

the DARTER MiniMAG

Aquatic Journalism *but less so*

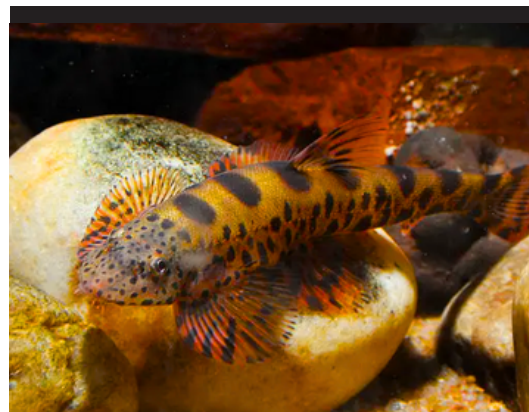
October 2025

Jambudweepan Jewels

*dragons and lizards and
zebras, oh my*

CONTENTS

- 2. The Dragon Loaches - *Sam Fernald*
- 11. Chameleon Fishes - *Mike Hellweg*
- 18. Breeding Zebra Danios - *Chuck Bremer*
- 24. Indian Hillstream Loaches - *Sam Fernald*



DARTER MAGAZINE

EMAIL: editor@dartermagazine.com
P.O. Box 1074, 177 Weldon Pkwy,
Maryland Heights, MO 63043-999

EDITORS

Micah Issitt • David Farel • Matt Rush

THE DRAGON LOACHES

Schistura & *Aborichthys*

by Sam Fernald

Long ago: while living in Los Angeles, I kept a 20-long aquarium full of *Schistura pridii* the “Mini Dragon Loach” of Thailand (and parts of Laos) in my sunroom. Another holy grail for many, this species is perhaps the smallest Schisturidae: only growing to maximum size of 2.0-2.5. In Thailand, this species is highly endangered and protected due to its restricted range; so, you could imagine my shock when I found them for sale on 3rd and La Brea in my LA local fish store for \$14.99 each (IIRC).



A companion to “Naga of the Serpent Isles” (Sept. 2025)

I remember them being so brave when I pressed my face to their holding aquarium. Rather than bolt around like kuhlis, or a sink into the substrate like horseface loaches—instead, the mini water dragons blinked at me, scooted a little closer to the glass, somewhat perplexed by the sight of me... Then went straight back to swatting each other with their tails, in typical Dragon Loach fashion. Adorable. They weren’t a want, rather a need. I took them all. They were my most precious treasures for several years.



Their aquarium would be my first attempt at a proper Dragon Loach aquarium: I selected inert and polished pea-gravel, pool filter sand and overpriced “river stones” from the same LFS. It was around this time I also began experimenting with partially-submerged Aroids: my houseplants, in my aquariums. Cheekily, I gave them a *Caladium bicolor* var. “Thai Beauty” I found at a local LA nursery for “dirt cheap” (\$14.99 back in the 2010’s. Present day, I had to pay \$90.00USD to get one shipped to Maine for a photo for this article) which served as a technicolor nitrogen fixer and made my living room feel like Pandora from Avatar. I would spend hours laying my sofa, watching them fuss around Thai Beauty’s roots in the Hollywood sunshine. They were my little Na’vi (the aliens from Avatar), and only mine...



Some months later, the same shop would get in *Aborichthys elongatus* from India—a bucket list species for me. The “Red-Tailed Indian Squirrel Loaches” and their little brother Mini Dragon Loaches became fast friends. At night, I’d check on them to find them sleeping communally in excavated burrows. Somewhat like gobies and gudgeons: Dragon Loaches will actively excavate their aquarium substrate using big, wide mouths. Once the *A. elongatus* were introduced, the *Schistura pridii* became even bolder, playfully sparring with the *Aborichthys elongatus* who were twice their size. Three *Serpenticobitis cingulata* “Banded Serpent Loaches” were the next additions and were quickly made comfortable by their little cousins.

ABOVE: Just as beautiful as I remember. It will take a while to reach the grandeur of my long-lost Hollywood specimen. *Caladium* spp. are quite thirsty plants, which allows to work as nitrogen fixers in our aquariums. Be careful when handling these plants, as their secretions from broken bits will irritate the skin. This compound breaks down quite easily in water and doesn’t affect our aquarium in the slightest.



Finally, five *Mesonoemacheilus triangularis* “Zodiac Dragon Loaches,” and a pair of pricey *Barbusca diabolica* “Fire-Eye Scooter Loaches,” came to join the multi-Genera school in the months leading up to the announcement of COVID-19. Without issue, everyone was accepted into the ever-growing “Skittles” school of well-fed, hotdog-shaped water dragons... The pandemic put an end to that aquarium; I like to imagine the aquarium itself broke the matrix we live in. I sold the lot (along with the rest of my wards) back to the same shop to partially fund my move back to Maine.



Fire Eye Scooter Loach (Barbusca diabolica)

Dragon Loaches may not be in the cards for me anytime soon, as breeding peaceful nano fish in community setups are my current undertaking (in addition to importing them). My precious Atheriniformes and Beloniformes seem tasty to them during the night, and my derpy Gastromyzontidae struggle to compete with the dragons for food: Schisturidae are simply too good at their job—being water dragons. A positive aspect about them: they can’t breathe fire, but they can certainly blow bubbles!

Nemacheilidae Family (the Stone Loaches)

Subfamily Schisturidae

Dragon Loaches
(e.g. *Sumo Loach*)

Subfamily Yunnanilini

Fairy Loaches
(e.g. *Hovering Loach*)

Subfamily Triplophysini

Plateau Loaches
(e.g. *Tibetan Royal Loach*)

Taxonomy

Schistura and their sibling lineages are members of Schisturidae (a subfamily of Nemacheilidae), or “Dragon Loaches,” as they’re called that in the Asian hobbies. Here in America and Europe, we continue to call them “stone loaches” which is a misnomer, and the name for the broader Nemacheilidae family. Sometimes, they are misidentified as Cobitidae. “Little Naga” is also an acceptable common name, as they’re also referred to as such by their local humans. Not to be confused with unrelated “Big Naga” Mastacembelidae... Luckily our English language allows us to make easy distinctions, and our Latin naming system is also of immense benefit.

Loaches from *Schistura* and *Aborichthys* are often referred to as Dragon Loaches or Stone Loaches in the hobby. Packed with personality and non-stop sparring, the “mini-naga” function as India’s little micropredators (somewhat like a *Rhinogobius spp.*), feasting on tiny shrimp and invertebrates in the creeks. The little water dragons are also quite breedable, given a species-only aquarium, lots of live food, and time: loaches take a while to mature; usually over two years, minimum.



Dragon Loach Husbandry

All known Nemacheilidae are manageably-sized for our home aquariums and do well as pets. Packed with high-octane personality and non-stop sparring, the “mini-naga” fill the same niche as freshwater gobies: feasting on tiny shrimp, larvae, and other freshwater invertebrates in the creeks. The little water dragons are also quite breedable—given a species-only aquarium, lots of live food, and time: all loaches take a long while to reach sexual maturity; usually over two years, minimum. All loaches are quite long-lived as well, to which Dragon Loaches are no exception, surviving a minimum of 7-15 years with excellent husbandry, like an amphibian or reptile. Another quirk about loaches is they seem to grow their entire lives, turning into rotund water piglets after settling into their owner’s long-term care.



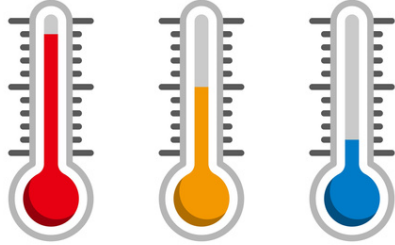
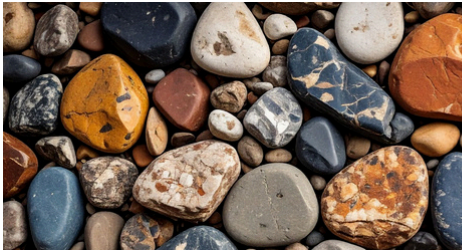
Like lobsters, Dragon Loaches seem to grow indefinitely - but fortunately aren't crushed to death in their own exoskeleton, being vertebrates.



Two male Aborichthys elongatus having a good spar. Dragon loaches have strict hierarchies in their schools, and each their own individual personality. Some individuals are quite peaceful, able to live long-term in a community aquarium without causing their roommates much damage. Others will decide to go on an eye-gouging spree their first night with nano fish, so it's best to keep Schisturidae only with other Schisturidae.

Dragon Loaches are not community fish: they are the pinnacle evolution of specialist micropredators within the riffles. Endowed with many super-powers such as radar-like barbels; eagle-like sight and speed; a ferocious bite and giant mouth for moving pebbles; and like all loaches... intelligence. These mini-naga will outcompete any other bottom-dwellers they're kept with for food. They'll also inhale shiny eyeballs of precious nano-fish in the night. Dwarf shrimp? Break out the cocktail sauce! It's best to keep Nemacheilidae with other Nemacheilidae and nothing else. Different genera within Nemacheilidae get along just swell and can even be tandem-bred together. They can be used to eradicate pests from aquariums and aquatic plant tubs quite quickly (like snails and planaria).





2 keys for breeding Dragon Loaches: pebbly substrate and a series of cool water changes

Dragon Loach Breeding

To breed Dragon Loaches, feed them well with a varied diet which has some live foods and allow females time to mature. At around two or three years of age, most female loaches will begin to produce some eggs—ramping up in production as she continues to grow. Diurnal Nemacheilidae tend to all breed the same: releasing eggs and milt over pebbly substrate and underneath rocks, after a succession of coolish water changes. Fry develop in the substrate, feeding on detritus and micro invertebrates. From the substrate and rock crevices: they eventually emerge, usually once miniature versions of their parents. Nemacheilidae (and Cobitidae) ignore their eggs and young, like most loaches do.

The DARTER

MAGAZINE

6 Packed Issues A Year

Only \$15




subscribe!

www.dartermagazine.com

MISSOURI

AQUARIUM

SOCIETY

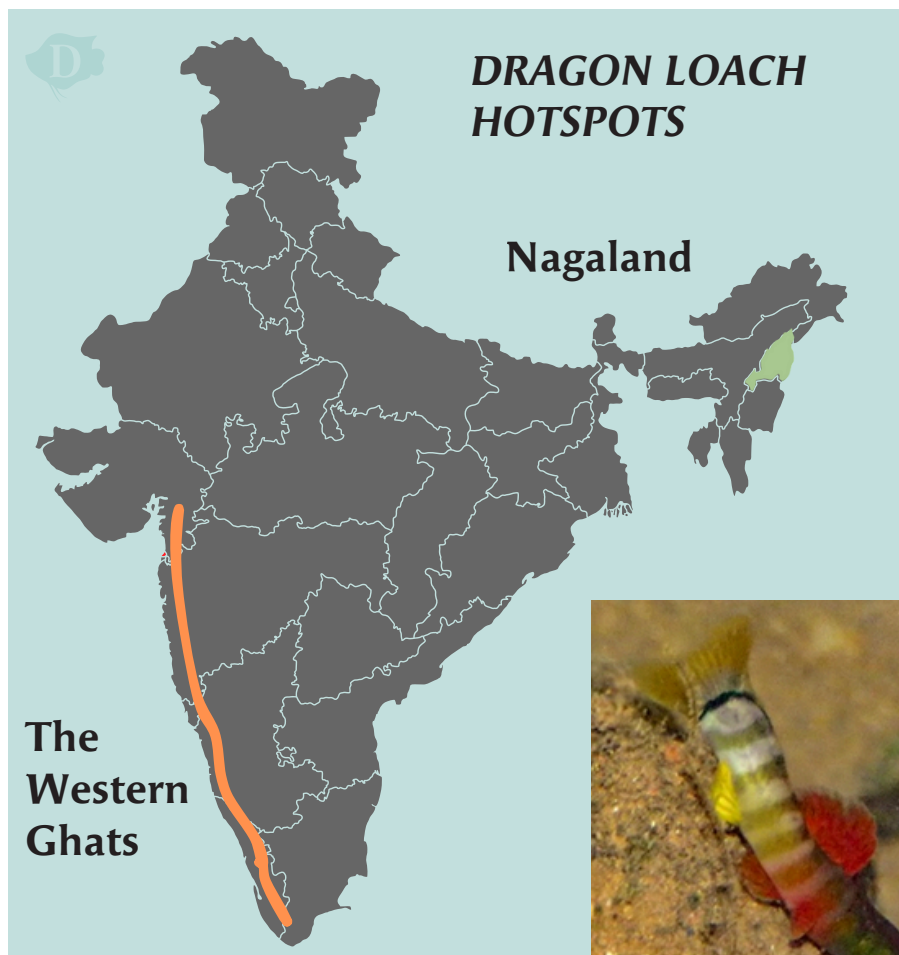


Dragon Loaches of India

India is home to the largest diversity of *Schistura* (and *Aborichthys*) species in the world, with most sporting outrageous garb. Highly revered by the locals, some of the loaches are now protected due to their extremely limited distributions. For instance, *Schistura hiranyakeshi* is found only in a single temple's courtyard pool (and several meters downstream from its drain).

The monks guard the little “golden red” dragon loaches with their lives, only allowing bathing in the pool during holidays. Two beautiful documentaries covering the *S. hiranyakeshi*, the temple and monks may be viewed here:

With two main diversity hotspots: the Western Ghats and the Arunachal Pradesh/Nagaland, India has countless, tiny water dragons to offer. Here are some of our favorite vicious fishes!



BELOW: Schistura hiranyakeshi viewed from above in the courtyard of the Amboli Temple. The loaches are plentiful in the pool and not shy at all, actively sparring centimeters away from prying eyes. Like most diurnal loach lineages: the Dragon Loach Subfamily are highly social and require the company of others for their long-term wellbeing in the home aquarium.





Schistura balteata is smartly named the “Sumo Loach,” owing to the three black belts around their waists.



Schistura beavani from central India is almost identical in pattern to *Micronemacheilus (Yunnanilus) cruciatus*.



Two sexually mature male *Schistura hiranyakeshi* inside the Amboli Temple Pool. Sparring for dominance, the water dragons amplify hues of crimson, neon yellow, electric blue and green. Sparkly blue eyes are a hallmark of the “Pygmy Schistura Lineage,” endemic to the Western Ghats. Fish in this sub-sub-grouping grow no more than 3.5cm.



Aborichthys sp. “AR01” often arrive as contaminants with *A. elongatus* and *A. sp. “AR02”* from India. The Wet Spot and Aqua Imports often have these three species for sale.



Aborichthys sp. “AR02” from India. Usually arrives stateside mixed with *A. elongatus* and *A. sp. “AR01.”*



RIGHT: *Schistura kodaguensis* a cousin to *S. hiranyakeshi* and sports the same blue eyes of the Western Ghats populations of dragon loaches. A pygmy species.



BELOW: *Schistura mahnerti* is endemic to midland India.



BELOW: *Schistura spilota*: a pinky-length dragon loach from the horsetail-laden grassland creeks of central India.



Conclusion

Americans are somewhat behind in developing specialist hobbyists on the loach front, and that mainly has to do with the livestock we've been able to import over the last century: African and South American imports have been the backbone of our US aquarium hobby and industry, with Asian fish consistently arriving, at last—after 100 years—in the late 2010's. Only to be halted again by the pandemic and then reopening again in 2022. Asian imports, namely from: Bangladesh, Bhutan, Borneo, Brunei, Cambodia, China, India, Indonesia, Japan, Laos, Malaysia, Myanmar (Burma), Nepal, Pakistan, Thailand, Singapore and Vietnam will yield these new “products” for our hobby and industry.

With the re-opening of Asia, the sky is the limit for our American aquarists and importers: we sit at a crossroads of all peoples and all lands here in our homeland. We can import from North, South, East and West. It all takes the same time to reach us, depending on which coast you're found (or not). At the end of this article is an Appendix with modern common names for most of the Schisturidae. Hopefully unlocking this information for the greater hobby and industry will allow the fish make their way into our collections, and hopefully: establishment in North America. Importers should always be actively diversifying the countries they contact: a fisherman may be sitting on an aquatic gold mine... perhaps guarded by water dragons.



**APPENDIX:
COMMON NAMES OF
SCHISTURIDAE LOACHES**

Aborichthys “Squirrel Loaches”
Acanthocobitis “Horned Dragon Loaches”
Afronemacheilus “African Dragon Loaches”
Homatula “Chinese Longtail Dragon Loaches”
Kapuasia “Borneo Dragon Loaches”
Malihkaia “Razor-Fin Dragon Loaches”
Mesonoemacheilus “Zodiac Dragon Loaches”
Mustura “Burmese Dragon Loaches”
Nemachilichthys “Snout-Faced Dragon Loaches”
Neonoemacheilus “Banded Dragon Loaches”
Paracanthocobitis “Zipper Loaches”
Paracobitis “Newt-Tailed Loaches”
Paraschistura “Anatolian Serpent Loaches”
Protonemacheilus “Bulldog Loaches”
Pteronemacheilus “Dwarf Dragon Loaches”
Rhyacoschistura “Siamese Dragon Loaches”
Schistura “Indo-Chinese Dragon Loaches”
Sectoria “Dragon Fire Loaches”
Tuberoschistura “Ferret Loaches”

Samuel Joseph Fernald is a lifelong aquarium hobbyist from the Acadian Maine with an interest in Atheriniformes, Beloniformes, Gastromyzontidae, and Procatpopodini. He operates Hillstream Kingdom LLC import/export with partners in China. Sam also keeps Mastacembelidae eels as his “pets.”





ROSELINE 17

Hillstream Loach

BAND

A Premiere US
Source for Tank-Bred
and Wild-Caught
Hillstream Loaches





Also check out

HILLSTREAM KINGDOM



hkfish.us

Imported Chinese Loaches and
other rare Southeast Asian Fish



The Confusing Chameleon Fish



Badis spp.

PHOTO:
Aquarium
Glaser

by Mike Hellweg, CFN

Updated from the Sept. 1993 article

One of the most popular of the little “Oddballs” seen frequently in the hobby is the Chameleon Fish, *Badis badis*. It’s subfamily Badidae was elevated to full family status and is a tiny member of the very large Perch family. The Badids are distant cousins to the Cichlids, the Anabantoids, the Darters and the Leaf Fishes. With this diverse group of cousins, you can see that it might be a subject of some confusion. Add to that the fact that what we hobbyists knew as *Badis badis* turned out to be a closely related group of species, not to mention varying trade names, and you have what can only be referred to as a confusing mess! This has been cleared up quite a bit over the past quarter century, with the single species now becoming a genus with 28 species! Finally, when you add in the instantaneous silliness that is the Internet, where anyone can say anything and come off as an expert if they yell the loudest in a chat room or have a flashy website, you can see why even the real experts are confused.

I’m going to try to clear up some of the mess, at least from a hobbyist’s perspective. In no way is this meant to be a scientific analysis of the family Badidae. I’ll leave that to someone who has access to all of the type material and scientific literature. I just want people to have a chance to learn more about this amazing group of fish. The classifications that I will use are based on Eschmeyer’s Catalog of Fishes, published by the California Academy of Sciences, which is the most complete and up-to-date reference on fish classification.

**RIGHT: a
visual history
of *Badis*
taxonomy**



Chameleon Fish Confusion

First, I think it's important to talk a little about the background of the fish in question. Then I'll talk in general about characteristics of the fish, and their care and breeding. Later on in the article, I'll get to the individual descriptions that can maybe help clear up some of the mess.

RELATED FAMILIES

NANDIDAE

Asian Leaf Fishes

PHOTO: [Beta Mahatvaraj](#)

CHANNIDAE

Snakeheads

ANABANTIDAE

Climbing Perches

OSPHRONEMIDAE

Gouramis

The genus of fish we know as *Badis* were first introduced to science by the famed biologist Hamilton-Buchanan way back in 1822. *Badis* is a native Indian name for the fish. At that time, he described them as *Labrus badis*. At the time, *Labrus* was a worldwide catch-all genus of both freshwater and marine fish that included many fish we know now as Gouramis, Badids, Cichlids and Wrasses. It remains a genus of Wrasses to this day, but as science expanded, the others were moved to different families and genera. As more was learned, Bleeker moved them from *Labrus* and erected the genus *Badis*, where they remain to this day. He also put this genus into the family Nandidae, which is made up of the fish we know as "Leaf Fish". They do bear some resemblance to the Nandid genus *Pristolepis* in both their appearance and behavior. But appearances can be deceiving, and sometime in the late 20th century, they were moved into their own family, Badidae. This is not too confusing a nomenclatural history as fishes go - just look at the Cichlids to see real confusion! However, 180 years and several dozen exporters later, much confusion has crept in to this tiny group of fish.

Chameleon Fish have been a popular fish in the hobby since just after the turn of the last century. They are peaceful with other fishes, are colorful, and stay small. About 80 years ago, a German hobbyist named Johann Paul Arnold reported the first captive spawning. Although not prolific, hobbyists were able to get them to spawn in captivity, which added to their popularity. They also prospered in the smallish, unheated tanks of the day on the wild-collected live foods that were available to most hobbyists. Don't forget Brine Shrimp have only been widely available for about 60 years!





The Badidae are all small fish that come to us from Southeast Asia, from the Ganges River in Northern India to the Mekong Basin in Laos. They are found in small, slow flowing streams, roadside irrigation ditches, and along the shores of small pools and lakes. The base coloration allows them to blend in with the background, and even in a well-planted tank they are often hard to see. Like the proverbial Chameleon, they can change colors in the wink of an eye. The almost instantaneous color change is not so much to allow the fish to blend in with their surroundings, but as an external reflection of the mood of the individual fish to other fish.

The base coloration of most varieties is a dirty yellow brown to silver interspersed with several irregular darker bars, usually brown in color. The coloration even extends into the unpaired fins of the males, where it is often interspersed or replaced with blue or blue-green. This can sometimes become a florescent royal blue, and sometimes even appears to be almost red. They can even assume an overall chocolate brown color, or fade to pale yellow-beige with nearly clear fins. You can see why famed aquarium pioneer William Innes gave them the name of Chameleon Fish, especially when you see all of these colors on the same fish within a few minutes time!

Generally, males are nearly twice the adult size of females. They have larger fins, more intense colors, and a concave belly that even in healthy well-fed specimens makes them look half starved. Females usually do not show any of the intense coloration, being more of a washed out beige to silver color with clear fins, depending on the subspecies. Females also do not show the range of expression in coloration, generally being limited to darker or lighter versions of their base color. In addition, the males are often surprisingly aggressive for fish of their size, especially males of the tiny Scarlet Badis. They do not generally direct this aggression at other species, but they have been known to kill other *Badis*, especially other males in the same tank.

As they occur over such a large range in the wild, they are adaptive to most water conditions that a hobbyist may throw at them. Some authors suggest that soft acid water would be best, but I have had them not only live, but also spawn successfully, in rock-hard water at a pH of 8.0! I have also had luck with specimens kept in softer water with a pH of 6.5. Generally, they can be kept in your tap water without problems.



Chameleon Fish Care

I would suggest that all novice fish keepers and even most advanced hobbyists stay away from playing with water parameters unless they are trying to breed a specific fish. I am not a chemist. Neither are 99.9% of the other hobbyists out there, yet many of them regularly play with water parameters that they can't even begin to understand, all to the detriment of the fish. In the wild, freshwater fish are subject to a constantly changing environment. Dry season water can be extremely warm and heavily polluted by decaying vegetation and even dead fish and other animals. It can be extremely hard or soft depending on the surrounding landscape, and nearly devoid of oxygen. Rainy season water, which often comes upon the fish suddenly, can be just the opposite of what they have been surviving in throughout the dry season. The temperature, pH and hardness can change radically in just a few minutes time. While this sudden change may stress the fish temporarily, it does not normally kill them. In fact, it is often the signal for them to spawn!

India's monsoon season exposes fish to dramatic changes in temp, pH, and hardness.



Instead of giving you specific water parameters for the Chameleon Fish, I think a general guideline as to water quality is more important to working successfully with these fish. To be seen at their best, they really should be kept in a small group of 6 – 8 fish in a single species tank of 10 to 20 gallons in size. They need clean, well-oxygenated water and a well-planted tank. Use a quality filter, and maintain it regularly. Just remember that *Badis* don't like the water to be flowing too heavily. Keep the nitrates below 10 – 15 PPM by doing large, regular water changes, and pH and hardness won't really matter. Give your *Badis* a choice of places to hide, and they will spend more time in the open. I always use some floating plants, to cut down on the light and to provide them with a sense of security. In addition, I provide caves of some sort so that every fish has at least one place to hide. *Badis* do not share their hiding place, unless it's the only one in the tank. At that point they would be too stressed to show any other normal behavior or coloration anyway.

Much has also been written about the diet of the Chameleon Fish. They do prefer living food, and will gladly consume blackworms, whiteworms, Grindal worms, microworms, young red worms, live brine shrimp, *Daphnia*, and other small living foods. They will also occasionally eat small pellet and finely crushed flake foods, as well as frozen and freeze-dried foods. The key to get them to accept the prepared foods is that it needs to be small enough to fit in their mouth AND in motion. Once it is lying on the bottom, most (but not all!) *Badis* will ignore it. The key to success is to stick to live foods. Some specimens will accept processed foods, and some will starve to death literally surrounded by what we think as food.



Badis Breeding

The biggest barrier to spawning the Chameleon Fish is that most imported stocks are composed entirely of males! This is not necessarily an attempt to “rip off” the hobbyist, but rather is due to the fact that the collectors only collect the largest, most colorful fish. That is what brings them the most money. Money is what they need to support their families. However, some exporters are now starting to understand that many of the end customers want both the colorful AND the plain fish – and they can make more money for pairs of fish. Hopefully this trend will continue to catch on.



Like the dwarf cichlids (above), most Badis are cave spawners, placing their eggs on the walls or ceiling of underwater caves.

Most healthy adult *Badis*, given a partner of the opposite sex and a quiet, secluded location, will at least try to mate. The eggs are adhesive, and are surprisingly large for such a small fish, especially for the Scarlet Badis, where the egg plaque can be larger than the female! Most varieties will spawn in a cave or under a decoration. The Scarlet Badis seems to prefer spawning under the leaves of floating plants near the surface. All varieties I have seen spawn so far spawn in a similar fashion to the Anabantoids, with the male embracing the female. Instead of releasing the eggs and the male spitting them into a nest as the Anabantoids generally do, the *Badis* female places the eggs onto the sides, bottom, and even the roof of the spawning cave, as would a female Dwarf Cichlid. When spawning is finished, just like in most nest building Anabantids, the male drives off the female and guards the eggs. The first clue that they have spawned is often that the male does not show up at feeding time for up to a week, then just as suddenly he reappears. At that point, if you look among the roots of plants and at the base of rocks and other decorations, you will see the ¼” long fry. They spend most of their first several weeks hiding among the decorations near the bottom of the tank. They scatter when they leave the male’s care and he shows no interest in them from that point on. If the tank is well planted and does not contain larger fish other than the adults, you can raise the fry with the adults. They consume the same foods as the adults, with a definite preference for moving food, and really enjoy baby brine shrimp!



Common *Badis* in the Hobby

Now let's take a brief look at the most commonly encountered species of *Badis*. As I predicted when originally working on this article, this nomenclature has changed immensely since the original publication. All of these are now considered full species, and some have even been moved into a new genus, *Dario*!

Badis badis



The original and still most popular member of the group is *Badis badis*, the Blue Chameleon Fish. It comes to us from Northern India in the Ganges River basin. As the common name implies, males exhibit primarily bright Royal Blue in their unpaired fins. The body is generally covered with deep chocolate brown bars that often expand so that the entire body appears to be chocolate. Females have tan to beige colored bars with a muddy yellow base color. Their fins are generally clear. Males generally reach about 2 inches, with females reaching about 1-1/2".

Badis ruber



The next most common variety is *Badis ruber**, the Rusty Chameleon Fish. It comes to us from Lake Inle in Burma. This is the subspecies that was first spawned in the hobby by J.P. Arnold in 1920. Males generally have a rusty orange color on the body where the Blue variety is chocolate brown, with rusty orange and blue-green bands in the unpaired fins. Females are a plain gray to muddy brown color. This variety, too, generally reaches about 2" in males, with females generally reaching about 1-1/2".

*often still sold by online vendors as *Badis burmanicus*)

Badis benegalensis

Sometimes still sold as *Badis bengalensis*, this is actually now known as *Dario dario*. See the last issue of the Darter for more on *Dario*.



Badis assamensis



Rarely seen in the hobby, but still available from time to time is the Assam Badis, *Badis assamensis*. As the name implies, it comes to us from Assam State in North Eastern India. This is the largest member of the group that I've seen, with males reaching 3". I have never seen a female. All groups imported so far seem to be males. They are an overall orange-brown to rusty orange color, with metallic blue scales interspersed on the body instead of bars. The unpaired fins are brownish to orange, with a dark band around the edge. Full colored males in breeding color are almost black with silver spangles. Like their distant leaf fish cousins, these guys are not above eating small fish, so choose their tank mates carefully.

Badis siamensis

Badis siamensis comes from Phuket, Thailand. I have not seen any photos or written descriptions of the fish.



The most recent species, *Badis limaakumi*, was described less than two years ago, so it would be wise to expect more to come. Whatever happens scientifically, know that The Chameleon Fish, whatever species that you have, is a wonderful fish with very interesting behavior that will challenge any hobbyist, novice or advanced. Any hobbyist willing to give them what they need to survive – clean water, hiding spaces, and good food can enjoy *Badis*. As always, don't forget to just sit and watch your fish. After all, isn't that why we all got into this wonderful hobby in the first place?

Mike Hellweg is a MASI Fellow and a legend in the fish hobby. He is the author of one of the most respected books on live foods in the aquarium and has written dozens of articles for the Darter covering all sorts of species.



Breeding Zebra Danios

the
easy way

by Chuck Bremer

Originally published Nov. 2015

My tank of choice is a colony of livebearers. They are easy to spawn and most, if given a space large enough, will coexist with their young and create a continuous colony. Everyone has probably done this with the guppy, but my fish room contains several dozen species colonies, both large and small. FYI, I consider mouth brooding cichlids to be akin to livebearers...put 'em in a tank and they take care of them selves...presto, colony! I recently decided I need to broaden my horizons.

But, you see, there are several things I fear about small egg scatterers. Current literature says most of the small ones are difficult to feed - they need special small foods for fry; the eggs fungus prior to hatching and need a lot of care or special water or some other treatments; the adults eat their young without hesitation, etc.

Oh, yes, I've done it. Over forty years ago I set my wife up with a spawn of Zebra fry and a tank of guppies to take care of while I was off to military training. She was also gestating our first son so this worked right in. We spawned the danios in a special-built long low tank full of marbles, and she fed them hardboiled egg yolk, then transitioned to ground guppy food. Not a high survival rate, but it worked...and was a lot of work. The egg yolk suspension kept going bad and turning into hydrogen sulfide, etc.

Chuck Bremer is a MASI Fellow and editor emeritus of the Darter. He has written numerous articles on pond plants, livebearers, and other topics.



Since then there has been the occasional spawn of egg scatterers, mostly by accident in the community tank. This has even included again the few Zebra Danio fry which were able to survive in a heavily planted tank. Rarely what one would consider as qualifying for BAP material, however.

But, as indicated, my horizons needs to be broadened, and that means spawning - on purpose - some of the egg scatterers. One can read of lots of newer, more modern methods now, especially for feeding. Many suggest use of infusoria or vinegar eels and then baby brine shrimp (BBS) when they are able to take them. But I still fear feeding the young fry as a major problem. And there's all that maintaining cultures and feeding frequently each day and water changes for fry one can barely see. It also means some one has to be around every day to feed and start the daily BBS culture. I just don't have the time, or the patience so it scares me - or maybe I'm just lazy.

The Method to the Madness

- 1) Conditioned adults are added to a bucket, along with two layers of marbles and one additional inch of water. Adults are left to spawn for two days.
- 2) Meanwhile, *Daphnia* are added to a 5.5 gallon aquarium, with aged water from a planted tank. The culture is fed ½ tsp pureed baby food (mixed with water), every other day
- 3) Adults and marbles are removed from the ice cream bucket, and the remaining water (and eggs) are added to the *Daphnia* culture. There, the eggs hatch and fry grow out.
- 4) When the juvenile *Daphnia* disappear, Danios are removed to prevent the culture from crashing.



Adult Zebra Danios (*Danio rerio*), ready for spawning

After making several eclectic purchases at a regional fish club auction, which included a 10 gallon tank with gravel and lots of marbles, a small breeding colony of Zebra Danios (5 fish), and a *Daphnia* starter culture, the problem was considered again. The three hour trip home gave time to think about the purchases and wonder if the Zebras might be spawned. By the end of the trip a plan had been hatched. This would be an experiment in spawning and not feeding Zebra Danio fry, using only what had been bought at the auction.

The danios were in good condition so upon home arrival were immediately put into a gallon ice cream container with only the water from the bag and fed a few black worms. By the time the rest of the fish room was fed, the danios, hungry from the long stay in the auction bag, had cleaned up the black worms. The marbles were picked out of the newly purchased tank and about two layers were placed into the ice cream bucket with the danios. This filled the bucket to about one inch of the top of the water with marbles. The ice cream bucket with the danios and marbles was then covered to prevent jumping and set on the bench where it would receive spawning inducing light in the mornings from the other tanks.



Next attention was turned to a *Daphnia* culture. The starter culture was poured into an aged five and a half gallon tank previously used as a holding tank for the fish to be sold at the auction and an air stone was added and set to “slow” just to keep the water moving slightly. The new culture was fed by pouring in about a half teaspoon of pureed sweet potato baby food suspended in water. By morning the *Daphnia* had begun to plump up.

BELOW: Adult Zebra Danios over marbles in the ice cream bucket. Note the shallow depth of the water. It prevents non-spawning adults from catching the eggs after they are laid.

It should be noted that the 5½ gallon tank was well aged and had been used as a holding tank with plants in the past. So it had snails and some dirt already in it. It was a “quick and dirty” *Daphnia* culture and these were left “as is”. The *Daphnia* had probably been collected in the wild as the culture had a few mosquito wigglers and a couple of small scuds in residence. A turkey baster was used to remove the mosquitos but the scuds proved too elusive to catch.

Everything was set aside for two days. The *Danio* adults were left unfed and at the end of this time were removed from the ice cream bucket and placed into a community tank for long term residence. Although in the white bucket no eggs could be seen, the marbles were removed, the water sloshed around, and poured into the *Daphnia* culture. The culture was again fed with baby food as above with a little bit of finely ground flake food added as a garnish.



Now began the waiting. Every couple of days the *Daphnia* culture was fed with baby food, sometimes with finely ground flake food added. The *Daphnia* grew and began to reproduce creating a successful and growing culture. Other tanks were even fed from it on occasion.

After about 3 days a couple of eyes with thin tails were observed hanging on the glass side of the tank. Yes, there had been some eggs in the ice cream bucket, and they were evidently hatching. The fry disappeared, but the water was murky from the baby food and all the *Daphnia*, and this hindered visibility - so it could not be known if they had survived past this phase or not.

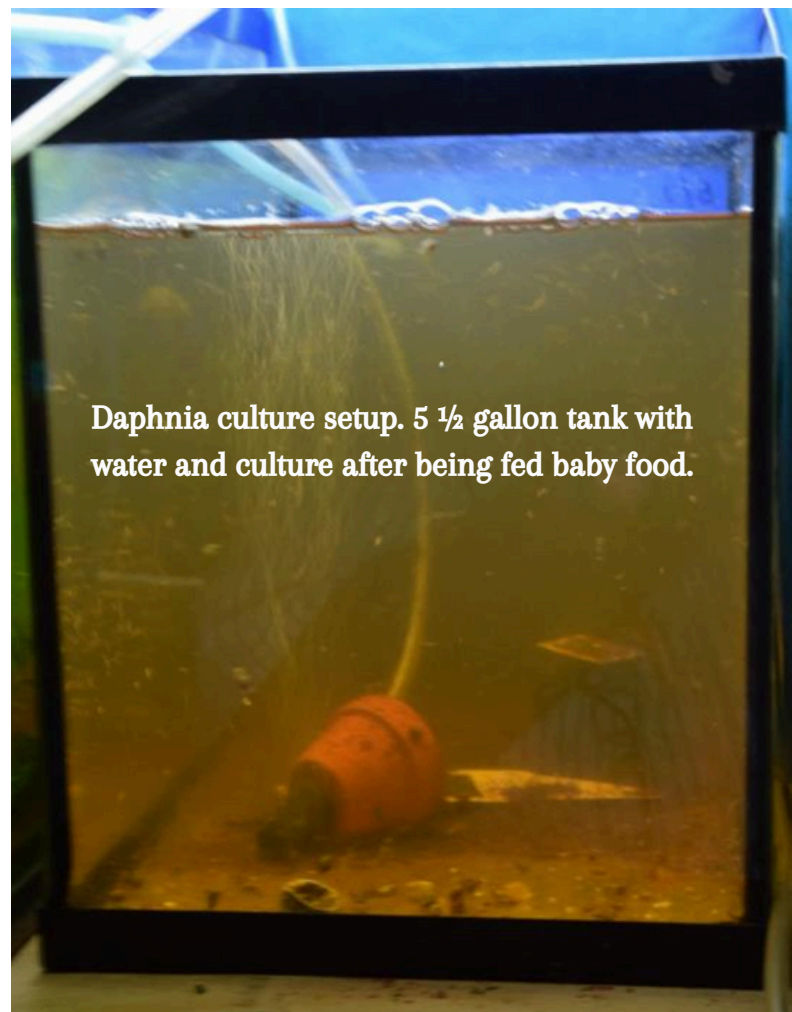
At the end of a week occasionally small slivers could be seen swimming around in the water column with the *Daphnia*. They were visible when silhouetted over a piece of white plastic laying on the bottom of the tank, so there were at least some danios that had survived to the free swimming stage. Normal care was continued for the *Daphnia* culture by feeding it about every other day. There was no special care for the danios, which the experiment required to survive and feed on their own from within the culture.

As time passed the small fish became a bit more easily seen. After about a month they could be seen readily and the small *Daphnia* had begun to thin. The *Daphnia* culture began to take additional food to maintain the many adults that were present but smaller *Daphnia* were disappearing. Danios were growing to ½ inch.

All at once, in the span of about a day, the baby *Daphnia* nearly disappeared, and it was time to remove the *Danio* fry before they eliminated the culture. The *Danio* fry were moved to a 10 gallon and fed from that point on as if they were adult fish.

The remaining adult *Daphnia* had clustered together in the water column and most could be dipped out with one scoop of a small brine shrimp net. They were placed into a cup for holding and a slightly more coarse net was used to sweep back and forth in the remaining colony to catch the Zebra *Danio* fry which were ironically placed back into the original ice cream bucket (with fresh, aged water, of course) for holding. After the danios were removed the adult *Daphnia* in the cup were returned to the original culture to maintain it.

Several *Daphnia* had been caught when using the sweep net method but the danios clustered in the bucket and the retained *Daphnia* could be re-netted from it with care and returned to the culture.



Daphnia culture setup. 5 ½ gallon tank with water and culture after being fed baby food.



DISCUSSION



Now success could easily be assessed. The ice cream bucket contained about 50 young danios of various sizes. At no time during the month since spawning was it apparent they were this numerous as they were always difficult to find in the *Daphnia* rearing tank. A thriving *Daphnia* culture also remained. And I had never worried about fungused eggs nor had to feed the *Danio* fry or change their water. Certainly an easy way to raise fry.

Contrary to how it may appear, this was not a haphazard trial. Below are some things that may have led to success and some questions still remaining.

The adult danios were already conditioned when purchased and ready to spawn, they did not have to be conditioned other than one high protein meal to kick things off.

Adult removal two days after initiating spawning was based on published hatching times and was to allow time for the eggs to get ready to hatch but before they could move up to where the adults would find them to eat. A shorter time might have reduced the number of eggs and longer might have allowed predation. Based on observations in this experiment of a possibly longer hatching period, it would be interesting to try a slightly longer egg catch period to see if more eggs could be acquired, perhaps 3 or 4 days.

It's still unknown what the newly hatched fry were eating in the *Daphnia* culture. They were probably eating the same pureed baby food as the *Daphnia* but the culture also contained plant remnants, some fish food and snails. Snails feeding on plant remains will create infusoria or the finely ground fish food may also have produced bacteria or yeasts on which the *Daphnia* or the newly hatched fry could have been feeding.

This *Daphnia* culture was created using a well-seasoned tank as a base. This tank had remnants of previous use that helped seed the colony food chain. If starting this tank from scratch I would have used 100% water from an established fish tank to do the same thing so it would not have to go through a nitrogen cycle of aging.

The *Daphnia* used were probably *D. pulex* or *D. magna* as they were rather large. The adults were larger than the newly hatched *Danio* fry and so could not have been eaten directly until the fry grew quite a bit older. The adult *Daphnia* could continue to reproduce providing young *Daphnia* as *Danio* fry food.

A few eggs may have been lost to the resident scuds. The scuds were small and few but could still be predatory. Preference would be a culture without them. The mosquito larvae are also predatory, but could be removed. Most of the mosquito risk would be if they emerged as adults and then fed on me, anyway, which is the real reason to get them out of the culture tank and into a tank with fish big enough to eat them first!

The fish food fed occasionally to the *Daphnia* culture was to provide additional nutrients that the baby food did not provide, particularly protein was only about 5% in this baby food. Other baby foods that might work would be squash, pumpkin or peas. It is unclear, and references differ, whether the *Daphnia* are feeding directly on the baby food or on yeast or bacteria the baby food helps promote.



Overfeeding of either baby food or fish food can lead to an ammonia spike, just like overfeeding fish, so feed sparingly until the colony is well established. The air stone helped keep the water circulating to remove any ammonia and help keep the baby food in suspension so the *Daphnia* could feed on it. There occasionally were adult *Daphnia* on the bottom appearing to fan to raise settled food.

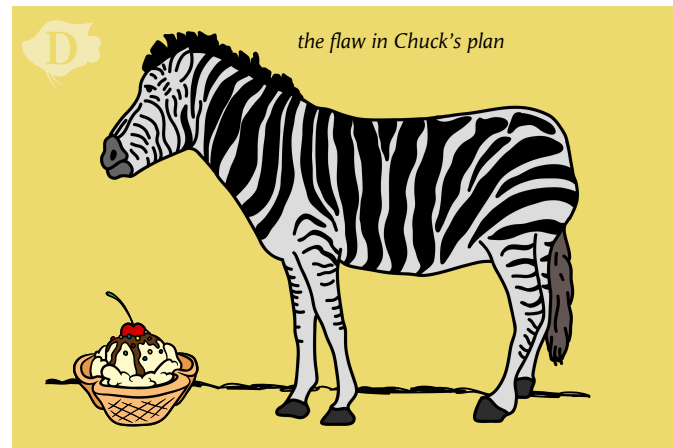
Even though all the *Danio* eggs were laid in a period of just over 24 hours, the fry produced were of quite varied sizes. Whether this was due to variability in hatching time or variability in learning to eat in the tank is still a mystery. Even after slightly over a month of this experiment at least one small sliver of a fry was found in the *Daphnia* culture after removal of the 50. Why it was still so small is a question still to be answered but it did survive and grow.

The water was never changed in the *Daphnia* culture. Occasionally water was added to replace evaporation or with the baby food slurry. Over the course of the month just over half a 4 oz. jar of baby food was used so the culture was certainly economical when compared to other prepared foods.

The key to success was probably the maintenance of the *Daphnia* culture. However, the experiment proved small egg scatters could be raised without all the muss and fuss of daily feedings and maintaining or purchasing multiple foods by using the food chain available in the *Daphnia* culture instead. This should be more like grazing of fry in their natural habitat. Intensive hatching and rearing using prepared or specific foods may have created more fry or fry at a more consistent stage of growth, but this worked sufficiently.



The biggest lessons learned with this experiment are again that fish don't read, fish keeping shouldn't be difficult, and there is no reason to make it more difficult than necessary.



(LEFT) Zebra *Danio* fry in the same ice cream bucket after removal from the *Daphnia* culture. The author counts about 50 fish, $\frac{1}{2}$ to $\frac{5}{8}$ inch long.



BHAVANIA

Indian's Hillstream Loaches

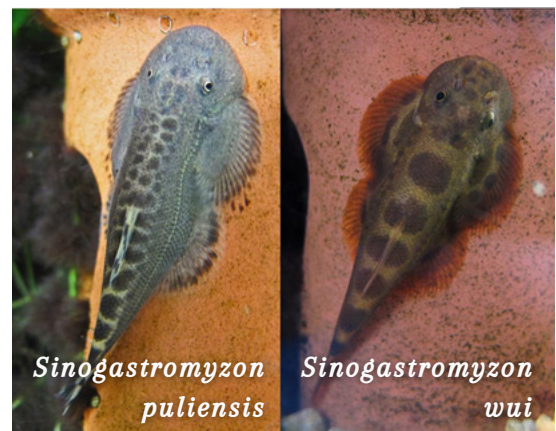
Photo: Hayath (C)

by Sam Fernald

Balitoridae, “Lizard Loaches,” are mostly nocturnal micropredators specializing in riffle and headwater ecosystems. During the day, the “water lizards” rest in the shadows, unlike their diurnal grazing-specialist Gastromyzontidae cousins.

There are several lineages of diurnal Balitorids which make worthwhile aquarium pets for community setups and can cohabitate with the more peaceful Gastromyzontidae. Namely: *Metahomaloptera* spp. and *Sinogastromyzon* spp. from Sundaland, but also *Bhavana* spp. from India!

A Companion to “The Suckers of Sunda” (May 2024)



Two very attractive Balitorids which are morphologically indistinguishable from some Gastromyzontidae. However, they have very different dietary needs.

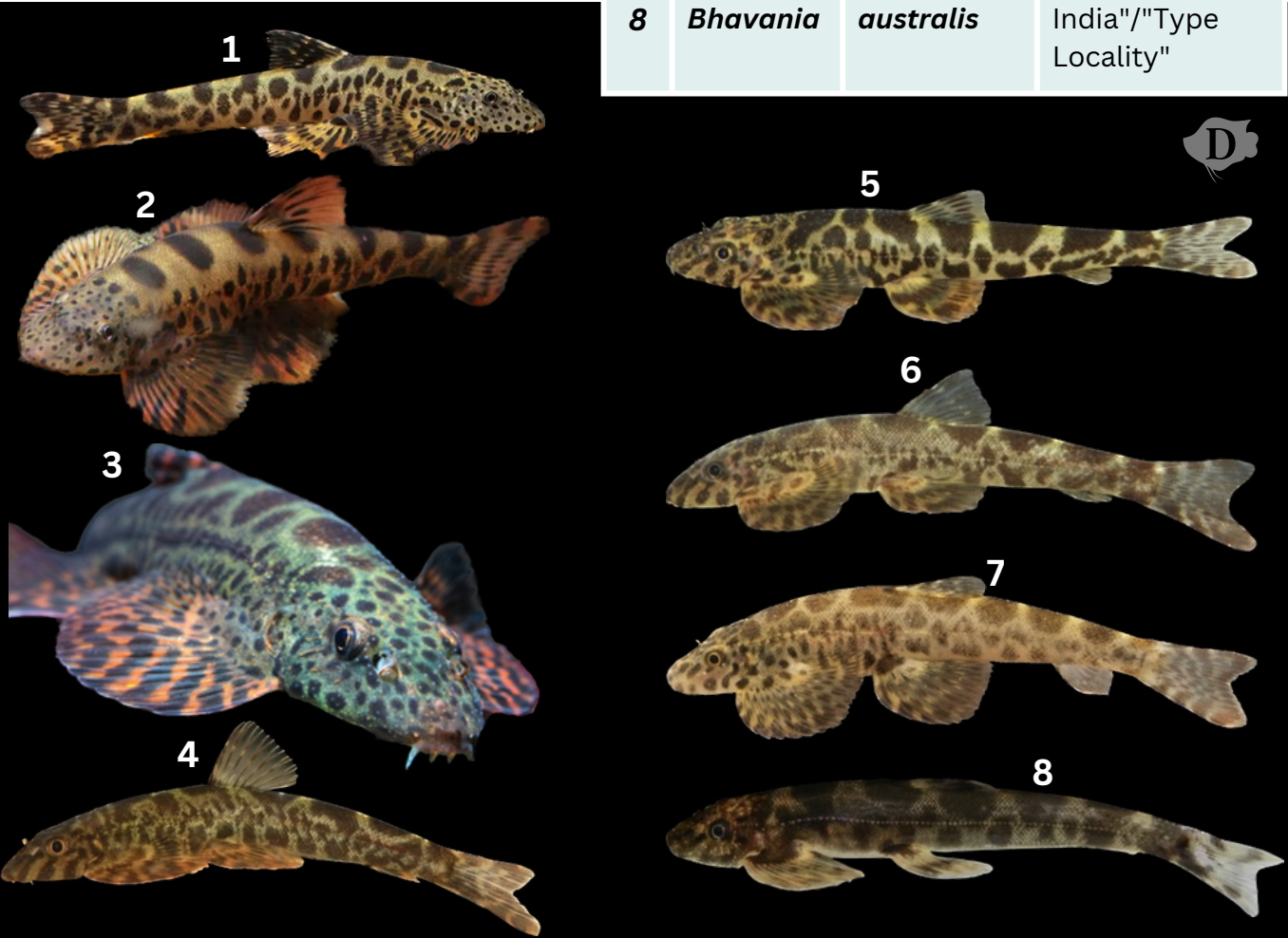


LOACHES OF BHAVANIA

There are currently three species of described *Bhavanias*: 1. *Bhavanias annandalei* (restricted to the Agasthyamalai Hills in the southern Western Ghats); 2. *B. arunachaelensis* from Arunachael Pradesh, Nagaland and “Seven Sisters” region; and 3. *Bhavanias australis* (restricted to the central-northern Western Ghats).

In recent years, many undescribed, colorful *Bhavanias* spp. have been pictured online and have made their way into the Indian exporter’s hands. New *Bhavanias* sp. are mostly discovered in India’s main biodiversity hotspots: the Western Ghats and “Seven Sisters” region (Arunachal Pradesh/Nagaland, etc.). Here is an inventory of the known *Bhavanias* spp. from India.

| | | | |
|---|------------------|-------------------|----------------------------------|
| 1 | <i>Bhavanias</i> | <i>sp.</i> | <i>sp.</i> |
| 2 | <i>Bhavanias</i> | <i>annandalei</i> | "Vamanapuram, India" |
| 3 | <i>Bhavanias</i> | <i>sp.</i> | "Cauvery, India" |
| 4 | <i>Bhavanias</i> | <i>sp.</i> | "Valapattanam, India" |
| 5 | <i>Bhavanias</i> | <i>sp.</i> | "Pampa, India" |
| 6 | <i>Bhavanias</i> | <i>australis</i> | "Kumaradhara, India" |
| 7 | <i>Bhavanias</i> | <i>australis</i> | "Sita, India" |
| 8 | <i>Bhavanias</i> | <i>australis</i> | "Bhavani, India"/"Type Locality" |



LIZARD LOACH CARE

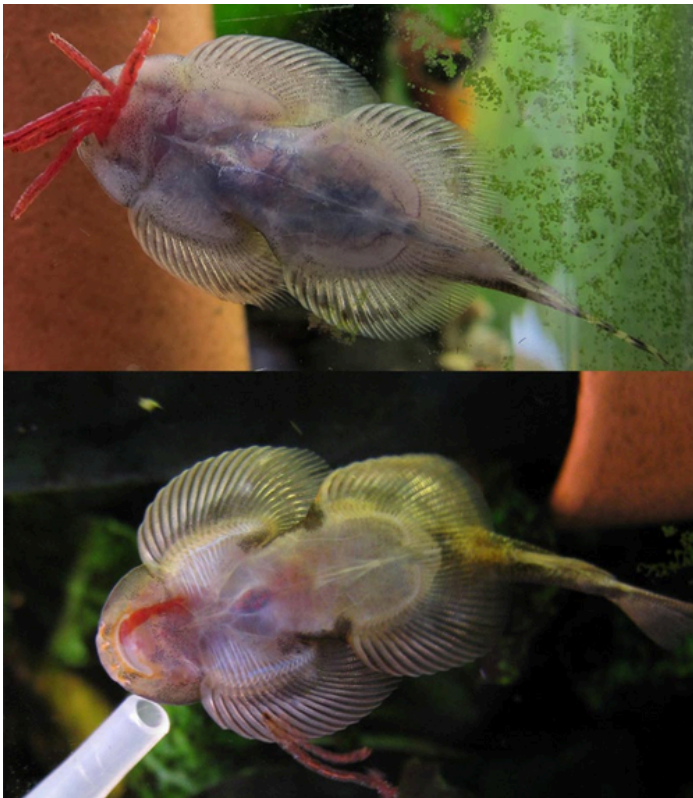
For those who have kept the gummybear-bodied Gastromyzontidae, care for Balitorids is somewhat similar. Provide the same general conditions of a well-oxygenated, room-temperature aquarium with smooth, sandy-gravel as bedding. Decorations can include live aquarium plants, smooth rocks and boulders, and unglazed terracotta pots. Balitorids, including *Bhavana* spp., are aquatic invertebrate specialists, namely worms and fly larvae. Balitorids will not graze like their “Hillstream Loach” cousins: instead, in the home aquarium most Lizard Loaches will wait for frozen foods to be door-dashed to their home rock or unglazed pot. Frozen blood worms are a must with Balitorids, however: they can be enticed to pick at prepared and dried foods after some time. Other live and frozen foods are also accepted: Frozen Mysis spp., live *Daphnia* spp., and *Artemia* nauplii (“live baby brine shrimp”) are greedily accepted.



ABOVE: A young *Bhavana australis* feeds on pellet food in an Indian home aquarium. The fish are sometimes kept as pets in India but are generally unknown to their public.



ABOVE: A mature *Bhavana australis* male from the Western Ghats of India. Sporting a jaguar coat and a side-profile almost identical to some Gastromyzontidae, these stunners should be popular worldwide! Yet to be established in the Americas and Europe.



TOP: A *Sinogastromyzon puliensis* being a glutton for her worms. BOTTOM: A male *Sinogastromyzon wui* with a red stomach full of blood worms.

BREEDING BALITORIDS

Breeding Balitorids (including Bhavania) is somewhat like Gastromyzontids: Balitorids' breeding behavior responds to water changes. To "activate" their breeding behavior, provide a substantial (20%-50%) cool water change each day for a week, to ten days, while also offering plentiful live foods. Rinse, repeat. Eventually, the females will begin to fill with eggs. The males are ready to mate any time of the year...

The Lizard Loaches will be tricked into thinking it's the plentiful rainy season, when monsoons bring plentiful larvae and microorganism down the mountain riffles. Eggs and milt are released either in or over the streambed, which our substrate functions as in the home aquarium. Fry will develop inside of the substrate and only emerge when they feel safe enough to, usually once mini versions of their parents.



ABOVE: A young *B. australis* reveals their lizard-loach heritage. Young *Bhavania* spp. can almost pass for some of the other lineages of Balitoridae. *Bhavania* spp. do not develop their large, flashy fins and colors until sexually mature. These loaches are also sexually dimorphic, with males being much more colorful and larger than females.



the loaches of **BALITORIDAE**

Bhavana are members of the family Balitoridae, the sister family of the ornamental hillstream loaches of Gastromyzontidae. While its sister clade is generally more suitable for captivity, a number of Balitorid genera do appear in the aquarium trade. Examples of each genera can be found below.

BALITORA

B. chipkali



BALITOROPSIS

B. zollingeri



PHOTO: Zoologische Mededelingen, CCSA3

BHAVANIA



HEMIMYZON



PHOTO: Aquarium Glaser

HOMALOPTERA

H. nanensis



PHOTO: S. Kulabtong, CCSA3

HOMALOPTEROIDES

H. bilineata



PHOTO: R. Workoran, CCSA4

PSEUDOHOMALOPTERA

H. tweediei



PHOTO: Aquarium Glaser

SINOCASTROMYZON

S. wui



PHOTO: Aquaportail

NOT PICTURED: Cryptotora (a cave species), Ghatsa, Jinshaia, Lepturichthys, Metahomaloptera, Neohomaloptera, Travancoria



INTRODUCING **MA SI's** NEW EDUCATIONAL INITIATIVE

The **DARTER**

the hobbyist's aquarium magazine

**Fishkeeping
Conservation
Aquarium Science
Aquatic Horticulture
and Ecology**



6 ISSUES PER YEAR
from Missouri's premier
fishkeeping community.



NOW FREE TO STUDENTS!
www.dartermagazine.com/subscribe
.edu accounts only. Email exchange@dartermagazine.com
for more info.

The Missouri Aquarium Society is a non-profit 501(c)(3) organization dedicated to fishkeeping, education, and conservation

CONTRIBUTE TO THE DARTER
editor@dartermagazine.com