

# the DARTER MiniMAG

Aquatic Journalism miniaturized

APRIL 2025

## Fauna of Africa

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**DARTER MAGAZINE**

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I saw the rains



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*Micah Issitt • David Farel • Matt Rush*



# Malagasy Mystery

## Habitatscaping for Madagascar's Unique Cichlids

By Micah Issitt

THIS FANTASTIC BIOTOPE (above) by designer **Pawel Lukasz Kocik** of Poland focuses in on the rare cichlids of Madagascar, in the genus *Paretroplus*. The biotope replicates the habitat of a rocky bank in Madagascar's Tseny Lake, in the northwest of Madagascar.

Aquascape Design by  
**Pawel Lukasz Kocik**

*Paretroplus menarambo*, the “Pin-Stripe Damba”, is a rare Malagasy cichlid threatened by overfishing and habitat loss. It is frequently found in the floodplains surrounding the River Sophia. The final remnant wild population of this beautiful fish was rediscovered in Lake Tseny after the species had been believed to be extinct. Scientists studying the lake also found populations of two other related cichlids, including the “Kotsovato,” *Paretroplus kieneri*, making this small body of water a true refuge for fast-disappearing Malagasy cichlid species.

The *Paretroplus* cichlids are closely related to the cichlids of the Indian Subcontinent, in the genus *Eutroplus*, which is the result of an ancient geographical links between Madagascar and India, from when both were part of the supercontinent Gondwana before breaking apart roughly 170 MYA. The shared taxon between the Indian Subcontinent and Africa are all relics of this shared evolutionary heritage, which saw many still extant groups of animals establish populations in both areas.



Kotsovato  
(*Paretroplus kieneri*)  
Photo by: Tino Strauss







The Biotope Aquarium Design Contest, which has been operating for over 10 years, is an educational benefit to anyone interested in aquariums, or, more specifically in replicating natural environments. Visit the Biotope Aquarium Project [HERE](#) and take a look at some of the wonderful biotope designs submitted by users over the years. Perhaps even consider submitting your own design!

## AT A GLANCE

### *Paretroplus menaranbo*

The Pin-Stripe Damba

## ORIGIN

**Habitat:**  
Lake

**Biotope:**  
Madagascar

## STOCKING + HUSBANDRY

**Size:**  
4-5"

**Temperament:**  
Territorial; but  
can be kept with  
non-cichlids

**Tank:**  
4'

**Group:**  
Colony

**Diet:**  
Omnivore

**Breeding:**  
Substrate  
spawner

**Lifespan:** 8-12 yrs.

## PARAMETERS

**Temp:**  
73 - 82° F

**pH:**  
6.5 - 7.5

**dGH:**  
6 - 17



## Ichtiologist Ilustrador

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*The lake in question*

Keepers who have worked with *Paretroplus* cichlids, and *P. menarambo* specifically, tend to describe them as largely peaceful and somewhat reserved or shy cichlids. They can grow to over 5" and are best kept in groups in a species tank, potentially with other small dither fish. A sandy substrate mimics what is found in the Malagasy lake systems where this species resides and driftwood and stones create complexity, help to mitigate aggression, and provide security for the residents.

## THE LAKE TSENY DAMBA BIOTOPE

**Volume:** 840L (~220 gal)

**Dimensions:** 200x60x70 cm

**List of fishes:** *Paretroplus Menarambo*

**List of plants:** N/A

**Description of decorations:** The layout is made of a large wooden drift trunk found by a friend of mine on the beach in Italy, and probably came here from Africa, the clear sand and the amber of the granulometry 0.6-1.2. and some silica rocks to integrate the habitats of these fish.

**Description of equipment:** Sump 120/45/45 and pump Jebao 8000, cube where I bring the snails hospital 45/45/45 connected to sump, UVB lamp JBL 11W, 2x Easy Led Aquatlantis 6800K sunrise and sunset

**Water parameters:** Temperature is 27°C Gh-15, Kh-7, pH-7.5



*Paretroplus menarambo* in Pawel Lukasz Kocik's 2017 biotope





# TANGANYIKAN SHELLDWELLERS

## *Lamprologus brevis* “Sunspot”

Photo: Hand Picked Aquatics

by Cory Koch

Originally published Sept. 2005

THE SHELL DWELLERS of Lake Tanganyika are one of my favorite groups of fish. In what other group do you find big cichlid behavior in such a small package? Most can be housed in community tanks (provided some research is done regarding tank mates.) or kept as pairs in small 5-10 gallon desktop aquariums. Shellies in general are easy to breed, do not eat their young, and exhibit some very interesting behavior.

*Lamprologus brevis* were first described by Boulenger in 1899. The “Sunspot” variety is a very attractive fish with a brownish mauve colored body highlighted by a bright golden yellow “sunspot” located directly behind the pectoral fins, a yellow circle around each eye and a fluorescent blue/purple line located below each eye complete the package. The species is **monomorphic** with males typically reaching a length of around 2.25 inches and females weighing in around 1.5 inches. These fish are found in waters with sub-tropical temperatures ranging from 77 to 79 degrees F with a PH ranging from 8.6 9.0.

I originally purchased a group of eight young fish from a fellow hobbyist I met through CichlidForum.com; unfortunately, three of the young fish did not survive 2nd day shipping. The remaining five were placed in a ten gallon quarantine tank for grow out as they were all around an inch long when I received them. After about a month, all of the fish had gained in size with the two largest being close to 2 inches long so I decided to move the group into a forty gallon long with a small group of *Cyprichromis leptosoma* “blue flash”. I set up two shell beds, one on either side of the tank, with each bed consisting of six whale eye shells. It is interesting to note that in the wild both male and female share the same shell once the pair bond is formed so theoretically *Lamprologus brevis* can make use of areas in the lake with very few shells.





In Shellie tanks, however, I always like to make sure I provide at least two shells per fish as they can be very particular regarding shell selection at times! The more shells the better...

The Brevis acclimated well to the larger tank eating every bit of what little the *Cyprichromis* let slip past at feeding time. After two months in the larger tank I decided that I had been lucky despite my initial loss of three fish, as I now had two pairs of Brevis! Both pairs stayed within a six in territory surrounding the males shell and both pairs tolerated the one remaining singleton female.

Over the course of the next few months I observed what looked to be much spawning activity, with males darkening and showing there best coloration then the female doing a tail slap spawning “dance” attempting to lure the male to her shell both fish digging pits around the breeding shell and the females guarding the mouths of the shells from intruders. All of this but no fry for months. During this same time period my Cyps were growing and fattening up very nicely...soon they were spawning as well. Hmmm.... (Could this be due a very excellent, but unintentional live food source?!)

I decided to move one pair of Brevis back into a ten gallon species only tank containing only fine sand and shells to see if I had any better luck getting fry. (Another cool thing about shell dwellers is how easy it is to catch and move them from tank to tank, as soon as they spot your hand or the net coming for them they dive for the protection of there shells. You then simply lift the entire shell from one tank to the next making sure not to tip the shell over and spill the contents out onto the floor!) Almost exactly a month after separating the pair from the main tank I was rewarded with twelve tiny fry!

*Shelldwellers are African cichlids notable for spawning in seashells. They form multi-generational colonies in-tank, if suitable shells are provided.*



The 10 gallon “breeder” tank was filtered using a Bio-Wheel 170 (fitted with a sponge pre-filter to prevent fry from being sucked up!), I kept the tank at about 78 degrees F, the pH was 9.0 and I performed 50 percent water changes weekly. I kept the fry in the tank with the parents to note any special parental care. The fry were offered newly hatched Baby brine shrimp as well as micro worms two to three times a day. Once the fry left the shell the parents did not show any interest in them whatsoever.

The fry are a mottled black and gray, blending in well with the black and white sand of my aquarium. and do not seem to be very concerned about being seen. They grew quickly on the live foods diet I had them on and were a little over a half inch long in a month. At around the one month mark the first batch of fry began to take up residence in the shells that the parents had not claimed for themselves and another; larger, brood of fry were free swimming. This time the number was about twenty five fry! I left both groups of fry in the 10 gallon breeder tank for three more weeks until I could move them into a larger grow-out tank with some newly hatched *Lamprichthys tanganicanus*. Meanwhile the pair in the 10 gallon are on spawn number four and the “trio” in the community set up continues to show signs of spawning, but still not many fry surviving the *Cyprichromis* ( I have spotted one new Sunspot).





## AT A GLANCE

### *Neolamprologus brevis*

Tanganyikan Shelldwellers

#### ORIGIN

**Habitat:**

Fast moving  
rivers

**Biotope:**

Lake Tanganyika

#### STOCKING + HUSBANDRY

**Size:**

M: 2.2"  
F: 1.5"

**Temperament:**

Generally  
peaceful

**Tank:**

10+ gallons

**Group:**

Colony

**Diet:**

Carnivore

**Breeding:**

Shell spawners

**Lifespan:** 5-8 yrs.

#### PARAMETERS

**Temp:**

73 - 81° F

**pH:**

8 - 9

**dGH:**

9 - 19

One interesting observation on the difference in coloration of these fish between the two tanks, the Brevis in the community tank are much more attractive at all times, displaying to each other and the Cyps, the bright yellow "Sunspot" really popping against the dark brown coloration of the bodies! These fish look much more like the pictures of the wild Brevis of the lakes I have seen pictures of in different books, meanwhile the pair in the 10 gallon are quite content to remain a rather drab light grey with only the markings under the eye for color, a faint "Sunspot," and produce batch after batch of fry! You would almost think that these were different variants of the same species when looking at them side by side.

Shelldwellers in general are fascinating fish to keep, and especially good for you with limited tank space or those who simply prefer to keep smaller fish. Most can be kept successfully in a variety of situations and have "Big Cichlid" behavior in a tiny package!



*Neolamprologus brevis*. PHOTO: © Jerome Hugues





# THE BUFFALOHEAD CICHLID

*Steatocranus casuarius*

by Mike Hellweg, CFN

Originally published Jan. 2020

OVER 50% OF THE FISHES regularly kept in the hobby are members of one family - Cichlidae. There are cichlids found on 4 of the 7 continents, with Europe, Australia, and Antarctica lacking any naturally occurring cichlids. They have fascinating behavior, are intelligent and often interact with their humans, adding to their endearment.

The vast majority of cichlids kept in aquaria today are found in just two lakes on the African continent - Lake Malawi and Lake Tanganyika. In fact, when folks mention "African Cichlids", they are usually talking about the Mbuna and Peacocks of Lake Malawi as if those are the only cichlids in Africa! They are surprised to learn that there are cichlids all over Africa from Egypt all the way west to Senegal and south to South Africa. Almost every river and lake on the continent is home to at least one cichlid species.

The smaller riverine cichlids of West Africa are my favorites, and those coming from West Africa are colorful and unique. The mighty Congo is the deepest river on the planet and home to the interesting buffalohead cichlid, *Steatocranus casuarius*.

The male has a large bulbous, fleshy growth on his forehead that continues to grow throughout his life, until it sometimes becomes almost as large as his head. Females and juvenile males also have a small hump, so that can't be used as a sure sign of sex in smaller specimens. Males can reach 6 inches, though they are usually a bit smaller. Females top out at just under 4 inches, but are also usually just a bit smaller. Males are deep chocolate gray brown and have pointed tips on their dorsal and anal fin. The male's lips are also very large, and these, along with the fleshy growth, make him look like a comic book character. Females are usually lighter brown with darker brown bands and have rounded tips to their dorsal and anal fins.



Buffaloheads are **rheophilic**, meaning they come from fast flowing water. Their swim bladder is reduced in size to decrease neutral buoyancy and make it easy for them to stay in place in this churning current without expending too much energy. They move along the bottom in short hops, reminiscent of a darter. Keep this in mind when setting up their tank. They really like good water movement.

The water doesn't have to be churning, but it's a good idea to give them a power filter at least one size larger than that rated for their tank, and set it up on one of the short ends of the tank so the current flows from side to side in the tank instead of from front to back. A power head or wave maker attached to the short end of the tank would work just as well. While water parameters are generally not that important to buffaloheads, water quality is. Give them large, regular water changes. They prefer their water a bit on the warm side, but don't go too crazy. Set the heater to 80 to 82 degrees Fahrenheit and they will be happy.



Congo River rapids, home of the rheophilic *Steatocranus*

AT A GLANCE

*Steatocranus casuarius*

Buffalohead Cichlids

ORIGIN

<b>Habitat:</b> Fast moving rivers	<b>Biotope:</b> Congo River Basin
---------------------------------------	--------------------------------------

STOCKING + HUSBANDRY

<b>Size:</b> M 4.8" F 3"	<b>Temperament:</b> Territorial; but can be kept with non-cichlids
<b>Tank:</b> 40+ gallons	<b>Group:</b> Pair; colony in larger tank
<b>Diet:</b> Omnivore	<b>Breeding:</b> Cave spawners

**Lifespan:** 3-5 yrs.

PARAMETERS

<b>Temp:</b> 75 - 82° F	<b>pH:</b> 6 - 7.5	<b>dGH:</b> 2 - 15
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They need a fairly large tank. A four foot tank (33 XL, 55 gallon or even larger) should be the minimum size considered. With rheophilic cichlids, it's all about lower level real estate, so a tank with a larger bottom should be chosen. Cover the bottom with larger gravel, and add an assortment of pebbles, rocks, and cobbles of various sizes. Add several caves that are large enough for them to hide in - at least two caves for each fish in the tank so they have choices. PVC pipes or clay pleco caves work very well for this purpose.

Due to the strong current, true aquatic plants are not often found in their natural habitat, so they won't be missed in your tank. You can design a fantastic looking landscape using various rocks while hiding caves behind or under them. Be sure to support large rocks on the bottom of the tank so that any digging activity won't cause them to collapse, injuring fish or damaging the tank. Add a few clumps of Java moss attached to some of the rocks out of the current as these will provide grazing areas for fry between meals.





*Steatocranus casuarius* forms pairs that often remain together and spawn several times. I believe strongly in the suggestion that you should start with a group of 6 to 8 young fish. They grow fairly slowly, but steadily, so in about a year or so you will have a pair or two form in the tank from this initial group. There will be some scuffles, but buffaloheads aren't extremely aggressive and the strong current will keep them from spending much energy on fighting.

Once they reach sexual maturity, if they are being fed a good diet they will spawn without further intervention on your part. The pair will choose a cave and the female will lay her eggs inside. Sometimes the male is too big to fit in the entrance of the cave, so he releases his milt at the entrance of the cave and fans or pumps it into the opening. If none of the caves are to her liking, the female will often dig a suitable "cave" under a cobble or larger rock out of the current - or in at least one case, under the base of the ceramic cave I had provided!

You will know they have spawned when the female remains in the cave, even at feeding time. She will guard the eggs and then the fry and keep them in the cave until they are free swimming and ready to head out mostly on their own. They are surprisingly large, much bigger than most other cichlids at this point in their lives. Mom and Dad will guard the area, but unlike most other cave spawning cichlids, they don't spend a lot of time leading the juveniles around the tank. The fry will spend their time grazing aufwuchs and picking over every space in the tank and will spend a lot of time near the clumps of Java moss, grazing on the microfauna that lives there.



*Steatocranus* looks out at the world and wonders...

They do not school in the traditional sense, but they will remain in a pretty close-knit group for a month or two. Some juveniles will hang around the old homestead after subsequent broods are produced, while others seem to want to get as far away as possible. Sounds familiar, doesn't it? I'm not sure if buffalohead parents like having their semi-independent juveniles living in the basement, so to speak, but the adults at least seem to tolerate them, and the older siblings don't bother their younger brothers and sisters. In the 125 that I kept them in several years ago, I had a large group of juveniles of different sizes from three spawns all schooling together.



It is a good idea to gently remove most of the youngsters about a week after they are free swimming. This will allow them to get targeted feeding and all of the food without having to share with other spawns and their parents. Move them to a 20 long filled with water from the parent's tank and supplied with good filtration. Feed them well; give them large, regular water changes; and within 3 or 4 months they will be an inch or more in size and ready to move to new homes.



They are very intelligent and even at this size, they have a great *piscinality* and spend much of their time watching what is going on outside the tank, and interacting with their human, and as always, begging for food. Feed them well, but don't get carried away!

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# SYNODONTIS MULTIPUNCTATUS

## A breeding report

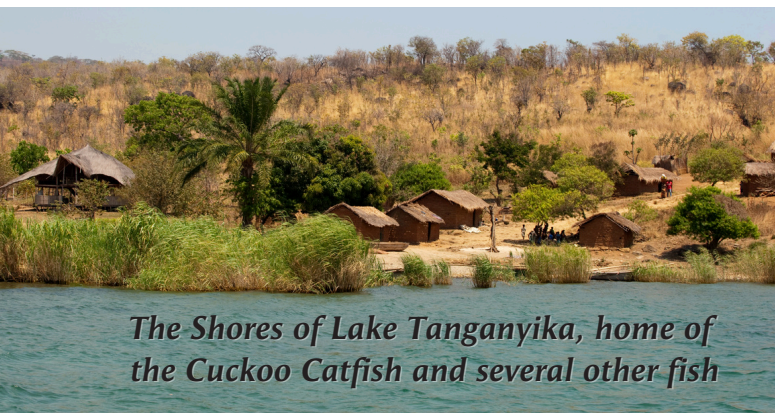
by Chad Christensen

Originally published Jan. 1998

SYNODONTUS MULTIPUNCTATUS is a rather well known *Synodontis* hailing from Africa's Lake Tanganyika. Through articles in popular magazines, such as *Tropical Fish Hobbyist*, the public has been enlightened as to the unusual spawning behavior of this Rift Lake catfish which utilizes mouth brooding cichlids as foster parents for their fry. *S. multipunctatus* has been classified in the family Mochokidae, which it shares with over one hundred other species of African *Synodontis* (Brichard, 472), including several Tanganyikan endemics which are very similarly marked.

*S. multipunctatus* has a base body color that is golden beige when young, but this seems to get darker with age. The body is covered with dark black blotches that are randomly strewn across the body and head. Pectoral, dorsal, and tail fins are black with a white margin, although the dorsal fin's white margin is only on the posterior of that fin. Their undersides are creamy white, as are their six barbels. The upper pair of barbels consist of two single stalks while the lower four are comprised of four single stalks with many cilia off of either side of each stalk giving the feelers a feather-like appearance.

Fairly abundant in the lake, great schools can be seen swimming at depths of 40 meters or more, where the harsh cast of the sun is filtered to a dim light. Once thought only nocturnal, a more appropriate classification might be "light sensitive" (Brichard, 474), which becomes apparent in the aquarium as the species greatly appreciates the canopy lights to remain off.



*The Shores of Lake Tanganyika, home of the Cuckoo Catfish and several other fish*





A hardy aquarium inhabitant, *S. multipunctatus* enjoy a variety of foods including various flakes and pellets and also frozen foods such as brine shrimp and bloodworms. A temperature of 78 degrees Fahrenheit is adequate and large, and weekly water changes and efficient filtration are needed as these fish produce a large biological load when fed their fill.

Unlike cichlids, which will often spawn at one third their adult size, *S. multipunctatus* must be full grown for a time, possibly a year, before sexual maturity is attained. The road to adulthood is not a brief one, for the fish OR the anxious hobbyist! Three to five years is the time it takes for these catfish to mature from lowly wigglers (eating their fill of cichlid fry within the safe haven of the cichlid's mouth), to storming the spawning pit of a pair of courting mouth brooding cichlids, dropping, or fertilizing, their own eggs while gluttonously gobbling up as many cichlid eggs as can be requisitioned!

As has been previously published, these catfish are **parasitic mouthbrooders** in that they, themselves, do not mouth brood their fry, but procure the services of a mouth brooding cichlid. National Geographic was so cunning as to catch this feat on film in one episode of a four part series named "National Geographic's Heart of Africa". They showcase a swarm of *Synodontis multipunctatus* bully their way into the shallow breeding nest of a pair of *Ctenochromis horei*. The unsuspecting cichlids attempt to continue spawning while driving away the persistent catfish. Every time the female *C. horei* would lay an egg, it would be snatched up by the *S. multis* before she could even turn around and pick it up.



*Synodontis multipunctatus* is a **parasitic mouthbrooder**: not mouthbrooding, itself, but tricking mouthbrooding cichlids like *Ctenochromis horei* (above) into raising its fry for it. As fry grow, they devour the young of their cichlid host, horrifying all who know.

Meanwhile, the catfish drop eggs or spray milt. They may even end up eating some of their own eggs. In her haste, the female cichlid picks up whatever eggs she can. The end result is the female cichlid with a mouthful of fertile cichlid eggs AND catfish eggs. This is how the fish behave in the aquarium, as well. I have watched these fish spawn dozens of times now, and every time it is just as interesting. It's like watching a sport. Sometimes, one switches "teams" and roots for a different side than usual...the cichlids! One can't help but feel sorry for the cichlid parents, as the fate of the cichlid fry is sealed if only one fertile catfish egg was picked up. Within about 3 days, the *S. multipunctatus* will hatch and begin devouring the cichlid eggs before they even hatch. Then, days later, when the cichlid fry do hatch, their lives are still in jeopardy. The minuscule catfish grab onto their yoke sac and suck them dry. Often, after stripping a cichlid, one will see both dead fry with no yoke sacs or live fry with stress marks peppering the yoke sac in the form of bloody areas. The voracious catfish waste nothing, however, and once they are big enough to eat the entire cichlid fry, which in only another few days, they will do so.





My breeding group of eight *S. multipunctatus* started with a single fish I acquired a few years ago. I got the other seven from Steve Edie. He had pieced together the group over the years and had even had one successful spawn in the past, but his interests migrated to the *Synodontis petricola* and as he began piecing his *S. petricola* colony together, the *S. multipunctatus* spawning effort was put on the back burner. After the fish had hung around for almost a year with no spawning activity, I strong-armed Steve into selling them to me. This was accomplished by a combination of whining, sniveling, and the occasional threatening letter left on the old welcome mat. Then came ACA '97 and the time was right. Steve wanted to open up the tank space for all the little gems that would accompany him home from Chicago. The trap was sprung and I carted home the mob of Synos and put them in a 75 gallon tank about a week before we all headed north to the ACA '97.

Now came the need for a host. Steve Edie and I theorized that inexperienced breeders might be a more productive alternative to an established breeding group because they would never know breeding under any other condition than the harassment of the Syno's. So began the search for a young, prolific species just reaching sexual maturity. A little inquiring led me over to Ted and Liz Rail's house where they, too, were clearing tank space for possible convention purchases. Home I went with thirty young adult *Haplochromis sauvagei*. These fish were quarantined in a 20H. I also wanted to sort out males and females. To accomplish this, I waited for fish to spawn. As soon as a female was packing, she was removed from the 20H and put in the 75 gallon.

After I had moved about a dozen female Haps to the 75 and fattened them up for a week, I moved the three most dominant males from the 20H to the 75. Within two weeks, almost all the females were packing and some *S. multipunctatus* breeding activity was witnessed. Evidently, *S. multipunctatus* can smell the breeding activity. Within seconds after a male and female Hap start spawning, Synos pour out of the 6 large igloos they call home (similar to feeding time) and swarm the area of courtship. Once they all get chased away the first time, they are more timid about intruding. Usually then only single fish or pairs dart in and out trying to steal a plump, delicious cichlid egg snack. At 1/16" and dark beige, the Syno eggs blend in well with the sand substrate. I regularly see the Hap eggs drop, but have only witnessed the Syno eggs dropped once. This from a female Syno that is part of a pair that seem to have a loose pair bond. Every time courting begins and the caves empty, this female can be seen cruising with her male swimming beside her, trailing about half a fish length back.

After packing for one week, the female Haps were stripped. Along with over 40 Hap eggs were eighteen Syno eggs. These eggs were very small, at 1/16", when compared to the 1/8" Hap eggs. Within two days, tiny white threadlike tails could be seen off the catfish eggs/yoke sacs. To avoid other fish biting at the fry through the bottom of a breeder net, clear hard-plastic floating breeder cages were employed. Fed three times a day on frozen baby brine, the fry grew from 0.25" to 0.5" in less than a week, at which time they began to gain dark pigment on their ghostly white bodies. Then one morning I awoke to find the breeder trap void of all life without a trace. Apparently something had gotten into, and out of, it in the night and eaten all the fry. Frustrating.



A week later, the breeder traps were again full of Syno and Hap fry. This time, the breeder traps were secured. Again, the fry grew amazingly fast. The dark pigment first appeared on the top of the head and then the back and tail. Soon the entire fish was colored in the golden beige base color with black dots cascaded across the body. After about two weeks, the fish were about 0.75". At this point, they were receiving crushed flake food as well as the frozen baby brine. At a size of about 1.25", these fry were moved to a 10 gallon tank of their own to free up the space in the breeder nets. I have gotten into a cycle of stripping all the Hap females every one or two weeks whether they look like they are carrying or not. I have had a few surprises when doing this. Occasionally a single, but chubby, catfish will wiggle out into the net. Yes, if one waits too long to strip, the Synos have eaten all the cichlid fry and turn to cannibalism. Only the strong survive!

The next time I stripped, I liberated about 18 various sized fry. With large batches of fry, they are split into several breeder nets for their own safety. I once witnessed a Syno that felt the baby brine was too small a meal to waste its time and went straight for another Syno within 5 minutes after being stripped. There was nothing I could do as I watched it swim around with another Syno's head sticking out of his mouth. He had devoured his sibling tail first! These cannibalistic tendencies seem to be quenched if the fry are stripped young and weaned immediately onto frozen baby brine. If left in the Cichlids mouth to feast on Cichlid fry, they learn that big prey equals full belly and, therefore, that is their first pick if given the choice between fry and baby brine. When weaned early onto baby brine, I had no problems with conspecific consumption.

With the new batch of 18 fry, I started experiencing high fry mortality, which was not an issue with the first batch of fry. Initially, I blamed the other Syno fry, but the bodies were not eaten. Soon I was losing fry every day or two. Within a couple weeks, all the fry were deceased. I was perplexed. I had been doing 30% to 50% weekly water changes and had plenty of biological filtration in the form of a Hagen Fluval 403 canister filter and 26 SeaStorm 240 fluidized bed filter. I deduced it must be a water quality issue, however, after ruling out all other possibilities.

AT A GLANCE

*Synodontis multipunctatus*

The Cuckoo Catfish

ORIGIN

Habitat:

Lake dweller

Biotope:

Lake Tanganyika

STOCKING + HUSBANDRY

Size:

Usually 6" in aquaria

Tank:

75 gallons

Diet:

Omnivore

Temperament:

Generally peaceful; will eat small fish.

Group:

4+

Breeding:

Parasitic mouthbrooder

Lifespan:

15+ yrs.

PARAMETERS

Temp:

75 - 82 °F

pH:

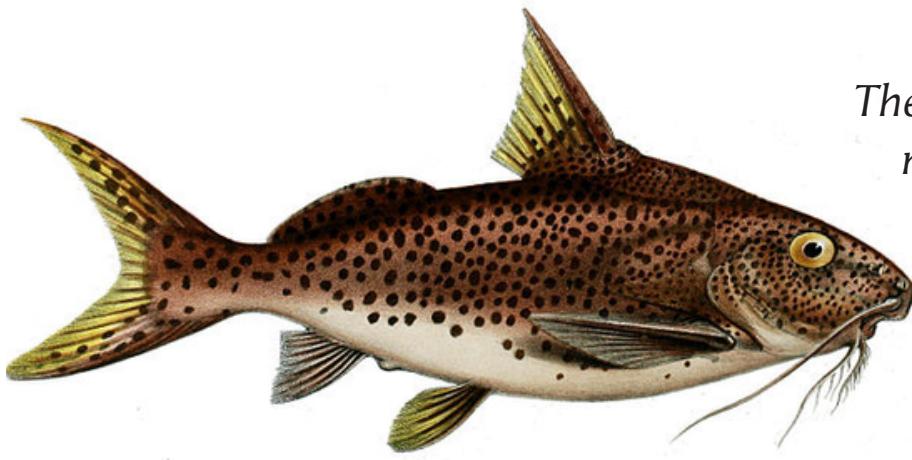
7.5 - 8.5

dGH:

3 - 9







*The Cuckoo Catfish's common name, of course, refers to its breeding practices, and not to its unquestionable sanity.*

I am on a well water system, so the thought of contaminants in the well water crossed my mind. I do water changes with water from a 55 gallon drum that I circulate for 24 hours or more through a Magnum 350 canister filter with micron cartridge. The micron cartridge is to remove grit and the 24 hour circulation is to aerate the water as well as let it naturally come up from its out-of-the-tap pH of 6.5 to its rock stable, naturally buffered 8.0 pH. The high pH swing and stabilization is not surprising when the waters hardness ranges from 330 ppm to close to 380 ppm out of the tap! With this, it takes only 1.5 teaspoons of Kent African Cichlid buffer in the 55 gallon barrel to raise and lock the pH at 8.6. I don't usually use carbon on any of my tanks, as they get large weekly water changes. I saw a change was needed. I replaced the micron cartridge with the carbon holding insert and started carbon filtering the water change water for 24 hours or more before each water change. I also added carbon to the middle compartment on the 75 gallon tank's Fluval. The premature deaths ceased immediately. From more experience with this tank, it appears that it was not a contaminant in the well water, but the amazingly heavy bio-load on the tank that caused the deaths. Even with the large water changes, the carbon is still used and changed monthly on that tank. Since this additional mode of filtration was added, no deaths have occurred.

In the wild, it is likely that the cichlid hosts have uninterrupted spawns between the chaotic attacks by the catfish. In the aquarium, the host fish have no such luxury. It is, therefore, recommended that the host fish be given a break from the pressure of defending a spawning session in the form of moving the catfish or the host fish to another tank where they may spawn unmolested. Some breeders have two tanks of hosts going at once and move the catfish from tank to tank every 3 - 6 months, thus giving the cichlids a much needed break. Another alternative is keep a supply of up-and-coming young breeders available. I have chose this route. I keep as many Hap fry as I can and grow them out in other tanks. As soon as they reach spawning size, they will be available as new hosts.

The investment of growing a group of *Synodontis multipunctatus* to sexual maturity can be a time and space consuming task, but can be well worth it to witness the fascinating spawning technique of the species. If time is an issue, purchasing adult fish will shorten the wait considerably. However one gets there, the reward of working with this species lies within the unique spawning technique that will stand out among all others.

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## REFERENCES

Brichard, P. 1989. Cichlids and all the other Fishes of Lake Tanganyika.  
T.F.H. Publications, Inc., pp. 472-482.

# THE EPIPLATYS KILLIS



Source: Dornenwolf

by Jack Heller

Originally published May 1997

I HAVE ALWAYS BELIEVED that the most exciting times in the aquarium hobby are when the first aquarium is set up, when a new fish is successfully spawned, and when an aquarist moves into a new area of the hobby. I found myself in this position a few years ago, when, as a collector of killifishes, I started feeling that I had “seen it all and done it all”. Then, at a local killifish show I saw a photo presentation on the killifish genus *Epiplatys*, and my passion for the hobby was re-ignited. The colors, elegant form and deportment of this small genus of killifishes convinced me that this was an area of the hobby worth moving in to.

The name *Epiplatys* (pronounced Eh’-pee-play-teez) means “flattened above”. *Epiplatys* are surface dwelling, oviparous (egg laying) Cyprinodontiform fishes found throughout the coastal areas of west central Africa, from Ghana through Nigeria and Cameroon, to Gabon.

They inhabit streams and pools of both forest and savanna areas. The genus is often lumped with the genus *Aplocheilus*, as these fish frequently appear in literature under the genus *Aplocheilus*. As with other killifish genera and species, there is a perennial debate over nomenclature, which can be frustrating for the average hobbyist. Even the term “killifish” is not consistently used in the literature as the common or popular name of these fish. They are often identified in literature under the name “Panchax”.

Adult size varies among *Epiplatys* species, with most achieving an adult length of two and a half inches for the intermediate size species and four inches for the large species. A few, such as *Epiplatys sexfasciatus*, can grow to five or six inches if given a lot of space, plenty of nourishing food, and frequent water changes. There are also a few small, delicate species such as *E. annulatus*, which rarely exceed one and a half inches in overall length.





The *Epiplatys* body form is adapted to make these fish efficient surface dwellers. The head is generally flat on top, the snout is rounded, the mouth is directed upward, and the lower jaw generally projects slightly over the upper jaw. This structure allows the fish to easily snatch live food from the surface of the water. Their generally long, slender structure together with their flat head and mouth structure give them a pike like appearance.

The enjoyment of Epies comes from their beautiful and varied form and color, their unique and interesting behavior, and the relative ease with which many of these fishes can be raised and bred. A pair of Epies do well in a three to five gallon aquarium, with ten gallons working well for two to three pairs. An important rule is not to overcrowd these fish, as overcrowding stunts growth and also causes aggressiveness among the males. Another important requirement is a tight lid on the aquarium, as Epies are all marathon jumpers. Epies prefer a temperature range between seventy and seventy-eight degrees Fahrenheit, and they also like a certain amount of hardness in their water, although they tolerate a wide range of water chemistry. The most important consideration with the water is that it is clean. Weekly partial water changes are strongly recommended. They also like a tank that is well planted, particularly with a floating plant cover, which seems to give them a sense of security. When Epies feel secure and comfortable in their environment, they tend to be less shy, and display their color and finnage more frequently,

As far as feeding requirements, Epies are generally less demanding than most other killies, accepting high protein flake food, frozen foods such as brine shrimp, blood worms and beef heart, and live foods such as red wigglers and white worms. Most adult Epies have enormous appetites, and need more substantive live foods than newly hatched brine shrimp or fruit flies. These foods are best saved for smaller fish that will appreciate them more.

Since Epies consume a lot of food, their tanks pollute fairly quickly, and weekly partial water changes are very important to keep them in top physical and spawning condition.

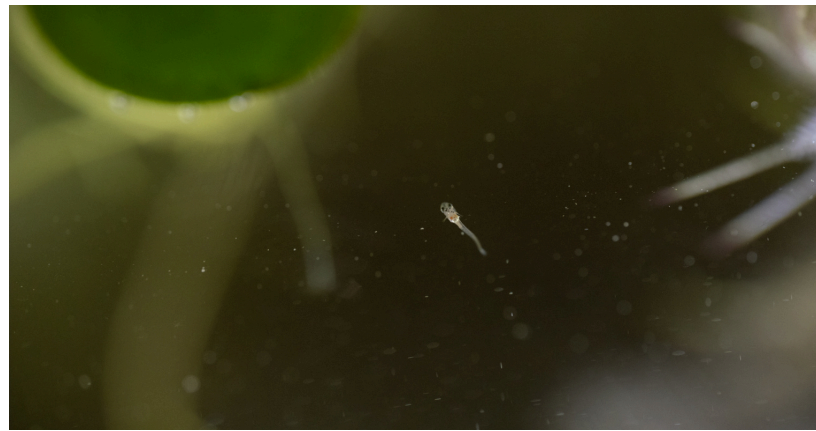
Epies lay their eggs in the upper part of a floating spawning mop or in thick floating plant growth such as java moss or horn wort. As with other top spawning killifish, there are some Epies that will leave newly hatched fry alone to grow up in the tank, and others that will snatch up a fry the minute they lay eyes on it. An aquarist who is serious about breeding Epies will want to pick the eggs from the spawning mop and place them either in an incubation solution or in a closed container over moist peat moss. I prefer to incubate the eggs in a solution. I pick the eggs once or twice a week, as I have time, and place them in an incubation solution which I mix myself. I mix this solution in a one gallon plastic milk jug. It consists of one gallon of aged water, a teaspoon of non-iodized salt, ten drops of Methalyne Blue dye, and around five drops of a fungicide such as Aquarisol. The mixture need not be precise. I pour some of the solution into a clean plastic butter dish, add some clean water from the same tank that I took the eggs from, place a tight lid on the butter dish, and place the butter dish in a warm, dark location to incubate. Every few days, for the first six to nine days, I open the container and pipette out any fungused eggs.

### **Heller's Killifish Egg Solution**



**Instructions:** Mix in a gallon jug. Add solution and eggs to a hatching dish and incubate in a warm, dark place, removing fungused eggs every few days.

The eggs develop and hatch in twelve to twenty one days. Some of the Epie species can take newly hatched brine shrimp immediately, but many are too small for brine shrimp, and have to be started on infusoria and microworms. I keep the newly hatched fry in plastic show boxes with gentle aeration from an air stone, and try to do a partial water change once a week, most Epie fry are sexable in six to eight weeks, but are relatively slow growing, and require a lot of space to reach their full size. Therefore, it is important to graduate them to a larger container as soon as they appear to be crowded, and to raise the intermediate fry in the largest tank available.



*Epiplatys fry are relatively slow growing and require space to reach their full size.*

## POPULAR EPIPLATYS SPECIES

Epies range, in degree of difficulty, from beginner fish to advanced, which are recommended for experienced aquarists only. Fortunately, many of the most popular and readily available species are hardy, robust fish easily raised and propagated by the beginning aquarist. Here are descriptions of some of the most popular and easily raised of the *Epiplatys*:



*E. annulatus*, also known as Clown Killifish or Rocket Killifish.

Photo: © Hristo Hristov

***Epiplatys annulatus***, commonly known as the clown killifish or rocket killifish, is a small Epie species with an adult length of 1.5 inches. *E. annulatus* has colorful black and yellow stripes with a colorful tail pattern that varies based on collection location. They are found in the shallows of warm, soft water streams in West Africa. A shy species, they require surface vegetation to be comfortable. *E. annulatus* prefer live and frozen foods, and may not accept flakes. Do 20% water changes weekly. They spawn in soft water. Fry are miniscule. Feed vinegar eels or Paramecium. After a week, they are large enough to accept brine shrimp.







***E. dageti*, the Red Chinned Panchax**  
Photo: © Hristo Hristov

***Epiplatys dageti*** (de.jay'.i) is a smaller Epie with an adult length of two to two and a half inches. There are two common varieties, *E. dageti dageti* and *E. dageti monroviae*. *E. dageti dageti* has six or seven black vertical bands on a brown background. *E. dageti monroviae* has five vertical bands, and the adult male has a red or orange spot on the throat. This variety also has a blue-green to indigo sheen on its scales, and makes a very striking appearance. This is a good beginner fish, which tolerates a wide range of water conditions, and does well in a community aquarium. Eggs, picked from a spawning mop and incubated as described above, will hatch in twelve to twenty-one days, and the newborn fry can take newly hatched brine shrimp immediately.

***Epiplatys fasciolatus*** (fas'.see.o.lay'.tus) is a large, robust Epie, and although most adult males grow to four inches, I have seen them as large as six inches. Although this is a generally peaceful fish, it grows quite large for a killifish, and needs a lot of space, and a lot of food. Again, the water requirements are flexible, but cleanliness is essential, particularly for a voracious fish such as *E. fasciolatus*, which produces substantial waste. The color pattern on this fish is variable, depending on where it was collected, but there seem to be certain standard features, such as colorful margins on the unpaired fins that generally consist of bands of blue and red. The males of the population that I am currently raising have a beautiful silver-blue speckling over the lower half of the body which presents quite a picture when they are displaying.



***E. fasciolatus*, The Banded Epiplatys**  
Photo: © Jose Vidarte



***E. lamottei*, the Red Spotted Panchax**  
Photo: © Hristo Hristov

***Epiplatys lamottei*** (la.mo'tee.eye) is a medium size Epie with an adult length of approximately four inches. This is certainly one of the most beautiful of the *Epiplatys*, and is considered by many killifish enthusiasts to be one of the most beautiful of all old world killifish. The males have a deep purple/violet color and five rows of red spots extending from behind the gills to the beginning of the tail. The unpaired fins have a wide, red outer margin. This fish prefers top floating plants and a quiet location. With these requirements met, it comes out of hiding and displays its beautiful colors and form. *E. lamottei* prefers temperatures of seventy to seventy-five degrees Fahrenheit for spawning, but can tolerate temperatures in the mid sixties. As with other Epies, pH and DH are not critical, but clean water, with a weekly twenty percent water is highly recommended. Eggs take twelve to twenty- one days to develop, and fry can take newly hatched brine shrimp immediately.



# FUNDULOPANCHAX AVICHANG



Source JJPhoto.dk

**by Charles Harrison**

*Originally published Dec. 2006*

WE FOUND THIS LITTLE FISH at the 2002 American Killifish Association National Convention in Colorado. There were bags for sale in the Fish Sale room and a few made their way into the auction. We picked up 2 pair. There was no mention of them in any of the literature. A Spanish physician Francisco Malumbres and a party of collectors found the fish in Equatorial Guinea in 2000. Their full name includes the location where they were found as *Fundulopanchax avichang* GEML 00/16 Nguba II together with the date taken. Other attempts to collect and keep alive specimens for breeding and distribution have not been successful to date. Avichang is a native word meaning “Small” in English.

The radiant and iridescent chrome yellow below a bright blue stripe extending from the gill through the caudal peduncle and into the tail first caught my eye even as a frightened washed out fish in a bag. I hadn't seen it before but it reminded me of the *F. amieti*. The color patterns are close but the brightness of the yellow stripe down the side told me it wasn't just some color variation of amieti. This was a new little jewel and since I planned to bring something home from the convention, I thought this one might just be one of them. Sue, my partner, really liked the fish and that is always a plus. She helps to keep the interest up when the fish is one she likes to see around and I depend on her to help out from time to time with water changes and feeding.





There were six pair on the auction and we got two of them for \$40 each, a little high but these guys were almost glowing in their bags, so have them we did, along with a couple of SA annuals. I have never seen this fish before and the New and Rare fish are the reason for me to stay for the auction.

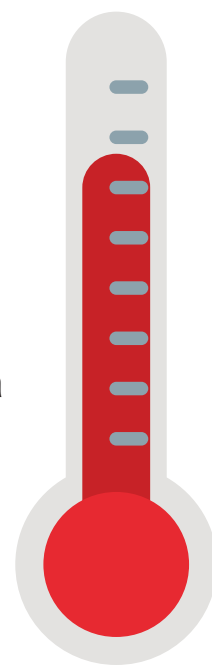
Once home the *avichang* jewels got more interesting – no one knew anything about them! Not their egg placement, their incubation time or type, where they were from, water temperature – nothing! After looking through the available literature, I asked the killietalk e-mail list. Mickelson came back with a name, *F. Malumbres* in Spain. Brian Perkins sent me on the right trail. So I set out to get in touch with *F. Malumbres* and to trial and error to get eggs and young from these jewels.

The fish colors up dramatically early in life and maintains their striking markings well into maturity. The lateral stripes of red begin as red spots in the face and coalesce mid body to form a broad bar into the caudal. Interlaced with the red is iridescent blue in the face, which coalesces into a second band into the caudal. Below this blue band, the underside of the fish and the lower unpaired fins are bright red orange. Both males and females reach a total length of about 1.5 inch. The fish coloration is variable individual to individual, but all the more striking in a group of these fishes.

And, speaking of groups of this fish, these are the most aggressive Killies I have found in 30 years of Killie keeping. The females as well as the males are often guilty of killing off their tank mates. Breeding setups need to take this into account. Lots of hiding mops, both bottom and top floating are recommended! Their aggression should not be taken lightly. There have been few people who have been able to maintain this fish and this is due mostly to their aggression. Two pairs of *F. avichang* in a 10 gallon tank without sufficient hiding places may have only one living fish swimming in it when left overnight.

Another difficulty of the fish is the egg development. The eggs require 2 months of dry period. I have kept the eggs in water for 4 months without seeing any development of the embryo. Eggs left behind and forgotten for 4 months in a vacant 10 gallon have turned into fish though so I would guess the fish are not completely annuals in the wild. After 4 months of dry there is a major decrease in the viability of the eggs to the point of less than 3 or 4% of the eggs hatching. I always re-dry the peat in the dish after wetting a first time. I have had several eggs rest for another 3 weeks and then hatch on a second wetting. When wife and I picked up the fish at the AKA Convention, there was no information about them in the literature. Only experimentation found the incubation time. I have also noted the temperature the eggs are stored at controls the gender ratio. Storage at temperatures below 72° F results in a preponderance of males. Raising the storage temperature to 76 results in more females than males. This observation comes from hatching a dozen bunches of eggs.

**For  
*Fundulopanchax  
avichang*,  
incubation  
temperatures  
play a key role in  
determining sex.**



My best hatching method is to store the eggs on the surface of moist peat moss in a glass dish like a Petri dish. Other methods like storage in a plastic bag of peat have not been nearly so successful. The dish method allows one to observe the egg development over the storage time and one can remove any dead eggs or wet them when they seem to be looking back at you. This method requires the eggs be picked from mops from the breeding tank and place them on the peat. Again this allows the removal any white or dead eggs and prevents fungus from killing viable eggs over the development time of 60 to 70 days. I wet the eggs by flooding the dish of eggs and peat carefully so as not to disturb the peat mat and allow the eggs to hatch. The new fry take newly hatched BBS and microworms as soon as they are free swimming. They soon graduate to Grindal worms and some frozen foods. I have never fed flake or dry foods but they do take fruit flies, so they probably could be trained.

## AT A GLANCE

### *Fundulopanchax avichang*

#### ORIGIN

**Habitat:**  
Temporary  
river pools

**Biotope:**  
Ecucu River,  
Eq. Guinea

#### STOCKING + HUSBANDRY

**Size:**  
1.5"

**Temperament:**  
Aggressive

**Tank:**  
5+ gallons for a  
pair

**Group:**  
Pair or group

**Diet:**  
Omnivore

**Breeding:**  
Egg Scatterers

**Lifespan:** 3-5 yrs.

#### PARAMETERS

**Temp:**  
70-78 °F

**pH:**  
6 - 7.5

**dGH:**  
3 - 8



*F. avichang* can be found in small, temporary pools of the Ecucu River in Equatorial Guinea.

I have had excellent results keeping this fish in St. Louis tap water dechlorinated with Thiosulfate. I have bred a pair in a 5 gallon tank with 4 to 6 100-strand breeding mops, half of the mops floating. I generally use a corner sponge filter. Our water here remains at a pH of about 7.5 to 8.0, a total dissolved solids of 250 to 350 ppm and a total calcium hardness of about 125 to 200 ppm. The tank temperature varies 68 - 73 °F in my fish room. I change at least 80% of the water in all my tanks once every 7 to 10 days. I have heard others say they only keep them in RO or rain water because they don't produce eggs for them if they don't. I have not found this to be true, St Louis tap water is just fine. But, change as much water as often as you can.





# EASY RHIZOME PLANTS

*Anubias,*  
*Bolbitis, and*  
*Microsorium spp.*

by Holly Paoni

Originally published Mar. 2019

I AM GROUPING THESE three plants and their variations into one article as these are some of the hardest and least demanding aquatic plants in the hobby. These almost anyone can grow, and treat them the same way. Extremely low light to high light, fertilizing or not, they will grow. Most herbivorous fish won't eat them as they are tough. Digging cichlids can't uproot them. These all grow on rhizomes, a thick green horizontal stem, which the others stems and leaves, and roots come off on. The trick to growing these plants is not burying the rhizome. All three of these will root into driftwood, rocks and attach to various decor over time. All are also considered slow growing, which means very minimal maintenance.

*Anubias* vary from the tiny leaved *A. nana* "Micro" to the huge leaved *A. gigantea*. Some grow horizontally, some grow more vertically. There is an *Anubias* variety for every tank, from the 2 gallon pico tanks, to that 500 gallon monster tank. They can even be grown emersed, in a humid terrarium. I've never noticed any real growth rate difference, when tied down to various objects. Resin decor growth seems very similar to driftwood and rock growth. Most have wider leaves, some heart shaped. Veining varies per variety and species. I've grown them in shady tanks with just incandescent room lighting feet away. I've forgotten about pieces of a few, and brought them back from only a rhizome. When attached correctly, these are as easy as it gets, just as easy as artificial, and feed off of what's in the water.



Java ferns can be as delicate as the Narrow Leaf and Windelov (Lace) varieties, or as sturdy and the normal and Trident varieties. In my experience Java Ferns do best in hard alkaline water attached to driftwood. In softer water or tied to rocks it doesn't grow and spread as well. You can still grow them that way, but it may just be slower unless an occasional fertilizer is added.

These will throw baby plants off their mature leaves. At first, it looks like random black dots all over the underside of the leaf. Then you will notice small plantlets and roots forming. I let these grow until there are 4-6 leaves about 3-4 inches long with some good roots before removing and attaching elsewhere. They are easily handled at that size. Occasionally fish will knock smaller ones off and these can be tucked among the leaves of the mother plant, tied down, or pushed into a nook somewhere until they're easier to handle. I've tried a few times to grow these emersed like *Bolbitis*, and *Anubias*, but my luck was short lived with emersed grown plants. I'm sure it is doable, it just needs specific conditions that I was unable to easily replicate.

There are a few varieties / species of *Bolbitis* in the hobby. *Bolbitis heudelotti* is the most commonly seen, *Bolbitis difformis* is a smaller species, and *Bolbitis heteroclita* both closely resemble common houseplant ferns and their leaf structures.

All of these grow best just like *Anubias*, tied or attached to driftwood, rocks or decor. A major difference is that *Bolbitis* loves current. Place it near an outflow or sponge filter and it will be happy and do well. The dwarf variations are great background plants in 10-15 or 20 gallon long tanks. The regular varieties work well in the background of 29-75 gallon tanks. These also can work very well in humid emersed conditions.

**The three most common *Bolbitis* species in the hobby (top to bottom): *B. heudelotti*, *B. difformis*, and *B. heteroclita*. Note the last is not an African species and more temperamental in aquaria.**

**PHOTOS: Glass Aqua**



To attach these plants to decor, driftwood, or rockwork, everyone has their preferred method. I'll try to go over some of those, with pros and cons of each method.

The easiest, would be simply tucking or wedging the roots into a nook or cranny. While easy, these plants can easily come untucked during water changes, or fish knocking them loose. You also don't always have a nook to tuck them into, or the placement isn't the most visually appealing. It does occasionally work out, but take care to not break or bury the rhizome. It needs light and water circulation. Many folks fail with these plants when the rhizome gets buried and plant dies off.





Another quick method is to use super glue gel or an aquatic plant gel to attach plants where you want them. Care must be taken with method, as you do not want to drown the roots or rhizome with this glue. Too much prevents the plant from being able to absorb needed nutrients, or kills the rhizome. The trick is to use very very little and spot it out sparsely over the area where you want to attach the plant.

My preferred method is to tie them down using cotton thread. With this method there is no worry about too much glue or burying the rhizome, but it can be more time consuming wrapping thread throughout the length of the plant without tearing off leaves and stems. I feel the time is worth it as it's now as stable as I want it, won't be knocked loose, and I won't drown the plant in glue. You want the thread snug, but not super tight or cutting into the rhizome. Cotton will dissolve on its own and simply break apart. Some use quilting thread, which will need cutting off later and others prefer fishing line because it's clear. One drawback to fishing line is that once cut, it remains sharp and fish can scrape themselves on that cut point. If using fishing line, take care to hide your knots and cut edges and place them where fish can't scrape against those accidentally.

You can also bury the roots in the substrate as long as the rhizome stays above the substrate. To do this you need some fairly long roots on the plant. Anubias are usually the easiest to do this with as the others typically have only very fine short hair like brown roots. Anubias roots can be much longer and are typically white to green, making them much easier to plant. The others occasionally are doable but not normally.

If you want to try live plants, I highly recommend starting with these three types. The only thing you really need to know is how to attach these properly to items in your tank, after that they really are some of the hardest live plants available.



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# THE AFRICAN CLAWED FROG

*Xenopus laevis*

by Mike Hellweg

IT IS ALMOST AN AMERICAN TRADITION that at some time in our youth, we are drawn to the local watering hole (not the tavern, but a pond lake, creek, stream, or whatever!). Here we come into contact with one of Nature's oddities, and most of us are drawn to take one home, or even to school. Usually, we grow out of this phase, but some of us, myself included, never do. I am of course talking about a fascination with FROGS! Even the venerable American writer Mark Twain was still captivated by these wonderful creatures.

The neat thing about the subject of this article is that it is easy to care for, feed, house, and even to induce to breed. They are all captive bred, so there is no pressure on wild populations, and their antics are enjoyable to watch. They have an endearing upward stare that seems to say "Feed Me!" whenever you (or anyone else, for that matter) walk into the room.

*Update from the article originally published March, 1994.*

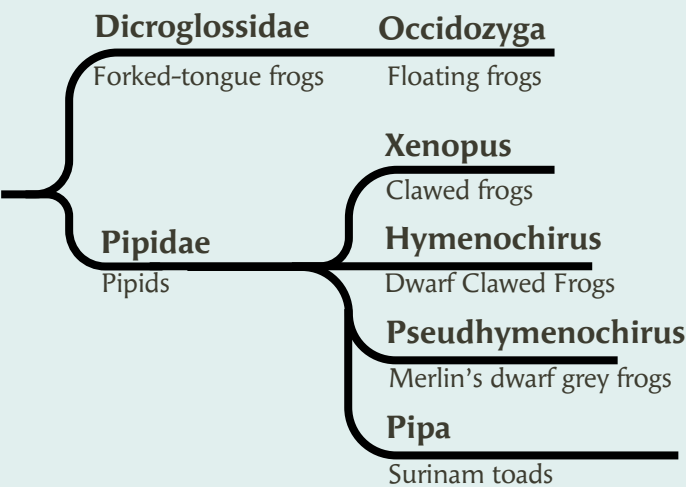
What is a CLAWED FROG? It is basically a totally aquatic mouth and stomach with four legs! It belongs to the group of tongueless frogs scientifically known as Aglossa. Their family name is Pipidae. There are about 15 species in their family. Among them are the South American Suriname "Toad", (*Pipa pipa*), and the cute little Dwarf African Frogs of the genus *Hymenochirus*, both of which are popular in Aquatic circles. Aside from their appetites, all Pipids share a few other characteristics: They are all fully aquatic; They have no tongue; They have no eyelids; They have either 2 or 3 clawed toes on their hind foot; and they all have some sort of fleshy appendages on their sides. In *Xenopus laevis*, these appendages almost make the frog look like it is covered with Zippers! Or maybe it had a run-in with Dr. Frankenstein! What these "Zippers" actually are is a sort of lateral line used in the detection of food (what else?).





African Clawed Frogs are the most widespread of the Pipids, occurring in almost all of Africa south of the Sahara Desert. They are so common that they are collected by the African Tribesmen (who call them "plantanna") and dried, ground, and sold as a health food and medicine. More on this later. They were first described to Science in 1403 by Daubin as *Bufo laevis*. Subsequently they were revised into the genus *Xenopus* ("strange foot") where they remain to this day. Their historical "contributions" to mankind are many, including the so-called Hogben Test. For many years this was the standard medical test for pregnancy in humans. The urine of the possible mother-to-be was injected into the lymph nodes of the female frog. If she spawned within a few hours, the woman was "diagnosed" pregnant. If not, she was not.

## TAXONOMICAL RELATIONSHIPS of Frogs in the Hobby



### AT A GLANCE

#### *Xenopus laevis*

African Clawed Frog

#### ORIGIN

**Habitat:**

Slow moving waters

**Biotope:**

Sub-Saharan Africa

#### STOCKING + HUSBANDRY

**Size:**

M: 2-2.5"  
F: 5-6"

**Temperament:**

Aggressive and voracious

**Tank:**

10 gallons for a pair (half filled)

**Group:**

Not needed

**Diet:**

Omnivore

**Breeding:**

Egg scatterers

**Lifespan:** 20+ yrs.

#### PARAMETERS

**Temp:**

68 - 78° F

**pH:**

7 - 8.5

**dGH:**

2 - 15

In spite of this, *X. laevis* was in danger of becoming extinct! While females were being collected by the thousands, it seems no one bothered collecting the males. I assume the female would lay eggs after injection, though they were infertile. Another "contribution" (remember the "health food" bit earlier?) is one that is the subject of current research. It seems not long ago a medical researcher was scratched by a Clawed Frog. Anyone who handles adult Clawed Frogs should EXPECT to get scratched as they struggle. It is painful, but, as the researcher discovered, the cuts heal quickly, and, in spite of the dirty, bacteria laden water of their home, no infection develops. It seems the frogs produce some sort of anti-bacterial agent that also facilitates healing. Whatever this agent may be, the African Clawed Frog is now a research animal with a different mission.

This is another argument for preserving biodiversity. Who would have ever thought of healing wounds with a "dirty, slimy, icky" frog? Of course, if the Europeans had paid more attention to the people on the land they were always fighting over, they may have noticed that African tribesmen had been using them as a folk remedy for centuries. But enough of history, politics and science, back to the Frogs!



MAINTAINING CLAWED FROGS is very easy. All you need is water, a container, and lots of FOOD. My pair of frogs live in a ten gallon tank filled with 3 or 4 inches of water. You can give them hiding places, but they never use them. Keep the tank covered tightly or keep the water level very low, as they have a tendency to go "over the top" and explore the big world in search of food. They hang at the surface with their legs on the bottom watching for food. Hands, fingers, siphon hoses, nets, etc. are all considered possible candidates. I don't know how many times my female frog has tried to inhale my finger! They have teeth, but no harm is done. They receive 1 or 2 nearly 100 percent water changes each week. Just drain the tank down as low as possible and fill it back up. A single frog can live very well in a 5 and a half gallon "critter tote". That is one of those plastic boxes with the lock on top which are available everywhere. As long as the lid is secure, you just have to dump out the sludge and water and refill it, without ever handling the frog. Use dechlorinated water of the same temperature, and your frog will be none the worse for wear.

Filtration is useless (it gets clogged too quickly) and aeration is unnecessary (they have lungs and breath air). Also, the airline and airstone seem to look like food and I have seen them try to eat either several times. Feeding is simple. As I stated before, they are a mouth and stomach with legs! The Australian "mouth all-mighty" has nothing on the African Clawed Frog. Anything they can get into their mouth is considered food. If it is too big to go down in one piece, it is gripped with the forepaws and the mouth, and the rear legs and claws are manipulated around to tear it to shreds. And then it is eaten. I have seen a 3" frog hanging on to a 6 and a half inch Jack Dempsey "arguing" over a worm. Each one had an end of the worm in their mouth. The frog won, and the Jack Dempsey was never the same again.

Now let us talk about another important aspect of the husbandry of these interesting little critters - breeding. Captive breeding of Amphibians, even more than fishes, is extremely important today. As many of you may be aware, Amphibians the world over are in serious, documented decline. This was first noticed in the late 1980's, and has been studied ever since. Until recently, the reason was a mystery. Now some clues are coming to light. It seems that Amphibian eggs are very sensitive to UV-B, a type of ultraviolet light that has been on the increase lately, possibly due to the cyclical decline of the ozone layer, magnified by pollution. This may be the only reason for the decline, or there may be a combination of factors. Whatever the reason, though, it is imperative that concerned Herp Hobbyists, and Aquarists with a little extra space, devote some resources to propagation of their favorite Amphibian. If you need a selfish reason, just think about the medical research and the African Clawed Frog. Male and female frogs are sexually mature at about 12 months. Males develop a black fleshy pad on their inner forearm which they use to stroke the female's belly during mating. Females have three fleshy lobes at their genital opening.



*Xenopus* are found throughout sub-Saharan Africa, including the Congo basin (pictured)





In the wild, spawning is initiated by the rains at the beginning of the monsoon season. Adult frogs may have just spent several months buried in the dried mud of their watering hole, so a gluttonous eating orgy brings the adults quickly back into peak condition. Remember these two factors when conditioning your breeders. Feed them well and give them lots of fresh water, even daily water changes. That's it. The males woo the females with a low chirping sound that sounds much like a rusty hinge or a drowning cricket! They then grab the female by one leg, and then "mount" them by wrapping their arms around the female's waist. This union is called 'amplexis' and can last from a few hours to several days. The male uses his fleshy arm pads (which, incidentally, are black even in albinos) to rub the female's belly. Soon eggs are released. Anywhere from just a few to over a thousand eggs are laid.

They may mate several times in the course of a week. When the mating is over, remove the adults or they will eat the eggs. The eggs, unlike the frog eggs you may be familiar with, are laid individually. They are surrounded by a clear jelly. You can watch the entire development right up to the hatch in one or two days. The young are little dark commas about a fifth of an inch in length. They quickly grow, and in just a couple of days are recognizable as tadpoles. The clear tadpoles have large eyes, external gills, and huge mouths. They swim a few inches off the bottom in a head down position. They open and close their mouths rapidly, and look almost like they are panting. This is normal. The tadpoles are filter feeders and are constantly pumping water over their gills, where the food particles are filtered out, rolled into a sort of ball, and swallowed.

Just like their parents, they require LOTS of food. I have fed them many things, but the best growth seems to be with what I call "Tadpole soup". I mix Spirulina (a type of algae) powder, powdered fish meal or fry food, and APR with water in a small shaker. Then I pour this horrid smelling, brownish-black liquid into their tank. They love it.

In about eight weeks they are nearly 2 inches long. At this time, metamorphosis begins. The rear legs come out first, near to the gill slits. When the rear legs are fully formed, the forelegs pop out almost overnight. The unusual thing about them is that they pop out right in front of the rear legs! As metamorphosis continues, they move forward until they reach their final position. The tail is absorbed quickly. When the tail is almost gone, I remove the froglets to a plastic shoe box filled with about an inch of clean water. They will eat small worms, small pelleted foods, baby fish, and each other. If you don't keep them graded for size, they will do it for you! I have seen a three quarter inch froglet eat two of their siblings at a time. Maybe eating each other will help control the population a bit! If not, several hundred African Clawed Frogs will eat you out of house and home, even if you feed Trout Chow!

If you want to try something really different, but still totally aquatic, give African Clawed Frogs a try. I guarantee their antics will bring a smile. I have enjoyed my oldest female for nearly five years now, and I don't think I would part with her for any amount of money!

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## REFERENCES

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- De Wet Van Der Merwe, P. et al. "Genomic Fingerprints of Paleogeographic History." *Molecular Phylogenetics and Evolution*, 2020.
- Dorn, Alexander, et al. "The strange case of East African annual fish." *BMC Evolutionary Biology* Vol 14, No 1. Oct 2014.
- "Special Killifish Issue." *Journal of the American Killifish Association*. Vol 47, No 4-6. Jul-Dec, 2014.
- Singh, Param Priya, et al. "Evolution of diapause in the African turquoise killifish..." *Cell*. Vol 187, Iss 13. Jun 2024.
- Watters, B.R. "The Ecology and Distribution of *Nothobranchius* fishes." *J. Am. Killifish Ass.* Vol 42, No 2. 2009.



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# CASTAWAY LAMPEYES OF THE AMAZON RAINFOREST

## The *Fluviphylacini*

by Sam Fernald

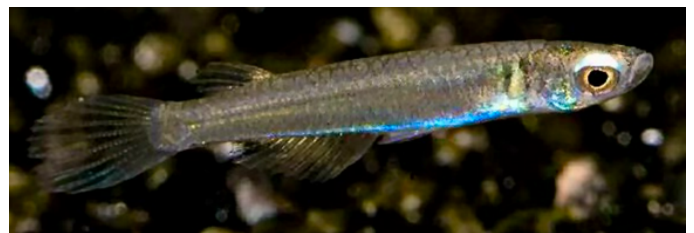
A follow-up to “Lampeyes from the Heart of Darkness” in The Darter, March 2025.

IN PREHISTORY, the Amazon rainforest and the Congo basin rainforest were once connected, further evidenced through the Procatopodinae subfamily, which includes two sibling branches of fish: I. Procatopodini, the “African Lampeyes” and II. Fluviphylacini, the South American “Dwarf Lampeyes.” There is only one genus in Fluviphylacini—*Fluviphylax*, micro fish: Dwarf Lampeyes, reaching no more than 0.50-0.75 in.



*Fluviphylax pygmaeus* in the wild (left). These South African dwarf lampeyes grow to a maximum size of 0.75 in

With only five described species, the *Fluviphylax* genus is somewhat new and poorly explored: formally erected in 1955, the first record of a Dwarf Lampeye was by Myers in 1955 with his description of *Fluviphylax pygmaeus*. New taxa weren't discovered until 1996, with Costa naming three more, and another in 1999.



“Wild Caught” *Fluviphylax pygmaeus* (right) once settled into an aquarium in Germany. *F. pygmaeus* are in several European collections. A true micro fish: worth an “import gamble,” or three!



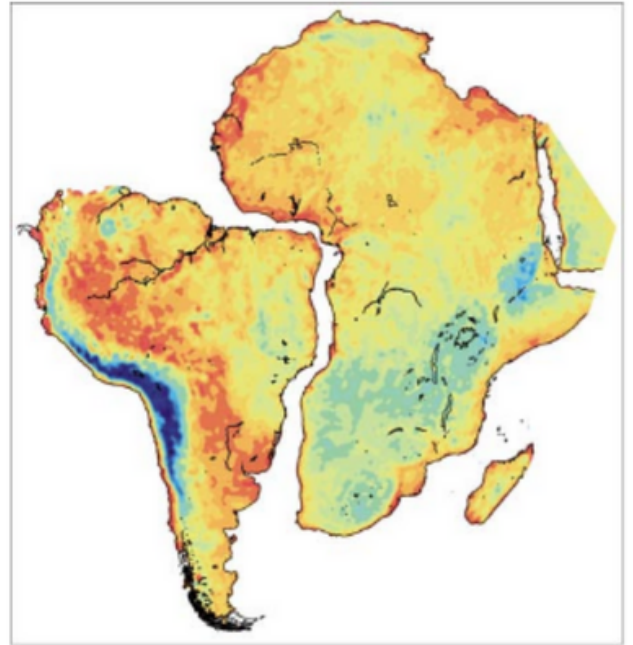


Hardy and prolific once established in the home aquarium: *Fluviphylax* spp. are rarely exported, sadly, due to their diminutive size. Rough handling or a turbulent trip can shake the tiny Dwarf Lampeyes to death—akin to shipping baby Endler’s! For this reason, they’re almost never listed by exporters, although being in ready supply. Perhaps, inquiries into the “Dwarf Lampeyes” of Amazonia will begin after this issue, as well.

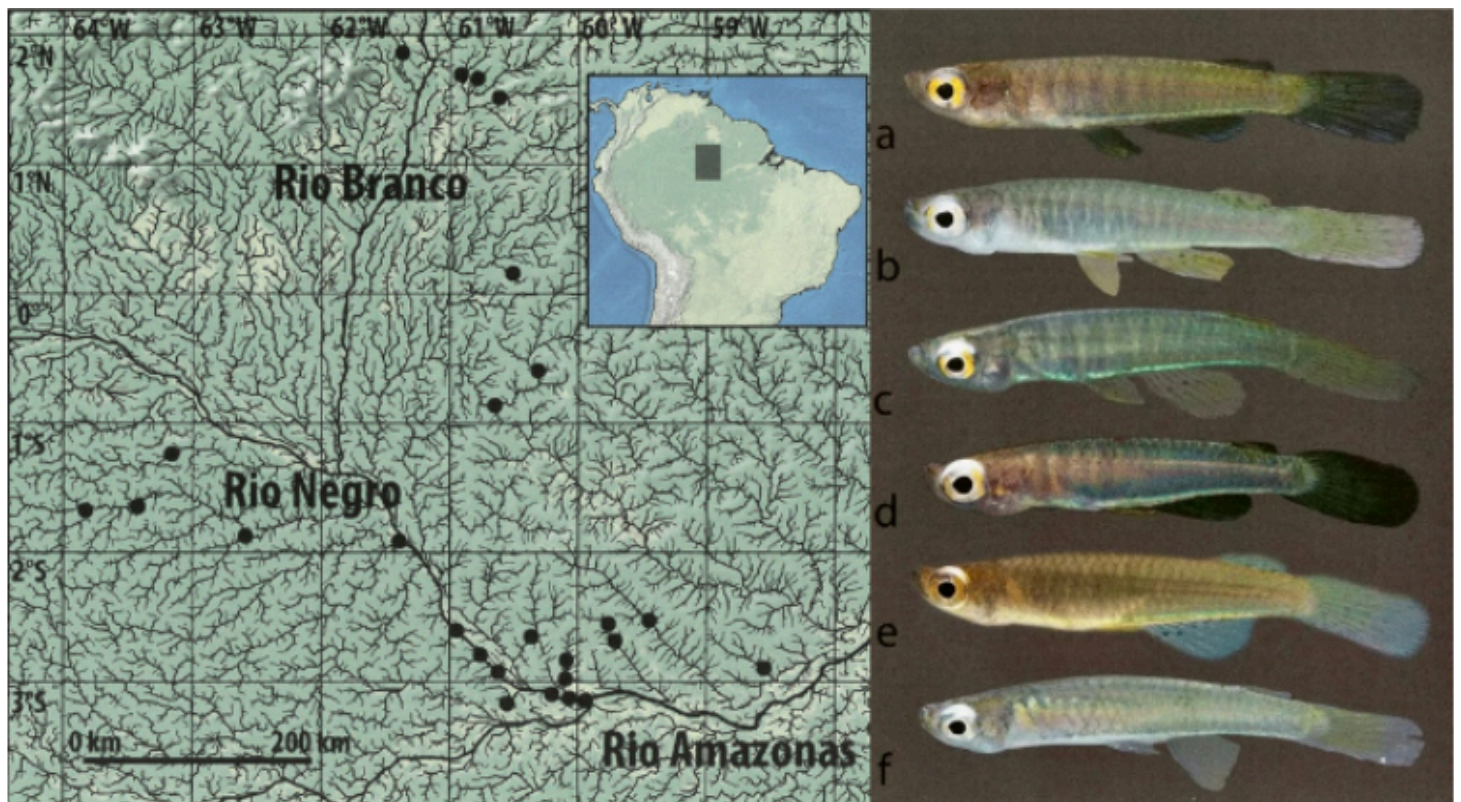
*Fluviphylax zonatus*, the “Belted Dwarf Lampeye,” is recorded from several popular fishing areas linked to the Rio Amazonas, Rio Branco and bustling Rio Negro (a catch site for many small aquarium fish). The record entries for this species seem to represent a species-complex, rather than a single species: phenotypic diversity between populations is vast.

Should these lost Dwarf Lampeyes from Amazonia ever make it stateside: they should be top-priority for any serious killifish collector’s fishroom... Medaka and Rainbowfish hobbyists may enjoy working with these mini peridots, too!

## Another Lost World: The Prehistoric Connection of Africa and South America (c. 140 MYA)



**Six collection locations of *F. zonatus*.** These microfish are most likely a complex rather than a species—and common in locations regularly fished for export.





## Sympatric Species from Spec's "Biogeography of Nothobranchius"

**EDITOR'S NOTE:** When Dr. Spec submitted his Notho article for last the March issue, he included 3 full pages of tables on the genus. For space, we had to trim the sympatric species info (which gives other species that overlap - geographically and possibly genetically - in the wild). However, we have reprinted the tables in their entirety here.

### INLAND CLADE

Species	Country	Incubation Period (Weeks)	Sympatric Species	Conservation Status
<i>N. attenboroughi</i>	Tanzania	12-20	<i>N. sagittae</i> ; <i>N. serengetiensis</i>	Vulnerable
<i>N. derhami</i>	Kenya	12-16	None	Endangered
<i>N. elucens</i>	Uganda	12-20	None	Vulnerable
<i>N. hoermanni</i>	Tanzania	20-32	<i>N. sonjae</i> ; <i>N. neumanni</i>	Vulnerable
<i>N. itigiensis</i>	Tanzania	20-32	<i>N. angelae</i> ; <i>N. neumanni</i>	Vulnerable
<i>N. ivanovae</i>	Tanzania	12-24	<i>N. kardashevi</i>	Vulnerable
<i>N. kardashevi</i>	Tanzania	12-24	<i>N. ivanovae</i>	Vulnerable
<i>N. moameensis</i>	Tanzania	12-20	<i>N. ottoschmidt</i>	Endangered
<i>N. neumanni</i>	Tanzania	"Manyara" 10-16; "Mbeya" 14-24; (Serengeti-Lake Victoria populations) 6-10	<i>N. angelae</i> ; <i>N. itigiensis</i> ; <i>N. hoermanni</i> ; <i>N. ottoschmidt</i> ; <i>N. torgashevi</i> ; <i>N. sonjae</i> ; <i>N. taeniopygus</i>	Least Concern
<i>N. nubaensis</i>	Sudan, Ethiopia	24-32	<i>N. virgatus</i>	Vulnerable
<i>N. ottoschmidt</i>	Tanzania	12-20	<i>N. neumanni</i> ; <i>N. hoermanni</i> ; <i>N. torgashevi</i> ; <i>N. moameensis</i> ; <i>N. serengetiensis</i>	Least Concern
<i>N. prognathus</i>	Tanzania	12-16	<i>N. steinforti</i>	Near Threatened
<i>N. robustus</i>	Uganda, Kenya, Tanzania	8-16	<i>N. ugandensis</i>	Least Concern
<i>N. rubroreticulatus</i>	Cameroon, Sudan, Chad	20-28	<i>N. virgatus</i>	Near Threatened
<i>N. rungwaensis</i>	Tanzania	12-24	None	Vulnerable
<i>N. sagittae</i>	Tanzania	12-16	<i>N. attenboroughi</i> ; <i>N. serengetiensis</i>	Endangered
<i>N. sagittae</i>	Tan.	12-16		
<i>N. seegersi</i>	Tanzania	16-20	<i>N. sonjae</i> ; <i>N. streltsovi</i>	Vulnerable
<i>N. serengetiensis</i>	Tanzania	8-12	<i>N. sagittae</i> ; <i>N. attenboroughi</i> ; <i>N. ottoschmidt</i>	Vulnerable
<i>N. skeltoni</i>	Tanzania	~12	None	Vulnerable
<i>N. sonjae</i>	Tanzania	12-24	<i>N. seegersi</i> ; <i>N. neumanni</i> ; <i>N. hoermanni</i>	Least Concern
<i>N. steinforti</i>	Tanzania	12-16	<i>N. prognathus</i>	Possibly extinct
<i>N. streltsovi</i>	Tanzania	24-32	<i>N. seegersi</i>	Vulnerable
<i>N. taeniopygus</i>	Tanzania	12-24	<i>N. torgashevi</i>	Vulnerable
<i>N. taiti</i>	Uganda	12-20	<i>N. ugandensis</i>	Endangered
<i>N. torgashevi</i>	Tanzania	20-28	<i>N. taeniopygus</i> ; <i>N. neumanni</i>	Vulnerable
<i>N. ugandensis</i>	Uganda, Kenya	12-20	<i>N. robustus</i> ; <i>N. taiti</i>	Least Concern
<i>N. usanguensis</i>	Tanzania	12-20	None	Vulnerable
<i>N. venustus</i>	Tanzania	12-20	None	Vulnerable

\*unknown, determined from a sympatric species



# COASTAL CLADE

Species	Country	Incubation Period (Weeks)	Sympatric Species	Conservation Status
<i>N. albimarginatus</i>	Tanzania	8-12	<i>N. melanospilus</i> ; <i>N. luekei</i> ; <i>N. ruudwildekampi</i> ; <i>N. rubripinnis</i>	Endangered
<i>N. annectens</i>	Tanzania	8-12	<i>N. melanospilus</i> ; <i>N. janpapi</i> ; <i>N. ocellatus</i> ; <i>N. eggersi</i> ; <i>N. foerschi</i> ; <i>N. flammicomantis</i>	Near Threatened
<i>N. balamaensis</i>	Mozambique	12-20*	<i>N. makondorum</i>	Endangered
<i>N. cardinalis</i>	Tanzania	12-16	<i>N. melanospilus</i> ; <i>N. matanduensis</i>	Vulnerable
<i>N. eggersi</i>	Tanzania	10-14	<i>N. melanospilus</i> ; <i>N. janpapi</i> ; <i>N. ocellatus</i> ; <i>N. annectens</i> ; <i>N. flammicomantis</i>	Least Concern
<i>N. elongatus</i>	Kenya	12-14	<i>N. microlepis</i>	Vulnerable
<i>N. fasciatus</i>	Somalia	12-16*	<i>N. jubbi</i>	Vulnerable
<i>N. flammicomantis</i>	Tanzania	12-6	<i>N. melanospilus</i> ; <i>N. janpapi</i> ; <i>N. eggersi</i> ; <i>N. annectens</i> ; <i>N. ocellatus</i>	Vulnerable
<i>N. foerschi</i>	Tanzania	12-16	<i>N. melanospilus</i> ; <i>N. janpapi</i> ; <i>N. annectens</i> ; <i>N. ocellatus</i>	Vulnerable
<i>N. fuscotaeniatus</i>	Tanzania	8-12	<i>N. janpapi</i> ; <i>N. lourensi</i> ; <i>N. melanospilus</i>	Critically Endangered
<i>N. geminus</i>	Tanzania	12-16	<i>N. lucius</i> ; <i>N. lourensi</i> ; <i>N. kilomberoensis</i>	Vulnerable
<i>N. guentheri</i>	Tanzania	12-16	<i>N. melanospilus</i>	Endangered
<i>N. hengstleri</i>	Mozambique	12-16	None	Endangered
<i>N. insularis</i>	Tanzania	~12	<i>N. korthausae</i>	Endangered
<i>N. interruptus</i>	Kenya	12-16	None	Endangered
<i>N. janpapi</i>	Tanzania	12-14	<i>N. melanospilus</i> ; <i>N. eggersi</i> ; <i>N. annectens</i> ; <i>N. ocellatus</i> ; <i>N. foerschi</i> ; <i>N. lourensi</i> ; <i>N. fuscotaeniatus</i> ; <i>N. flammicomantis</i>	Least Concern
<i>N. jubbi</i>	Kenya, Somalia	12-16	<i>N. patrizii</i> , <i>N. microlepis</i> , <i>N. bojiensis</i> , <i>N. willerti</i>	Least Concern
<i>N. kilomberoensis</i>	Tanzania	12-16	<i>N. lucius</i> ; <i>N. geminus</i> ; <i>N. lourensi</i>	Vulnerable
<i>N. korthausae</i>	Tanzania	10-16	<i>N. insularis</i>	Endangered
<i>N. krammeri</i>	Mozambique	12-16	<i>N. cf. makondorum</i>	Vulnerable
<i>N. kwalensis</i>	Kenya	8-16	<i>N. palmqvisti</i>	Endangered
<i>N. lourensi</i>	Tanzania	12-16	<i>N. geminus</i> ; <i>N. kilomberoensis</i> ; <i>N. janpapi</i> ; <i>N. melanospilus</i> ; <i>N. fuscotaeniatus</i> ; <i>N. luekei</i> ; <i>N. rubripinnis</i> ; <i>N. ruudwildekampi</i>	Near Threatened
<i>N. lucius</i>	Tanzania	12-16	<i>N. lourensi</i> ; <i>N. kilomberoensis</i> ; <i>N. geminus</i> ; <i>N. melanospilus</i> ; <i>N. rubripinnis</i> ; <i>N. ruudwildekampi</i> ; <i>N. luekei</i>	Near Threatened
<i>N. luekei</i>	Tanzania	8-12	<i>N. melanospilus</i> ; <i>N. rubripinnis</i> ; <i>N. ruudwildekampi</i> ; <i>N. albimarginatus</i> ; <i>N. Lucius</i> ; <i>N. lourensi</i>	Endangered
<i>N. makondorum</i>	Mozambique, Tanzania	12-20	<i>N. krammeri</i>	Least Concern
<i>N. melanospilus</i>	Tanzania	12-16	<i>N. janpapi</i> ; <i>N. eggersi</i> ; <i>N. annectens</i> ; <i>N. ocellatus</i> ; <i>N. luekei</i> ; <i>N. rubripinnis</i> ; <i>N. albimarginatus</i> ; <i>N. foerschi</i> ; <i>N. lourensi</i> ; <i>N. lucius</i> ; <i>N. flammicomantis</i> ; <i>N. fuscotaeniatus</i> ; <i>N. guentheri</i> ; <i>N. palmqvisti</i>	Least Concern
<i>N. niassa</i>	Mozambique	12-20*	None	Vulnerable
<i>N. nikiforovi</i>	Tanzania	12-16	<i>N. cf. melanospilus</i>	Vulnerable
<i>N. palmqvisti</i>	Kenya, Tanzania	12-16	<i>N. kwalensis</i> ; <i>N. melanospilus</i>	Vulnerable
<i>N. patrizii</i>	Kenya, Somalia	14-18	<i>N. jubbi</i> ; <i>N. willerti</i>	Least Concern
<i>N. rubripinnis</i>	Tanzania	12-18	<i>N. melanospilus</i> ; <i>N. luekei</i> ; <i>N. ruudwildekampi</i> ; <i>N. lucius</i> ; <i>N. albimarginatus</i> ; <i>N. lourensi</i>	Endangered
<i>N. ruudwildekampi</i>	Tanzania	8-12	<i>N. melanospilus</i> ; <i>N. luekei</i> ; <i>N. rubripinnis</i> ; <i>N. lucius</i> ; <i>N. albimarginatus</i> ; <i>N. lourensi</i>	Vulnerable
<i>N. vosseleri</i>	Tanzania	14-20	None	Vulnerable
<i>N. willerti</i>	Kenya	12-16	<i>N. jubbi</i> ; <i>N. patrizii</i>	Vulnerable

\*unknown, determined from a sympatric species





## COASTAL-INLAND CLADE

Species	Country	Incubation Period (Weeks)	Sympatric Species	Conservation Status
<i>N. kirki</i>	Mozambique	16-24	<i>None</i>	Vulnerable
<i>N. kuhntae</i>	Mozambique, Zimbabwe	20-36	<i>Unknown</i>	Not Assessed
<i>N. sp. Northern Mozambique</i>	Mozambique	Unkn	<i>Unkn</i>	Unkn
<i>N. sp. Southern Kenya</i>	Kenya	Unkn	<i>Unkn</i>	Unkn
<i>N. wattersi</i>	Malawi	12-20	<i>None</i>	Near Threatened

## KALAHARI CLADE

Species	Country	Incubation Period (Weeks)	Sympatric Species	Conservation Status
<i>N. sp. Kamilundu</i>	Congo	Unkn	<i>Unkn</i>	Unkn
<i>N. sp. Kasenga</i>	Congo	Unkn	<i>Unkn</i>	Unkn
<i>N. sp. Lubi</i>	Congo	Unkn	<i>Unkn</i>	Unkn
<i>N. malaissei</i>	Democratic Republic of Congo	12-20	<i>None</i>	Vulnerable
<i>N. milvertzi</i>	Zambia	12-16	<i>None</i>	Endangered
<i>N. sp. Mokobe</i>		Unkn	<i>Unkn</i>	Unkn
<i>N. oestergaardi</i>	Zambia	12-16	<i>None</i>	Endangered
<i>N. polli</i>	Democratic Republic of the Congo	12-16	<i>None</i>	Endangered
<i>N. rosenstocki</i>	Zambia	12-20	<i>None</i>	Vulnerable
<i>N. sainthousei</i>	Zambia	12-16	<i>None</i>	Endangered
<i>N. symoensi</i>	Zambia, Democratic Republic of Congo	10-12	<i>None</i>	Endangered

## NORTHERN CLADE

Species	Country	Incubation Period (Weeks)	Sympatric Species	Conservation Status
<i>N. bellemansi</i>	Sudan	20-32*	<i>None</i>	Endangered
<i>N. bojiensis</i>	Kenya	24-32	<i>N. jubbi</i>	Vulnerable
<i>N. microlepis</i>	Kenya, Somalia	16-24	<i>N. jubbi</i> ; <i>N. elongatus</i>	Vulnerable
<i>N. occultus</i>	Sudan	20-32*	<i>N. virgatus</i> ; <i>N. nubaensis</i>	Data Deficient
<i>N. virgatus</i>	Sudan, South Sudan, Ethiopia	20-32	<i>N. nubaensis</i> ; <i>N. rubroreticulatus</i>	Least Concern

\*unknown, determined from a sympatric species



## OCELLATUS CLADE

Species	Country	Incubation Period (Weeks)	Sympatric Species	Conservation Status
<i>N. matanduensis</i>	Tanzania	16-28	<i>N. cf. melanospilus</i> ; <i>N. cardinalis</i>	Vulnerable
<i>N. ocellatus</i>	Tanzania	12-16	<i>N. melanospilus</i> ; <i>N. janpapi</i> ; <i>N. annectens</i> ; <i>N. eggersi</i> ; <i>N. foerschii</i> ; <i>N. flammicomantis</i>	Near Threatened

## SOUTHERN CLADE

Species	Country	Incubation Period (Weeks)	Sympatric Species	Conservation Status
<i>N. albertinensis</i>	Uganda	12-20	None	Vulnerable
<i>N. furzeri</i>	Zimbabwe, Mozambique	20-30	<i>N. orthonotus</i> ; <i>N. pienaari</i>	Least Concern
<i>N. kadleci</i>	Mozambique	20-28	<i>N. orthonotus</i> ; <i>N. pienaari</i>	Least Concern
<i>N. krysanovi</i>	Mozambique	20-28	<i>N. orthonotus</i>	Least Concern
<i>N. mkuziensis</i>	South Africa	20-28*	Possibly <i>N. orthonotus</i>	Least Concern
<i>N. orthonotus</i>	Malawi, Zimbabwe, Mozambique, South Africa	20-36	<i>N. furzeri</i> ; <i>N. pienaari</i> ; <i>N. kadleci</i> ; <i>N. krysanovi</i> ; <i>N. rachovii</i>	Vulnerable
<i>N. pienaari</i>	Mozambique, South Africa	20-28	<i>N. furzeri</i> ; <i>N. kadleci</i> ; <i>N. orthonotus</i>	Near Threatened
<i>N. rachovii</i>	Mozambique, Malawi	20-28; KNP Black 20-48	<i>N. orthonotus</i>	Likely Extinct

\*unknown, determined from a sympatric species

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