you can also divide the rhizome.

The genus **Hibiscus (Malvaceae)** contains many species, but some, like *H. syriacus*, are too big for a pond. *H. moscheutos* (= *H. palustris*) is obviously the most suitable for a pond. Indigenous to the southern United States it loves sunny places and will grow up to 2.5 meters in height. The flowers are pink with darker inner part, they remain open only during one day but are a lot so the plant is in full bloom during all summer. Another good species is *H. coccineus*, also from the southern USA. During the winter it needs protection otherwise the leaves will die. This plant has amazing buds that become beautiful big red flowers from July to September. If you want to reproduce *Hibiscus* from seed you can sow in the spring, but if you divide mature plants in autumn you'll have a delicious blossom next June. Cultivate them in a mix of soil and sand.

**Hosta lancifolia (Liliaceae)** is a perennial plant from China and Japan. This species is appreciated for its decorative green leaves and though it will do well in shady spots it needs good sunlight for several hours per day if it is to bloom. You can plant *Hosta* in fertile soil in March or October, from June till September you'll enjoy the graceful lilac flowers. *Hosta* rarely produces seeds, so it is easier to reproduce this plant by splitting mature plants. Plants reared from seeds often do not look much like the parent plant.

**Houttuynia cordata (Saururaceae)** comes from China and Japan and has very beautiful green leaves with red or white edges. Unusually for bog plants, *Houttuynia* have a delicate scent that attracts butterflies. In March or September you can plant this species eight centimeters deep, laying horizontally the rhizome, during the summer the flowers will bloom, but if the season is warm we can have two flowering each year. This plant will reproduce without problems; you have only to wait! *H. cordata* can live in a shady corner of the pond, but to maintain the red leaf edge it needs strong but not direct sunlight.

**Iris (Iridaceae)**. Hundreds are the species and varieties of *Iris*, all the *I. laevigata*, *Iris pseudoacorus* and *I. kaempferi* are suitable for ponds where they live in 15-45 cm deep water. *I. kaempferi* comes from China and Japan, is a strong plant and during the winter can live in dry soil. The flowers, white, violet, pink appear in June. The plant produces many stolons but if you want to reproduce *Iris* by seeds you have to wait



**Hibiscus coccineus leaf**



**Hibiscus coccineus flower**

April. Remember: this plant doesn't like hard, alkaline water or earth and direct sunlight. Iris can grow up to 80 cm and are perfect for pond borders, planted in clumps.



***Eichornia crassipes* flower**

***Lysimachia nummularia* (Primulaceae)** This genus is found across Europe, America and Asia, in bogs and along inundated riverbanks. *L. nummularia* can live in any position but needs sun to produce yellow flowers. The leaves are rounded and lie on the water surface in “branches” long up to 40 centimeters. Don't submerge *Lysimachia*, she lives well in very shallow water, at a depth of 5-10 cm. From May to September the plants bloom, and in September you can divide the pot contents into new plants using soil mixed with sand.

***Mentha aquatica* (Labiatae)** is a perfect addition to every pond; you can cultivate this cosmopolitan plant for years without problems. During harsh winters the leaves die but the plant will spring into life once it gets warmer. This plant prefers shady positions; if the sun is too strong the leaves turn pale green. The little white or lilac flowers bloom from May through to the end of summer. One *Mentha* is settled in and thriving, you'll have new nice plants spreading into your pond without any extra effort!

***Mimulus ringens* (Scrophulariaceae)** lives in North America and is a beautiful plant with small violet flowers that thrives in shady positions and in shallow water up to 10 cm deep. It can reach 50 cm in height and is a good plant for covering the banks of the pond. The hanging, light green leaves and the violet flowers make an interesting contrast. If you plant your *Mimulus* in September, by the next year you'll have many clumps of this plant that you can divide and move to new locations. This is a rather robust plant: last year I transplanted young *Mimulus* that were in flower during a hot July (not recommended) and they continued producing flowers and new leaves without any trouble!

***Pontederia cordata* (Pontederiaceae)** is spread in the temperate zones of North America. This high plant (up to 1 meter) is recommended for big ponds where it prefers sunny places that are warm and either stagnant or feebly flowing. You have to plant them at a depth of 20 cm maximum in a rich soil. From June to September the soft, downy buds will bloom. In April or May you can cut the rhizome (always with a sharp knife to avoid mould and rotting) and bury the portions in 6-7 cm deep water. If the plant is happy it will also produce new

plants as stolons, and these can be cut away and replanted. Not a plant for ponds with freshwater turtles: mine have eaten a 60 cm tall *Pontederia* in just one day!

***Sagittaria sagittifolia* (Alismataceae)** comes from Europe but many other species of this genus live in America and Asia. Above water, this plant has large and decorative arrow-shaped leaves (*sagitta* means “arrow” in Greek, hence the name). Below the waterline the leaves are different and rather ribbon-like. In June plant only young specimens; large specimens tend to be disturbed by the sun and wind. During the summer the plant blooms; the male flowers don’t ripen at the same time with female ones to avoid self-pollination. The stolons of all species of *Sagittaria* carry small light-blue or green tubers (regarded as eatable in Asia) in which the plant stores reserves of nourishing matter for the cold winter. To reproduce this species you can subdivide the rhizome in March or cut off from the mother plant any new daughter plants that form.

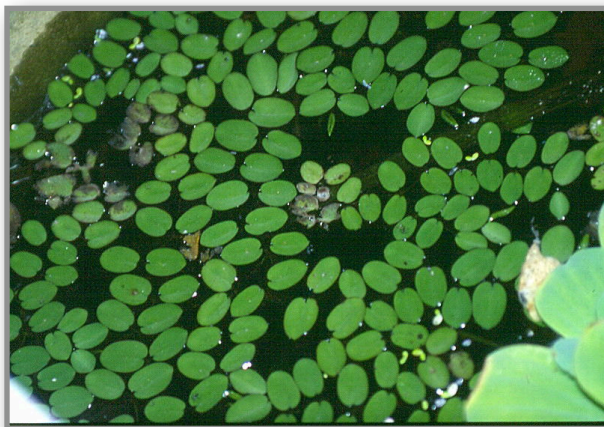


***Eichornia crassipes***

And now is the turn of floating plants, to be successful in their cultivation we need warm air and water, stagnant water and rich soil in the ground to release nourishing substances to the floating roots. Remember: goldfishes and freshwater turtles love small floating plants as meal.

***Eichornia crassipes* (Pontederiaceae)** originates from Central America but by now has infested warm water in all the temperate world. In the wild *Eichornia* creates floating islands that give harbour to thousand of fishes (perfect plant for cichlid-lovers). This plant can live also in very shallow water with the roots in the ground. Rarely she produces seeds but new plants grow during the summer when temperature reaches 25°C.

If you haven’t success with *Eichornia* the main problem is the poorness of the water.



***Salvinia auriculata***

***Pistia stratiotes* (Araceae)** is diffused through the temperate zones in all the world where the temperature flows between 20° and 30°C. Loves sunny and shady places but fears water drops on the leaves and poor water. If the velvety nice leaves turn yellow iron is needed. In the summer *Pistia* will produce new plants.

***Salvinia auriculata* (Salviniaceae)** lives in the Tropical America and absolutely wants sun, warm air and fertile soil. If the light is enough the leaves crowd together lifting their edge from the water as an ear, hence the name auriculata. *Salvinia* reproduces by spores.

And now you have only to try and enjoy your pond!

# Mbu for you?

For more articles in freshwater and brackish water pufferfishes, go [here](#).

## Stuart Morse

I am very fortunate to have such a great fish. Only another puffer owner can really appreciate the relationship that these fish can provide. There is something about their face that makes you feel they are studying you as you look at them. It is not uncommon to hear a puffer owner say that their puffer greets them when they walk in the room, just like a puppy. Very few fish behave in the way that a puffer does or can match their character. While some cichlids can claim to have character, a puffer has it in buckets. I shall concentrate on the Mbu puffer, as it is the species I have, but certain rules are true to all puffer species. Puffers are sensitive to poor water quality, and therefore they require over filtration and large water changes. Most puffers are aggressive and as a rule should be kept in a single specimen tank, however the Mbu is one of the more laid back species and is generally more tolerant of other fish. This needs to be taken with reservation however, as few Mbu live to maturity in captivity with other fish so it is difficult to say how that might change with age. Clooney seems indifferent to tank mates at the moment he may change his outlook as he matures. I am aware of some Mbu being very aggressive and attacking everything else that was unfortunate enough to be placed in the tank.



*Tetraodon mbu*

## A Few Facts about the Mbu

Tetraodon Mbu is widely spread throughout the Congo basin and Lake Tanganyika; in fact the word Mbu means rock in certain African dialects. It is pronounced "uhmboo" but I say "muhboo" and to be fair I'm sure it doesn't matter. The other name often given is Gold Ringed Puffer or Reticulated Puffer and this derives from the stunning markings of these fish. The pattern of darker reticulated rings over a golden base color is unique to each individual fish and allows for great camouflage in the wild. Even a fully-grown adult can disappear before your eyes in a river and become one of the rocks, hence the local word for rock, Mbu, is used for the fish. The Mbu is the largest of all freshwater puffers and will attain a maximum size over 67cm(two feet) in the wild. They feed primarily on crustaceans such as crabs, mussels, clams, and shrimp. The reason that they can tackle this hard-shelled prey is because of the very impressive beak that they have. The name of the genus to which Mbu belong, Tetraodon, literally means four fused teeth, and the pointed beak formed by the teeth can be seen clearly on the larger puffer species. These teeth are incredibly strong and continue to grow regardless of the size and age of the puffer, so it is imperative that they feed on ever harder shelled food as soon as they have the jaw power to tackle it. Without this diet the teeth become overgrown and eventually prevent the



puffer from feeding at all. In the wild the Mbu will swim along and blow water at the sand bed, hunting out prey that may be buried in the river bottom tucked away safely. Their independently moving eyes allow for a great range of vision, which helps them to take in the environment around them as well as study it for food items. I am not sure if they rely solely on eyesight to find their food in the wild, but I often see Clooney blowing jets of water into gravel to uncover something beneath. Saying whether he can pick up on a tiny movement of something in the gravel or can smell something there would be purely conjecture; but from my observations of Clooney I believe there is more to these puffers than has been researched. As the term puffer suggests, these fish are able to inflate when threatened, and though they are not easily seen as with porcupine puffers, Mbu have spines under their skin which act as a deterrent to potential predators. A puffer's defense against predators can be summed up as a warning saying, "You really don't want to eat me." Puffing is a really unique adaptation, and works thusly, according to Dr. Peter Wainwright:



***Tetraodon mbu***

*After filling its mouth with water, the fish flexes a large muscle at the base of the oral valve which then catapults forward against the entire front of the mouth, forming a tight seal against the back of the front teeth. This prevents the water from escaping while a "plunger" type of apparatus... mounted at the base of the throat forces the water upward where it shoots down the fish's esophagus and into its stomach.*

The lack of a ribcage or pelvic bones and very flexible spine allows the puffer to inflate considerably and small muscles under the skin erect the spines. I have only seen Clooney do this once but there have been several times I saw him partially inflated in the 4 years that I have had him.

Another unique feature of puffer biology is the ability to store toxins in their skin and organs. The poison is tetrodotoxin in marine puffer, but a variant, called *Saxotoxin*, is present in some freshwater puffers. The puffer does not produce them itself; they come from *Pseudoalteromonas* strains of bacteria found in the crustaceans that puffers eat. The bacterium has no ill effect on the puffer and is only dangerous to humans if puffer flesh is eaten, contact with the fish is not dangerous. The symptoms of poisoning can include nausea, vomiting, muscular weakness, paralysis, respiratory distress and eventually death. The poison can be take effect as fast as 10 minutes or as long as three hours later. No specific antidote is known. To give an idea of how powerful tetrodotoxin is, injected intravenously less than one milligram is fatal to humans, making it over 1200 times as deadly as cyanide. There is no reason for worry for puffer owners however, as the food we give our fish are free of the necessary bacteria and therefore their stores of poison will deplete over time. However, I still do not suggest you try puffer filets this summer on the BBQ; sushi chefs spend many years learning how to prepare puffers safely for human consumption. While it's generally claimed there are 50-100 deaths from tetrodotoxin poisoning a year, Japans Health, Labor and Welfare Ministry reports only 14 people dead of blowfish poisoning

from 2002 to 2006, and even if amateur preparations outside of restaurants (Amateur preparation is much more likely to result in poisoning and much more likely to have the true cause go unreported) are taken into account, between ten and twenty a year is more likely.

The way that puffers swim is also unique, to quote Neale Monks in his article in Practical Fishkeeping:

*The way pufferfish swim compared with that of other fish is rather like comparing a helicopter to an aeroplane; while they may be slow, they are extremely maneuverable, and this allows pufferfish to spot and capture prey that other fish would simply swim straight by.*

Propulsion for a puffer to swim is produced mainly by the small pectoral fins on the body, with the large and impressive tail used only for bursts of speed. This method of swimming allows even the largest Mbu to turn on a sixpence or rotate on the spot; they are diligent, thorough hunters that will not dart past potential food, and find snails or crustaceans even if they are well hidden.



***Tetraodon mbu***

Very little is known about these puffers' habits, it is not believed that the Mbu can be sexed from external observation and information on their breeding habits is non-existent. For this reason, all Mbu that are available in the aquarium trade are wild caught in nets and then shipped to us. It is fair to say that this would be a stressful time for any fish, but puffers seem to suffer more from it. A Mbu puffer who a couple of weeks ago was free to swim in the Congo basin or a huge lake now finds itself imprisoned in a small tank with a pink castle and some bothersome fish in its personal space. It breaks my heart to see them confined like this and if anyone has seen one in their local fish store they will know what I mean.

### **Aquarium Care**

A very well respected puffer keeper of many years and scientist has recommended a tank of about 4000 litres (approx. 1000 gallons) and I have to say that I agree that a large tank is the only way to keep these fish happy. I would say that the footprint is key and that as a minimum size I suggest seven foot by four foot as an absolute minimum, with a height of about 3ft. In an ideal world I would go for a tropical pond or a ten-foot by four-and-a-half-foot by four-foot tank. This would give a probable volume of about 4000 litres if you allow for gravel and decoration. You then have to deal with the issue of how to filter such a tank, so a large sump and/or several large canister filters such as Fluval FX-5s would be needed. Additionally, plenty of pond heaters would be needed to keep the temperature around 26 C. All in all an appropriate tank is a little out of most people monetary or practical range. It is also worth noting that acrylic tanks are not a good idea for large puffers, as their teeth are known

for scratching the plastic, which is unsightly and may weaken it over time.

Even assuming that we have a tank large enough that these puffers can turn around properly in, we need to look at decoration and design of the tank. Varied surrounds with many points of interest are necessary to keep these puffers active and interested in their surroundings; again this is something a standard six-foot tank would struggle with. Ideally you would have lots of bogwood, medium grain natural gravel and large plants. Clooney loves it when I put new plants in the tank, he will always swim over to check them out. Plants that are ideal for a tank this large include Giant Vallis and certain large sword plants, Clooney actually chooses to rest under sword plants when I have them in the tank. These fish are active hunting swimmers, not lurkers, the planting and décor should be kept far enough apart or to the fringes and background to allow plenty of room to swim about and crucially to be able to turn properly.

Once you have a tank set up it will need to be fully cycled before the Mbu is added, Mbu puffers like all puffers are very sensitive to ammonia and nitrites. Though it may seem silly putting 4 inch baby Mbu in such a vast tank, I would much sooner do that than try to catch and remove a twenty inch fish powerful enough to bite your fingers off without getting it above the water, important because like all puffers, if it inflates and traps air, it could end up dead. They prefer a PH of 7.2-7.6, while hardness is not too much of an issue. Temp needs to be between 24-28C, though the lower part of the temperature range is better as it allows for more oxygen in the water, something a large puffers uses in spades as they grow and feed. Very large puffers will use up to 40% more O<sub>2</sub> when digesting their food, I have heard of one Mbu that suffocated in a small tank because of this, so be sure to keep the water well aerated. High volume water changes are also absolutely essential for such a large, messy and sensitive fish. Their sensitivity to any accumulating toxins is another reason for the large tank size, the bigger the tank the more dilute any poisons in the water will be. Applying the normal rules for stocking small fish is not accurate for puffers due to their messy eating, waste production, and rotund figures.

### **Feeding the Mbu**

It is important to address the natural dietary needs of these fish to keep them healthy so shelled food is important to keep the teeth trimmed. Young puffers will benefit from snails the most, and the best types are pond or rams horn snails. You can raise either yourself as they lay eggs quickly if well fed and can be fed well on household vegetables. Snails you raise yourself will be free of any disease or pesticides that may be present in those taken straight from a pond or local fish store tank. Garden snails may be used too, but again they must be pesticide free and it is suggested that they be stored in a container for a few weeks while fed wholesome foods to purge anything potentially dangerous in their systems. Malaysian trumpet snails, which look kind of like ice cream cones, should be avoided as it has been reported some persistent puffers have cracked their teeth on the tough conical shells of these snails.

Puffers that damage their teeth may need to be drugged with clove oil and have them trimmed to even them out, not a job for the faint hearted and not one any Mbu puffer owner would want to do. The teeth overgrowing from lack of crunchy food will also necessitate trimming, and

while it is easier when the puffer is smaller, trying to hold a large unconscious Mbu and get enough force with the clippers sounds terrifying. Perhaps a dremmel or power sander would be a better option, but best to avoid it entirely by giving your Mbu a proper diet. The best staple food for many larger puffers would be mussels, and the Mbu is no exception. As the fish matures it can be moved onto other larger foods, such as cockles in shell, crab claws, freshwater clams, and squid. Another good food is ghost shrimp; ideally these can be kept in a separate tank and fed up on veggies to gut load them, conveying some greens and vitamins to the puffer. I believe variation is the key to a good diet, Clooney eats almost anything I put in for him, mussels, clams, cockles, bloodworm, and prawns. Crab claw is a real favorite, and he absolutely loves Hikari brand algae wafers. He will also spend some time tearing up the tank up chasing live shrimp, which is very fun to watch.

### **In Closing**

While I hate to end with such a down note on these great fish, I do not believe they belong in the general fish trade. They should only be made available on special request to someone who can care for and house them properly. If I had it to do again knowing what I do now, I would not have purchased Clooney for my 5 ft tank. I was assured that he would be OK by my local fish store, but with how large he is now, his tank would be the equivalent of me being caged in a ten-foot by four-foot space. I might survive but I don't think I would be too happy about it. In the wild these gorgeous fish are roamers; I would love to know just how far they travel but it has not been studied. A Mbu needs a tank they can explore and every time I see Clooney sitting on the bottom at the back of the tank I get a bit sad and feel sorry that I have imprisoned him.



***Tetraodon mbu***

If you truly can accommodate one of these fish and are ready to commit to a pet that could live well over fifteen years, then you will never desire another fish. Clooney has provided me with countless happy moments, and one very scary moment when I thought he was going to die. I have never been so attached nor will I ever be so fond of another pet. When my dog died I was upset, when my rats died I was upset, when the day comes that Clooney will pass on, likely due to my keeping him in a smaller than suitable tank, I shall be distraught. In fact, I find it hard to even type about it; my eyes are actually welling up. If you don't want to break your heart then get building that big tank please!!

There are plenty of puffers all with great personalities that can be kept in a more reasonable set up, so if you really want a fish with character then go for the puffer you can accommodate. Remember to research them properly as correct information on puffers at local fish stores is scant, to be very kind.

# Rift Valley Cichlids: Talking Tanganyikan

For more WWM articles on selecting livestock for a freshwater aquarium, go [here](#).

## Neale Monks

The cichlids of Lakes Malawi and Tanganyika have become among the most popular of all the fishes in the aquarium hobby thanks to their brilliant colours and dazzling variety. While some are demanding fish best suited to advanced hobbyists, others are hardy enough to do well even when kept by relatively inexperienced or casual hobbyists.

### About the Rift Valley lakes

Rightly have Lakes Malawi and Tanganyika been referred to as inland seas. Both lakes are almost incomprehensibly vast bodies of water.

- Lake Malawi has a surface area of about 30,000 square kilometres, about the same as Belgium or the state of Maryland. Lake Tanganyika is even bigger, at a whopping 32,000 square kilometres.
- Lake Malawi is about 560 km long and Lake Tanganyika about 670 km long. Driving between New York and Washington only covers about 400 km, and even the distance between San Francisco and Los Angeles is a mere 600 km. In other words, these are seriously big lakes!
- Both lakes are also very deep, the average depth of Lake Malawi being around 300 m and Lake Tanganyika 570 m. At its deepest point, Lake Tanganyika is almost 1500 m deep, equivalent to one quarter the height of Mount McKinley!



*Julidochromis regani* "Sumbu"

These facts should make it clear that both bodies of water are more like small seas than lakes, and it is because of this that they support such an incredibly variety of endemic species. As well as the cichlids for which the lakes are famous, they are also home to a variety of other aquatic animals including catfish, spiny eels, crabs, snails, even jellyfish.

### The Tanganyikan cichlids

For the first part of this series, we'll look at the cichlids of Lake Tanganyika. In some ways they're easier to keep than their Malawian cousins, being generally less aggressive (though still territorial) and consequently easier to combine in a community. There is also a nice variety of dwarf

species too, and setting up an small single-species aquarium for these cichlids can be very rewarding. On the other hand Tanganyikan cichlids have a well-earned reputation for being sensitive to poor water quality, so anyone keeping these fishes will need to provide ample filtration and regular water changes.

The cichlids of Lake Tanganyika are typically assigned to one of twelve tribes. Of these, only a few are significant in the aquarium hobby: the Cyprichromini, Ectodini, Eretmodini, Lamprologini, and Tropheini.

The **Cyprichromini** are sometimes known as the sardine cichlids, a good name given their lifestyle. These are open water fish that live in large schools and eat plankton. There are two genera in this tribe, *Cyprichromis* and *Paracyprichromis*, species of which are reasonably commonly traded. They are all mouthbrooders.

The tribe **Ectodini** contains a number of genera typically associated with the substrate and in many cases sand-sifters that forage for prey in a way analogous to the earth-eating cichlids of South America. Members of this tribe are not common in the hobby, though some, including various species of *Cyathopharynx* and *Xenotilapia*, are periodically traded. All are mouthbrooders.

The clown and goby cichlids of the tribe **Eretmodini** are small, benthic fish that feed extensively on algae. *Eretmodus cyanostictus* is probably the most regularly traded, though other species in the genera *Spathodus* and *Tanganicodus* are sometimes seen as well. Eretmodine cichlids are mouthbrooders.

The tribe **Lamprologini** dominates the Tanganyikan cichlid trade, with numerous genera routinely represented in hobbyists' tanks, including *Altolamprologus*, *Julidochromis*, *Lamprologus*, and *Neolamprologus*. Lamprologine cichlids are egg-layers.

The tribe **Tropheini** contains several genera with one in particular, *Tropheus*, being regularly traded and containing several very popular species. One of the biggest Tanganyikan cichlids, *Cyphotilapia frontosa*, is also a member of this tribe. These cichlids are all mouthbrooders.

### **Environmental conditions**

The water in Lake Tanganyika is consistently alkaline (around pH 9) and very hard (around 12-14 degrees KH) and replicating these conditions in the aquarium is important. In practise though, most Tanganyikan cichlids have proven to be relatively adaptable, and what appears to matter most is not the precise pH or hardness values (provided they



***Eretmodus cyanostictus***

are not too far from the ideals given above) but that the water chemistry in the aquarium should not change much over time. In other words, the water needs to be well buffered, and water changes should be small and frequent rather than large and occasional.



***Cyphotilapia frontosa***

One approach is to use a pre-packaged Lake Tanganyika salt mix in the same way as marine salt mix is used to make up artificial seawater. An alternative approach is to rely on chemical filtration to harden the water and raise the pH. A good system is to combine a canister filter (for mechanical and biological filtration) with an undergravel filter (for chemical filtration). The outflow of the canister filter passes water into the undergravel filter plate, and as the water rises out of the plate it passes through layers of crushed coral and coral sand. In hard water areas, the water may be sufficiently hard and alkaline that chemical filtration is redundant, and simply by performing regular water changes and background changes in pH can be avoided.

While Tanganyikan cichlids are fairly adaptable in terms of water chemistry, what they won't forgive is failure to maintain good water quality. These fishes are notably intolerant of nitrate, far more so than most other freshwater fish. The key things to avoid are overstocking, overfeeding, and insufficient water changes. As a general rule, you want to aim for a nitrate level of no more than 20 mg/l.

### **Decorating the Tanganyikan tank**

Tanganyikan cichlids are well served with a tank containing plenty of rockwork for hiding in, some open sandy areas for foraging, and, in the case of the shell-dwellers, some empty shells for spawning in. The traditional Tanganyikan cichlid aquarium uses tufa rock for the rockwork, coral sand for the substrate, and empty apple or edible snail shells for the shell-dwellers.

Plants aren't a major part of the Lake Tanganyika environment except around the mouths of the rivers that empty into the lake. There, plants like *Vallisneria* and *Potamogeton* can be found in abundance. While there's no reason not to add plants tolerant of hard water conditions to a Tanganyikan aquarium, a lot of cichlids will either view them as food or else destroy them while foraging or landscaping their territories. Epiphytic plants, like Anubias and Java fern, are likely to be easier to accommodate in the aquarium than species that require a deep and largely undisturbed substrate.

### **Social behaviour**

While some Tanganyikan cichlids are schooling fish that exhibit little aggression or territoriality, this isn't true for most species and the aquarist must take care that each individual or pair has enough space to satisfy its territorial needs. Many are also aggressive towards any other species of

similar shape and size. For that reason, it's often best to include only a single species per genus. This minimises the chances of cross species aggression.

While Malawian cichlids, especially mbuna, are outgoing and easy to tame, Tanganyikan cichlids tend to be rather shy and often nervous. An aquarium well provided with hiding places will encourage them to settle down, but even then these are fishes that get on with their own lives rather than spend all their time begging for food. If you want robust, friendly cichlids then Tanganyikans are generally not a good choice. But if you enjoy watching the more natural aspects of cichlid behaviour, the Tanganyikans can be very rewarding.

### **Favourite Tanganyikans**

The variety of Tanganyikan cichlids on the market is enormous, but the following are a selection of species that are easily obtained, known to do well in home aquaria, and generally peaceful enough to coexist in a community tank alongside species of similar size and temperament.

#### ***Altolamprologus calvus***

This laterally compressed cichlid feeds on invertebrates and small fish in the wild, but in the cichlid community tank it poses no threat to tankmates larger than guppies. Live and frozen foods of all types are accepted, though a mix of bloodworms, brine shrimps, and the occasional small earthworm works well. These are very mild cichlids and their tankmates need to be similarly gentle. This is especially critical at feeding time, when these slow feeders can easily lose out to more boisterous tankmates. Several varieties are available, collected from different parts of the lake. Maximum size is 15 cm for males and 10 cm for females. Sexual dimorphism is obvious even with immature fish, the males having a more robust head and larger fins. They do best in harems, with one male being kept with a group of females.

#### ***Altolamprologus compressiceps***

Similar to *Altolamprologus calvus* in shape and behaviour, this is another relatively placid cichlid that works well in quiet communities. Compared with *Altolamprologus calvus*, this species is more deep bodied but with a shorter snout. As with *Altolamprologus calvus*, there are many varieties of *Altolamprologus compressiceps* available in the trade.

#### ***Cyphotilapia frontosa***



***Neolamprologus multifasciatus***



The 'frontosa' is one of the most popular and easy to keep Tanganyikan cichlids, suffering in only one regard: size. Adults are 30-40 cm in length, with males being slightly larger on average than the females. Obviously such big fish require a massive aquarium, upwards of 700 litres. On the other hand, these are spectacular fish with brilliant colours, and male fish develop a very noticeable nuchal hump that makes them very imposing fish. Despite their size, frontosa cichlids are quite gentle animals that do best kept in groups. They are predatory though, and will eat any fish small enough to swallow whole. Captive specimens eat all sorts of foods other than live fish though, including pellets. There are a few regional varieties available in the trade.

### ***Cyprichromis leptosoma***

This is one of the 'sardine cichlids' that form schools in open water, feeding on plankton. They rarely swim anywhere but at the top of the tank, making them useful for adding movement and colour to a community tank without overcrowding the hiding spaces among the rocks. They also work as excellent dither fish, encouraging shy benthic cichlids to leave their burrows or caves and swim about in the open. They are basically hardy, but like other open water fish require lots of swimming space so are not suitable for small aquaria. Maximum size is about 12 cm, with males being more colourful than the females. There are numerous varieties in the lake, some of which are regularly traded.



***Neolamprologus pulcher* "Daffodil"**

### ***Julidochromis ornatus***

One of the most widely traded of the 'julies', *Julidochromis ornatus* is a very pretty and basically easy to keep species, but like other members of its genus, it is rather secretive and rarely strays far from its cave. For this reason it is important to provide them with food at the lower level of the tank. Wild fish mostly scrape algae and small invertebrates from rocks. Maximum size is 10 cm, with no reliable differences between the sexes. They breed readily even in community tanks.

### ***Neolamprologus brichardi***

This cichlid is one of the most popular of all the Tanganyikans thanks to its basically tolerant personality and attractive colouration. Maximum size is about 10 cm, the female being a trifle smaller than the male. Matched pairs are very loyal to one another, and have proven to be excellent parents, to the degree that these cichlids routinely rear sizeable clutches of offspring even in community tanks. In

aquaria at least, older juveniles will help their parents defend younger batches of fry. Easily satisfied in the aquarium, these cichlids eat most foods, though live or frozen crustaceans will help them develop their best colours.

### *Neolamprologus leleupi*

Similar in size and shape to *Neolamprologus brichardi*, the 'lemon cichlid' *Neolamprologus leleupi* is one of the most dramatically coloured of the Tanganyikans. Depending on the variety, the basic colour is orange or yellow, with varying amounts of electric blue on the fins and fins. In terms of basic care they are similar to *Neolamprologus brichardi* but are a bit more aggressive and overtly territorial. Maximum size is 11 cm. In good condition, this is a superb cichlid that rivals any saltwater fish but aquarium fish often lack the bright colours of wild fish. A diet rich in carotene is important to prevent this, for which reason the aquarist should regularly provide these fish with plenty of live or frozen crustaceans as well as occasional mouthfuls of colour enhancing flake food.

### *Tropheus duboisi*

*Tropheus* spp. are among the most aggressive Tanganyikans and are best considered fish for their own tank rather than the community. Another reason they should be kept alone is their diet. They are strict herbivores, and even small amounts of meaty food (such as flake or frozen bloodworm) causes them harm. The ideal diet for them is algae, either fresh or in the form of Spirulina flake, Sushi Nori, or similar. In terms of social behaviour, they should be kept as a colony of a dozen or more specimens. This will prevent bullying, but it does of course mean that these relatively large fish (around 14 cm) can only be kept in a big aquarium. Still, for all their problems these are beautiful fish, and there are lots of different varieties available. *Tropheus duboisi* is perhaps the mildest of all the *Tropheus* and has sometimes been kept in large Tanganyikan community aquaria, though this isn't recommended.



***Altolamprologus calvus***

# Freshwater livestock selection

For more WWM articles on selecting livestock for a freshwater aquarium, go [here](#).

## Bob Fenner

The appropriate selection of freshwater livestock, both as species and individual specimens determines from the outset whether you will have a low/no trouble arrangement or ongoing troubles, perhaps even deaths. Utmost care should be exercised in “putting together your livestock assortment” — carefully make working lists of what you might have, particularly as regards each species initial size, growth rate and likely maximum in your setting, its foods and feeding, water quality preferences and ranges, temperament (at least likelihood of all getting along), as well as issues of what type and part of the aquarium each will likely occupy.

Looking about our planet and its varied freshwater environments, it's not surprising to find that there are many and varying type habitats... Some colder, others warmer... where the water has more/less dissolved solids, oxygen, is softer/harder, of high/low to middling pH, there are places where light is bright, the water clear and not...

waters calm and briskly moving... . There are many other factors that one might list to differentiate the many diverse habitats of freshwaters... but these stated identify the principal characteristics in helping us decide which fishes, invertebrates and plants we might keep together.

None of these aquatic worlds is “peaceful” either... with most all life found there seeking to eat, and avoid being eaten by others... All of this must be borne in mind... indeed investigated by you, to determine what sort of habitat you'd like to provide or alternatively what mix of life you can likely apply to having a successful aquarium



**Travis fabulous Zaire River tank...**

## A Plan

Ideally, you will be able and willing to study up ahead concerning the aquarium hobby to where you knowledgeablely choose **both** the system **and** the livestock you intend to keep, instead of "ending up" with a tank of certain size/shape, filtration/aeration/circulation gear, lighting et al... that impinge on your ability to choose and suit the life you intend to keep.

In this ideal circumstance, you would know the quality of the part of the water world you intend to mimic... and the livestock's' needs specifically.

### *System information:*

- The size/shape of the tank needed... how much it weighs, where you'd place it.
- What sort of stand/support you're going to need/want...
- The type of gravel for the fishes, invertebrates, and possibly plants... what color, make-up chemically, physically... the depth/amount...
- What sorts of lighting; brightness, quality... timers to aid in creating a steady light/dark cycle.
- Filtration and circulation...

### *And for the proposed livestock:*

- Best initial purchase size range, growth rate, likely maximum size.
- Water quality preferences and ranges... e.g. temperature, pH, water hardness, water movement, light brightness
- Foods and feeding.
- Temperament; likelihood of bullying, predation.
- Habits of swimming/location, space needs.

## Another Approach: Centerpieces

Most folks will be finding themselves already in a "fixed" position of having a set-up in hand, or at least the principal components. Given this perspective, or starting point, you can work out what you might want to keep in a few ways... My favorite approach involves building a collection around a "must have" organism... Something that I really want to keep... and working from there in making sure the conditions that my "number one" piece



***Pantodon buchholzi* Peters 1877**

African or Freshwater Butterflyfish. A great favorite, and fabulous jumper... To four inches in length. Feeds on live crustaceans, insects and fishes.



***Gnathonemus petersii* (Gunther 1832)**

Elephantnose. The most (actually only) common species, perhaps along with the "Baby Whale", West Africa, where it grows to some fourteen inches in maximum length. Here in an aquarium showing the back reflection of "flash" light from their tapetum lucidum, light amplifying structure of the eyes.

of livestock enjoys are amenable to my secondary et al. choices.

As an example, let's say I have a 29 gallon aquarium... nominally 30 wide, 12 deep front to back and 18 inches tall. For my must have centerpiece I want to keep an African Butterflyfish, *Pantodon buchholzi*. Doing a bit of looking up I have an idea of its likely purchase size... about 3-4 inches, it's maximum size, without the tail, is about four inches... And what sorts of water conditions this fish likes: Softer, acidic, tropical... and not too much light as it lives near the surface, nor current... Oh, and a completely covered top... so it doesn't leap out of the tank!

Note that you really don't need to be overly concerned with "how" hard or soft your water is, nor usually with whether it's tropical or cold water... Just the general matter of whether this is so for the species you intend to keep. Similarly, some freshwater fishes will tolerate some salt content in their water, but by and large, it is best to keep freshwater systems fresh, brackish as so, and marines in turn as full-strength saltwater.

Now, as to the issue of the other livestock... obviously, with that trap-door like mouth, any small fishes will likely become food... Likewise, this fish doesn't care to share the surface area... so top-dwelling tankmates are out... as are too fast-moving ones that would spook it badly (e.g. tinfoil barbs or silver dollars)...

What sorts of fishes might be good choices then? One way of figuring this out is to consider what other fishes et al. are found (and collected) from the area where *Pantodon* makes its life... Some definite good choices here are the Mormyrids, like the Elephantnose and Baby Whale; the African Knifefish; and the Mochokid Catfish (the "squeakers" mainly of the genus *Synodontis*). Some "mid-size" tetras you might like are the Congo, and the genus *Alestes*.

## Plants

As previously stated, the African Butterflyfish doesn't like too-bright lighting, and you want to keep it feeling safe and secure to discount it jumping and injuring itself... Live plants do all sorts of good things for freshwater systems. Some good "biotopic" selections include



### ***Xenomystus nigri* (Gunther 1868)**

African Knifefish. Western Africa. To eight inches maximum length. Vies with the Clown Knife as most popular aquarium species of the family. Easy going, intelligent addition to peaceful tanks.



### ***Synodontis nigriventris* David 1936**

Dwarf Upside Down Catfish. Central Africa; Congo Basin. Conditions: pH 6-8, dH 5-12, temp. 22-26 C. To nearly four inches total length. The most popular/common species of the family in the aquarium interest.

slow-growers of the genus *Anubias*, fast-growing *Crinums*, and *Bolbitis heudelotii*. Another excellent choice and personal all-time favorite aquarium plant choice is the "Indian Fern" (it is found in Africa), *Ceratopteris thalictroides*, or the congener *C. cornuta*. African butterflyfish love the shade this genus supplies (grown floating... it can be rooted as well), and they do very well in low-current settings.

### The Value of Lists

I can't state emphatically enough just how important list-making as a tool can be... There is no better way for you to gather and absorb useful information than applying your mind, hand, pen and paper... A table of the qualities you're looking for, species to mix can be easily constructed and the "boxes" filled in with simple (and fun!) searching. Believe me, finding out all this before spending good money on life that may not be compatible... is the way to go.

### Finding Out About All This?

Resources abound for a curious mind... the Net has a myriad of sites, BB's... and there are a plethora of in-print books and magazines... that are easy to search with a little help from a librarian. Again, I urge you to take good (written) notes re what you want and its specific needs... and to record the sources of this information. Unfortunately, a good deal of what is posted on the Net is a bit "noisy"... not often in total agreement. It is best to take all you encounter with "a grain of salt", and remain speculative re single source, personal accounts.

How can you find out what comes from the same area? Use the Net! Put search words like "Plants from Africa to use in aquariums" in your engine... and go!

### Cloze

A hodge-podge approach to stocking ones aquarium system is to be guarded against... These "garden variety" mixes of supposed "community" organisms rarely work out satisfactorily... With unneeded tension, extra maintenance and poor showing, growth and behavior of specimens as consequence of slipshod, inadequate investigation ahead of their acquisition. Do be a conscientious consumer and look into the needs and compatibility of the life you intend to keep **before** buying it. To the extent that you know what you're doing, so much more will be your enjoyment and understanding of your aquarium world.



***Phenacogrammus interruptus***  
**(Boulenger 1899)**

Congo Tetra. Central Africa; the Congo. Males to a little over three inches, females to two and a half. Conditions pH 6-8, dH 5-19, temp. 23-26 C. Feed on meaty foods, plant material. Aquarium photo.

# Questions and answers

## What can I keep with *Aulonocara* 'Ngara'?

I have a trio of Ngara peacock cichlids that I would like to breed. I have them in a 90-gallon aquarium. Is it possible to add additional cichlids to add life and color? I do worry about hybridization so I know other peacocks are out. If the answer is no, could I add additional Ngara to the tank? What cichlids would be appropriate based on the low aggression level of the Ngara? Thank you in advance for your help.

*Hybridization should always be considered when stocking cichlids, and I am very pleased that you are doing so! Aulonocara stuartgranti 'Ngara' is only at risk of cross-breeding with other Aulonocara spp., so provided the other fish in the tank were from other genera, you'd be fine. Obvious choices for tankmates would be yellow Labidochromis caeruleus and Iodotropheus sprengerae, both peaceful and hardy Malawi cichlids. Avoid mixing Aulonocara with Mbuna; Aulonocara are simply not aggressive enough to do well. One possible exception might be Pseudotropheus 'acei', a reliably docile member of the Mbuna group. To some extent this would depend on the design of the tank -- the Pseudotropheus 'acei' like to hover above piles of rocks, whereas Aulonocara will utilize open sand areas. For more on selecting tankmates for Malawian cichlids, have a read of the [African Cichlid Compatibility FAQ](#) at WWM.*

## Can I keep a brackish-water pufferfish in freshwater?

I wanted to know if it was okay to keep two Green Spotted Puffers with a couple a cichlids? I know they are brackish fishes. But can

they still tolerate the freshwater? I really want to get one and I don't want to buy another tank. Any suggestions? I also know they are messy eaters, so I will do 50 percent water changes every week. Do you think it will be okay to keep it with freshwater fishes and aquarium?

*Why would you want a fish to just "tolerate" it's living conditions? Yes, you will need to wait until you can set up the proper environment for these high-end brackish fish, that do quite well in marine conditions as adults. You absolutely cannot keep this fish in freshwater conditions indefinitely. Keeping any fish in conditions other than what is best for it will lower it's immune system, causing stunted growth, disease & shorter lifespan. See [this article](#) on WWM for more.*





# Instructions for authors

## About The Magazine

*Conscientious Aquarist* is an on-line magazine dedicated to the sharing of information about the aquatic hobby. Content is intended to promote the husbandry of aquatic animals in a responsible and ethical manner. Material presented includes information on freshwater, marine, reef, reptile, amphibian, and pond care, animal selection and general husbandry.

Our intent is to provide content which will inspire the beginning hobbyist, encourage the intermediate hobbyist, and provoke the advanced hobbyist to investigate new areas of the art and science of aquatic husbandry. Of foremost importance is that this magazine serves as a forum by hobbyists, for hobbyists, and that the content be presented in a straightforward, friendly, and non-intimidating manner. Particular emphasis will be placed on a “how I do it” point of view, without excessively scientific material, which might be intimidating to a novice hobbyist.

## Article Submission Guidelines

Articles should be submitted via email as an attachment as either an RTF or Microsoft Word formatted document. The email should include the author’s name, address, email address, website URL (if applicable), and a brief “autobiography” of the author. We encourage contributors to present a “casual” autobiography covering their hobby experience and interests, not simply a “resume” of hobby and academic achievements.

We welcome submissions from hobbyists and authors at all levels of experience. Be sure to include any photos, illustrations, and artwork that is appropriate for the article. An appropriate bibliography and list of references are encouraged. Since we have access to WetWebMedia’s vast library of photos, please advise if you require a specific photo or photos to be included in your piece, and we will do our best to locate and include them as needed.

Material accepted for publication will be subject to editorial revision as required, at the discretion of the editors, in order to meet publication standards. All editorial contributions need not be “exclusive”.

Electronic/Digital photos should be of high quality and should be numbered, or provided with captions, if desired. Photos should be sent in a JPEG format, with a resolution of 72 dpi or greater. If photos are imbedded in a Word document, please send separate JPEGs. Photos should be unedited and uncompressed. Please note that not all photos provided may be utilized.

Materials for consideration should be sent via email to [crew@wetwebmedia.com](mailto:crew@wetwebmedia.com).

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