

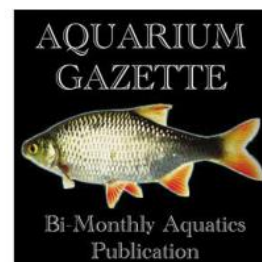
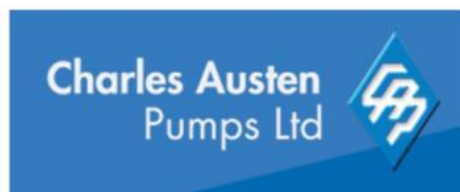
# Journal of the Catfish Study Group



March 2021

Volume 22, Issue 1

**In this edition: Unusual eye colour in plecos; Breeding *Ancistrus* L255;  
Colour change in *Spectracanthicus* L354.**





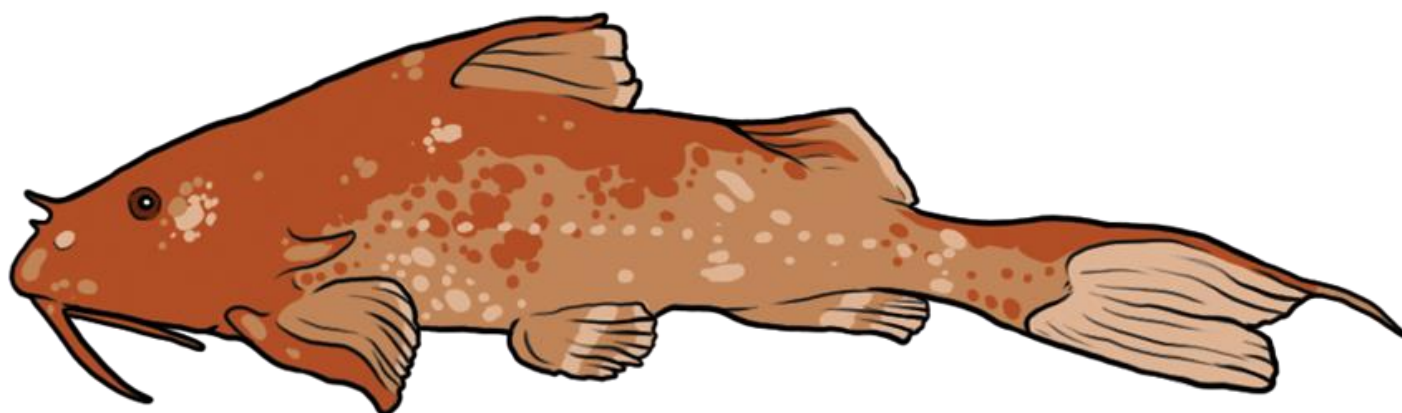
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**Cover image: *Panaque cochliodon*. Photo: Daniel Konn-Vetterlein**

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**Convention 2020 logo – *Hara mesembrina* original artwork by Coral Vane Wright, courtesy of Catfishes of the World**





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## Chairman's Report - Mark Walters

Welcome to 2021 and the hope for a return to a more normal way of life. The UK has just announced its plans for relaxation of lockdown restrictions over the next 4 months, which could pave the way for CSG meetings to take place in 2021. It is still too early to announce anything and depends on the roll out of vaccinations and evidence that the situation is manageable. The committee is hoping we can host our annual show and auction in September and will make announcements later in the year. It is also hoped that we can start to make arrangements for the CSG Convention in 2022, fingers crossed.

### 2021 AGM

We were at least able to hold a virtual Annual General Meeting in January, although there wasn't a great deal to report on! Current Committee is as follows, with an indication of when roles will be open for re-election (usually after a 4-year term):

Chairman - Mark Walters until January 2023;  
Treasurer - Danny Blundell until January 2023;  
Show Secretary - Brian Walsh until January 2023; Editor - Steven Grant until January 2024;  
Press Secretary - Michael Hardman until January 2023; Secretary - Mark Walters until January 2024; Convention Manager - Mark Walters until January 2023; Assistant Convention Manager - Jamie Horne until January 2024; IT Secretary - Mark Walters until January 2024; Assistant IT Secretary - Ben Nicholls until January 2024; Catering Manager - Brian Walsh until January 2023; Auction Manager - Mark Walters until January 2023

Virtual attendees (responded via correspondence): Mark Walters, Danny Blundell, Brian Walsh, Steve Grant, Jamie Horne, Ben Nicholls, Michael Hardman

Minutes from 2020 AGM accepted. No further actions or AOB.

### Relevant CSG Committee Reports

Chairman - CSG activity in 2020 was curtailed by the Coronavirus pandemic and lockdown restrictions preventing activities to be conducted

from March onwards. We did carry out our regular club meeting in February. We were also able to go ahead with a hugely successful 41st annual convention, just prior to restrictions taking effect. We have kept in touch with our membership through social media, direct emails and of course our Journal.

We have had no issues raised against the club, its committee or its members. The social media outlet (Facebook) has provided an effective conduit for club communications and effective administration maintains its presence for the benefit of all users. The CSG website has not been updated with content in 2020, due to a lack of resources and IT skill on the part of current Committee.

Secretary - I have been carrying out any essential Secretary duties for 2020, in conjunction with other roles. Primarily, these have been in communication with members over AGM matters. I have also kept in touch with all Committee members for ongoing CSG business directly and through shared emails. Although we have not conducted many formal committee meetings, essential committee business has been managed effectively in 2020. Notification of the 2021 AGM was made in accordance with the constitution.

Editor - We have issued 4 Journals in 2020 with great support from the rest of the Committee in proof reading, final preparation, printing and posting. The Journal has been issued by the end of the relevant quarter. Great thanks to our Editor and all the contributors to the Journal.

Convention Manager - Although an enormous task, the role of Convention Manager brings me into direct contact with many of our active membership. The 41st Convention in 2020 was a great success with no significant issues. We notified members and cancelled the planned 2021 event in October 2020, due to lockdown restrictions still being in force. Planning for a 2022 event will commence when UK lockdown restrictions are confirmed

Auction Manager - I coordinated the only auction in 2020 which was subsequently

affected by significant storm conditions and localised flooding. Unfortunately, I couldn't travel for the event due to the weather but provided cover. Remaining auctions for the year were cancelled due to lockdown restrictions. Thanks to everybody who supports auctions and associated events.

Mark

## Editorial

If you are interested by the unusual eye colours in some plecs there's an in-depth discussion in this issue, as well as another record of colour change. We also have another breeding report. For fans of Asian catfishes, we have possibly the first record of live photos of a bagrid as well as a that of an introduced species.

As usual, my request is that members please send me any possible articles.

Steve Grant

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### Introduced *Tachysurus dumerili* (Bleeker, 1864) in Perak, Malaysia

Mat Shazwan



Freshly caught *T. dumerili* in Malaysia. Mat Shazwan

A single specimen of *Tachysurus dumerili* was caught on the morning of 9th January 2021 in Lambor, Perak, Malaysia. The native range of this species is in parts of China and the Korean peninsula, making this an alien species to any part of Malaysia.

*T. dumerili* are rare in the aquarium trade. Even wild caught specimens can be considered rare in their native range, but there are a few farms in China and Korea that breed these catfish, mainly for consumption (see Grant, 2020. JCSG, vol 21, no. 2).



Farm bred juvenile *T. sinensis*. Jong Hoon Kim



Farm bred adult *T. sinensis*. Jong Hoon Kim

The specimen that was caught in Malaysia would probably have been brought in by a fish farm and escaped to local waters. To find these "escapees" in the wild will be rare as their ability to survive or breed in Malaysian waters is unknown.



Malaysian specimen after being moved to an aquarium. Mat Shazwan

The specimen was initially placed in a quarantine pond as it had some bacterial problems. Once they were healed it was moved to an aquarium with large barbs and catfishes. It started to bite the other catfishes so it was moved to a pond with more room.



## Breeding *Ancistrus* L255 (Loricariidae) Jacqueline Heijmen Bennett-Leaver



*Ancistrus* L255 female. Image by Jacqueline Heijmen Bennett-Leaver

What can I say? Their body shape, their black base colour with bright white dots, the row of bristles around the upper lip, their shyness... I simply love everything about this fish!

They used to be illusive. There were some older pictures, but not much information and not to be found on any stock list. Where was this fish coming from and where are they now?

I started off with a well-known relative of L255: *Ancistrus ranunculus*. I was fascinated by this dark coloured fish. I have always loved the challenge of keeping certain species. Sensitive and difficult; *A. ranunculus* had certainly tested my skills at fish keeping. Once I got the basics right for keeping them strong healthy and happy, they started spawning for me.

Once a breeding challenge has been completed, I always start looking for the next. So, I started to search for *Ancistrus* L255. I contacted one of Brazil's exporters and was given some information about them. It became clear that it would be a difficult search and the main thing was to stay patient until the time was right.

*Ancistrus* L255 are located in a nature reserve just north of Sao Felix in the river Xingu Brazil. This is where part of the difficulty starts for catching L255. Once caught, the road out to the holding facility in Altamira or directly to Belem is long and treacherous. Due to the rainy season many roads and bridges are destroyed which makes traveling difficult. It seems that for the

past two years they have found some better access as they have been on the stock lists more often now.



Biotope of L255. Daniel Konn-Vetterlein



Some of the crevices (currently above water) they can be found in. Daniel Konn-Vetterlein





Fast flowing water in L255 biotope. Daniel Konn-Vetterlein

In November 2019 I was extremely fortunate to receive four *Ancistrus* L255. Three males and one female. My first priority was to get them home and reduce the stress levels. Many people fail to keep fish from the *A. ranunculus* group and I believe the biggest reason for losing these fish is stress related issues. They seem to die from stress more than anything else. In my experience these fish are quite hardy but react terribly to stress.

I keep both my *A. ranunculus* and *Ancistrus* L255 in well-established mature tanks. Some parameters for those who wish: Ph 7, Kh 3, conductivity of around 300 microsiemens and 29-30 degrees Celsius. I noticed that if you keep them in a fresh tank, for quarantine for instance, they will go downhill fast. Most of the imported fish will be starving for food. The first two weeks are critical and you really do need to stabilize the fish in that time. The best way to do this is by giving them optimal water conditions, a dark quiet tank with lots of hiding places, leave them alone to recover and feed them at night. Except for the odd *Sturisoma* it's not wise to put any other fish in with them. Mainly because they don't compete well for food. They will only come out to feed when it's quiet during the night so the food still needs to be there when they find the courage to come out of hiding. Repashy is a very good option as it doesn't disintegrate and offers a very nutritional diet. Once they've started feeding, they will be fine and on the road to recovery.

About 10 months later I noticed the male took residence in a flat type of cave, more a crevice than a cave. Fish from the *A. ranunculus* group don't usually use caves and rather stay between slate or wood crevices. This is backed up by observations in their wild habitat where they are always found between rock crevices, often in strong currents from the river. On several

breedings from my *A. ranunculus* group I found they spawned under a piece of slate, never in a cave.

A few weeks later the pair spawned for the first time. There is no traditional trapping like you would see with other species which use caves.



Spawning pair. JHBL

*Ancistrus* L255 will lie side by side at the roof of the crevice or open cave, the whole event is without any aggression. The female will deposit her eggs on the roof where they will stick and the male fertilizes them. He will then place himself over the eggs and fan until they are ready to hatch.



Male guarding the eggs. JHBL

The eggs will take about 5 days to hatch. In my case the eggs often separated from the roof of the crevice and so the male lost his eggs just before hatching almost every time. Most of the time I could just put them in a fry ring and wait for them to hatch the day after but there were also times that I lost the egg batch due to fungus.



5-day-old eggs. JHBL



The eggs can be very sensitive to this. I found out that the fry can be extremely sensitive to this too.

An overall observation from both *A. ranunculus* and *A. L255* is that the newly hatched fry have large suction disks to hold on to the substrate in strong current and the fry already have dark pigmentation so they blend in to their surroundings safe from predators. This strengthens the theory that these species spawn in crevices and are not traditional cave spawners.



Fry at 2-days-old. JHBL



Fry with large oral disc. JHBL

Although I had many fry hatch, only a select few managed to grow into beautiful little replicas of their parents. Their growth rate is slow. Most of the F1 juveniles are now about 5-6cm TL and just over one year old.



6-month-old juvenile. JHBL

As most of my fish the *Ancistrus* L255 group seems to spawn seasonally we are getting ready to produce some new fry very soon.

Thanks for taking the time to read my article. I wish you all happy fish keeping.

Thanks to Janne Ekström and Daniel Konn-Vetterlein.

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# “Don’t it make my brown eyes blue” - Unusual eye colour in some Hypostomins (Loricariidae: Hypostominae)

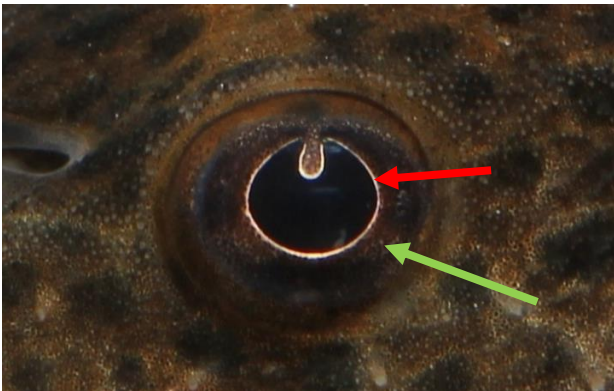
Steve Grant



*Panaque cochliodon*. Image by Ralf Heidemann

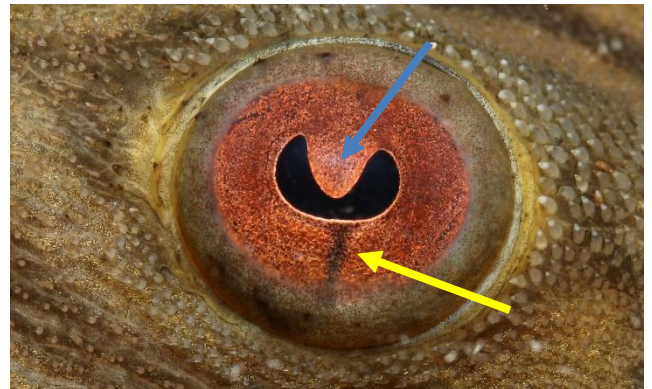
The usual main eye colour (area around the pupil) for species of the subfamily Hypostominae is brown or black (albeit sometimes with a golden edge around the pupil).

wondered why their eyes are so unusually coloured? In this article the issue and possible reasons for it are discussed.

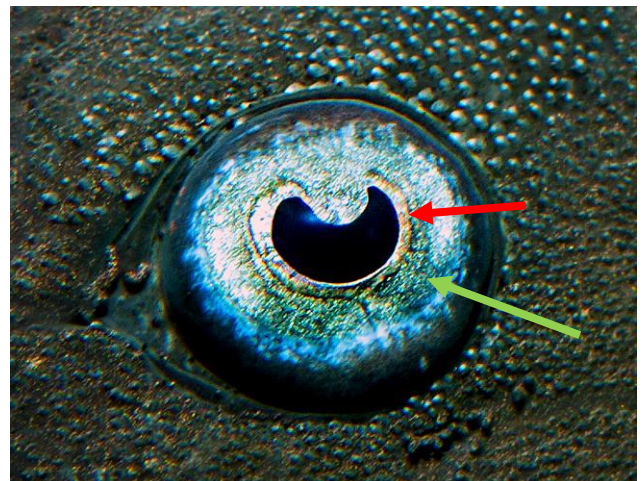


1. *Pterygoplichthys punctatus*. DKV

This is probably because a lot of species have an overall brown or black colouration, so the eye colour blends in with their base colour. Some species have white/pale, yellowish/golden, or greenish eyes, and again these usually blend in with their overall colour, to camouflage the eye (Cott, 1940), which is a conspicuous object to visual predators. More rarely there are species with reddish or blue eyes, and unusually these colours are not the same as their head colour. As aquarists most of us would look at the reddish or blue-eyed species and find them attractive or interesting as ornamental fish, but have you ever



2. *Panaque nigrolineatus laurafabianae*. DKV



3. *Panaque cochliodon*. Ralf Heidemann



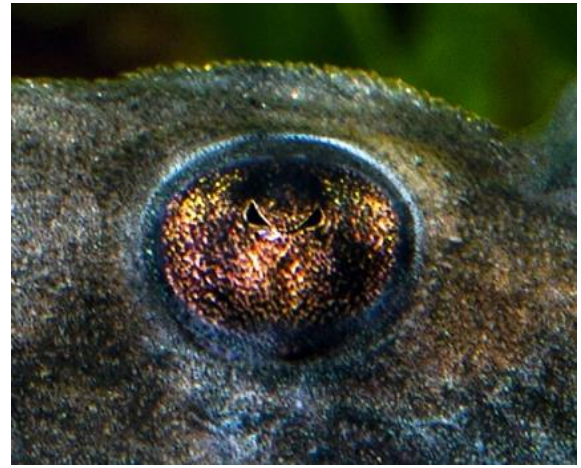
## Fish Eyes

Before eye colour is discussed it is useful to discuss the eyes of hypostomins. Unlike humans the pupil of most teleost fishes cannot change in size in response to levels of illumination. This is not the case for most loricariid species as according to Douglas *et al.* (2002) they have a ‘dorsal iris operculum’ (DIO) or ‘irideal flap’ (Fig. 2, blue arrow) which they state is a part of the iris that can extend from its upper portion, to cover some of the pupil. In fishes of the family Platycephalidae the terms umbraculum and ‘iris lappet’ have also been used instead of DIO (Schultz, 1953).



4. “a great Eye, lidless, wreathed in flame”. Not all loricariids have a DIO - *Hypoptopoma inexpectatum*.  
Steve Grant

Similar structures are present in some tadpoles and adult anurans. In anurans, Colaço *et al.* (2020) state that the umbraculum, is a fleshy projection of the iris into or over the pupil which should be considered synonymous with an enlarged pupillary nodule. In anurans there can be a dorsal pupillary nodule (DPN), which would be synonymous with DIO, and in some cases a ventral pupillary nodule (VPN) is present. They propose the use of DPN and VPN instead of umbraculum. It is not clear whether the structures in anurans are the same as in teleosts. For the purposes of clarity and following recent terminology used in fishes, the author will use the terms Dorsal Iris Operculum (DIO) for the cover that extends from the top of the eye downwards over the pupil; for the gap in the chromatophores on the iris that can be seen in the ventral portion of the eyes of some species (Fig. 2, yellow arrow), this will be called the ventral pupillary node remain (VPNR) (adapted from Colaço *et al.*, 2020).



5. ‘*Baryancistrus beggini*. Ralf Heidemann

In ‘*Baryancistrus beggini* Lujan, Arce H. & Armbruster, 2009 there is some evidence that in addition to a DIO the ventral portion of the iris can constrict to cover some of the pupil (Fig. 5).

In fishes, it has long been known that some species have one or more iridescent reflective layers in the cornea and / or in the iris which are visible under some conditions of illumination (Lythgoe, 1975; Douglas *et al.* 1998). These layers can produce eyeshine, which can appear white or other colours, including blue and red, depending on the wavelength of light they reflect. As well as the cornea and iris there are at least four other ways in which eyeshine is created in fishes, involving different structures of the eye, and even the optic nerve (Fritsch *et al.* 2017). Depending on the species and type of eyeshine, it can camouflage the eye by reducing the contrast between the otherwise dark pupil and the surrounding tissue (sometimes looking hazy in water – discussed further below), increase visual sensitivity under dim light, or filter out unwanted light to the retina (Gur *et al.* 2018; Santon *et al.* 2018). One study found that the irises of a triplefin (Tripterygiidae) species reflect light sideways to induce and detect eyeshine in nearby micro-prey, but also induce eyeshine from one of its predators and therefore possibly helping to avoid predation (Santon *et al.* 2020). In some fishes the iris can even produce fluorescent light (Wucherer & Michiels, 2014).

Some shallow-water fishes, both sea and freshwater, belonging to several groups of teleosts, are able to change the corneal

coloration according to illumination level. Quite colourless in the dark, their corneas become yellow, white, orange or even deep red (depending on species) under direct sunlight, in an hour or so. The white eyes of some *Chaca* species may be an example of this (Grant, 2006). Rather than reflective cells or iridophores as discussed above, this phenomenon is based on the redistribution of coloured cytoplasm between cell bodies and dendrites of highly specialised corneal chromatophores. The corneal chromatophores form compact cell masses outside the pupil area, at the corneal border, their flat ribbon-like processes protruding over the pupil corneal area (Orlov & Kondrashev, 1998). The function of these coloured corneas is thought to be to help camouflage the eye shape and dull the appearance of the pupil, but also help to filter out different wavelengths ('colours') of light. Pigmentation in the dorsal area of anuran corneas is called the Elygium.

### Omega Eyes

The covered pupil in Loricariids has the shape of a crescent or an upside-down Greek letter Omega ( $\Omega$ ), which is why they are sometimes referred to as Omega Eyes.

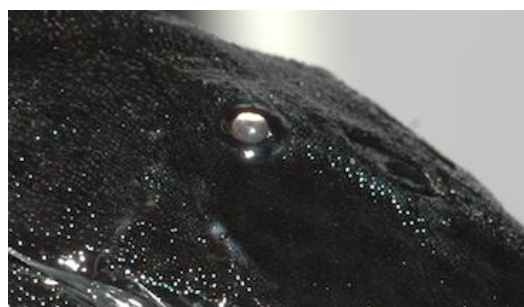
Douglas *et al.* (2002) studied several species of *Pterygoplichthys* Gill, 1858 and subjected one of the species to exposure to different intensities of white light. They found that the constriction of the pupil took the form of a general reduction in the diameter of the pupil and the downward extension of the DIO. Compared to another fish and most vertebrates they found that the constriction in the catfish was much slower, and that when light was removed the pupil did not dilate. They had previously suggested that, since the majority of teleost fish with extensive pupil mobility are bottom-dwelling species that attempt to blend in with the substrate, the constriction/coverage of the pupil may aid in camouflaging the animal through obscuring the otherwise very visible pupil (see Cott, 1940), rather than acting as a shade against light or to reduce the effect of any longitudinal spherical aberration of the lens. Douglas *et al.* made the same argument for the loricariids, as the DIO distorts the shape of the eye and blends with the

rest of the fish's body markings when viewed by potential predators from above. They state that the catfish would, however, be able to maintain vision through its crescent-shaped pupil in the anterior, posterior and ventral directions, with two areas of increased acuity examining the substrate in front of and behind it. The author hypothesises that the VPNR could have evolved to allow light into the bottom of the eye, to compensate for when the DIO is closed, so as to improve vision.

Lujan & Chamon (2008) stated that the absence of a DIO among *Peckoltia pankimpuju* and *Panaque bathyphilus* "is consistent with the species' other putative morphological specializations for deep water habitat, where the predominant sensory vectors for predator-prey interactions are nonvisual". However, when both species are kept in clear water and subjected to normal levels of light, they change from having a very pale body colouration to darkly pigmented, with *P. pankimpuju* becoming jet-black. From seeing live specimens that have colour morphed, L090 (considered to be *P. bathyphilus*) does have a small DIO, and L350 (considered to be *P. pankimpuju*) an even smaller one, but a DIO is present.



6. *Panaque* L090. Daniel Konn-Vetterlein



7. *Peckoltia* L350 DIO producing eyeshine. Erlend Bertelsen



Based on their natural habitat and reduced eyes it is possible that they have a reduced or vestigial DIO. *P. pankimpuju* also seems to produce a form of eyeshine.

Whilst the theory for the reason for DIO in loricariids sounds plausible, in the extreme case of *Panaque cochliodon* (Steindachner, 1879) how does a larger area of bright blue eye (the DIO covering some of the black pupil resulting in more blue coverage) on a black body help to camouflage the eye more than a larger black eye (pupil dilated) with a smaller blue iris? Or in *Panaque nigrolineatus laurafabianae* Ortega-Lara & Lujan, 2020, a larger area of reddish/orange eye on a pale and dark patterned body, more than a black pupil with a smaller reddish/orange iris? Whilst it would not make the overall eye less conspicuous in these cases (due to being more blue or reddish pigment on show) it would conceal the pupil more, and it is the pupil shape (round) and colour (dull black) that is visually recognised and used by predators to locate prey (Cott, 1940). So, even in these unusual cases, the theory for the DIO by Douglas *et al.* (2002) is still plausible.

It is perhaps worth mentioning that some hypostomins can roll their eyes into the sockets (see the video by Ivan Mikolji discussed further below). Based on the author's observations that this is not a regular occurrence, and generally does not happen when the fish is handled, it is hypothesised that this is either a response to eye irritation, or some form of intraspecific signalling. If the eye myology is similar to Corydoradinae (that can also do this), the muscles responsible are discussed in Huysentruyt *et al.* (2007).

### **"Behind Blue Eyes" - Distribution and structure of irideal colour cells**

If the morphology described by Douglas *et al.* (2002) for the few catfish species eyes that they studied, is representative of other omega eyed loricariids, it appears that that the colours seen in the eyes around the pupil are predominantly situated in the iris, rather than the cornea. Gur *et al.* (2018) studied the iris of *Danio rerio* (Hamilton, 1822) and found the outward facing edge of the iris has three layers. The outer layer

has ordered layers of iridophores (crystalline reflective cells) in a tiled formation, the middle layer has disordered (different angled) iridophores, and then an inner layer of pigment forming melanophores (cells containing chemically produced dark pigment). The specific formation of the iridophores and the melanophores in the zebrafish allows for a complex optical response, which combines wavelength(colour)-dependent light reflection, scattering, and absorption. The reflection function is what makes the eye appear a particular colour to the observer depending on their angle to the eye (see discussion under colours).

In *D. rerio* the ordered iridescent layer reflects 80–90% of the impinging blue-green light. The residual light that passes through the first (ordered) layer is scattered by the disordered (middle) layer. Finally, the thin pigmented layer likely absorbs any light passing the outer and middle layers. In addition, the scattering of light by the disordered (middle) layer, likely makes incoming light have an angular spread, which increases the probability for the light to be absorbed by the melanin pigment. It is the faulty display of melanin pigment (due to leucism) in the lower irideal layer in *Ancistrus* sp. 4 that means it can exhibit blue eyes in some light.



8. *Ancistrus* sp. 4. Ralf Heidemann

Wucherer & Michiels (2014) found a similar set of structures and actions in the eyes of a triplefin species (Tripterygiidae), which allowed it to produce red fluorescent light at will, by covering or revealing iridophores to the light. This is achieved by dispersal and aggregation of the melanophores that have finger-like extensions

that can encase the iridophores on the outer layer of the iris. Gur *et al.* (2015) found that the neon tetra *Paracheirodon innesi* (Myers, 1936) has the ability to change the structural colour of its lateral stripe in response to a change in the light conditions, from blue-green in the light-adapted state to indigo in the dark-adapted state. The physical mechanism of the light-triggered colour change in the lateral stripe of the neon tetra is controlled by changing the tilt angle of the guanine crystal arrays (iridophores), similar to a Venetian blind. It is possible that similar control could happen in the iridophore layers in the eye of catfishes.

When the hypostomin iris is viewed from directly facing the eye, there is usually an inner edge/ring of colours, nearer the pupil (Figs. 1 & 3, red arrow). It is not clear if this is just different iridophores on the outer layer of the iris, or the lower layer curved outwards towards the surface, as in the eye of humans (François *et al.* 2009). The inner ring can be a similar colour to the outer but can also appear gold or silver in some species. Based on their reflective appearance, the surface of the inner irideal ring appears to be made up of iridophores. In the bright-eyed species the outer irideal ring (Fig. 3, green arrow) and surface layer appear to be iridophores, and in the dull eyed species there are probably more melanophores (Fig 1. green arrow). In some species there also appears to be some colours around the outer edges of the rim of the cornea, and in at least two species this can appear whitish or light-blue: *Pseudacanthicus serratus* (Valenciennes, 1840) and *Ancistrus ranunculus* Muller, Rapp Py-Daniel & Zuanon, 1994.



9. *Pseudacanthicus serratus*. DKV

This is unusual for otherwise predominantly black fish (and rest of the eye). In the latter species the snout tentacles and some of the fins can also sometimes have a blue appearance. Almost all blue colouration in fishes is as a result of the combination of iridophores and melanophores interacting with light. On that basis it is likely that the bluish colour on the latter, and bluish fishes like '*Baryancistrus beggini*', are produced this way.

### "Mr. Blue Sky" - Vivid eye colours

Before the possible purpose of the eye colours is discussed, it is worth briefly reminding ourselves what colours are. Perception of colour derives from the stimulation of photoreceptor cells in the eye of the observer by electromagnetic radiation, or 'light'. Colours of objects appear to the observer through the wavelengths of the light that are reflected from the object, and their intensities. This reflection is governed by the object's physical properties such as light absorption, emission etc (in this case iridophores, melanophores etc). Not all animals perceive the same wavelengths or spectrum of light, and therefore not all animals see the same colours. Most fish species are thought to have colour vision (Levine & MacNichol, 1982). Some fish can see ultraviolet and some are sensitive to polarised light.

As light passes through a greater depth of water, colours (the different wavelengths of light) are selectively absorbed by the water. Water preferentially first absorbs red light, and to a lesser extent, yellow, then green, then violet light, then blue, so the colour that is normally least absorbed by water is blue light. However, colour absorption is also affected by turbidity of the water; the speed and bend of movement at the surface; and colour wavelengths can be dissolved by various dissolved materials, including salinity and organic matter. This is why at a certain depth and salinity most clear water looks green, and deeper still, blue, but some river water appears brown, due to dissolved organic matter (Sandström, 1999).

The bright blue or reddish eyes that we see in an aquarium or photos, would not look the same in natural biotope water and illumination. In an aquarium the water is much clearer, well



filtered, usually shallower, and receives different angles of light (even more so from side illuminating camera flashes), rather than one main source of downwelling light in a river. We are also usually seeing their eyes from the side, whereas some predators would not. Humans may also perceive different colours to the fish's predators or conspecifics. All these factors and others, affect how reflective and the colours the eyes appear. At night (when some of these fish are active) in their natural environment they will appear as and perceive different colours, due to moonlight and starlight reflecting or emitting different wavelengths and intensities of light.

### **“Ol' Blue Eyes Is Back”**

So, the question remains, why would a vivid blue or reddish eye that doesn't match the colour of the fish's head evolve, especially when most congeners and consubfamilials don't have such an eye colour?

Negro *et al.* (2017) studied intraspecific eye colour variability in birds and mammals, and stated that some eye colours may facilitate advertising, whereas other colours are less visible on the face or head, and may serve to conceal the eye. Eye colouration may also be related to visual needs, as the pigments involved capture or reflect different light wavelengths (colours). Davidson *et al.* (2017) discuss one possible reason why cavity nesting birds might be more likely to evolve bright irises: guarding cavities from competitors. This is something that could correlate with loricariids wedging in and competing for caves and crevices. However, a number of other hypostomins that live and breed in caves/crevices have not developed these eye colours.

*Pseudacanthicus serratus* and *Ancistrus ranunculus* live in similar environments as the bright eye-coloured species, and as discussed earlier they have white or bluish corneal colouration, and bluish snout tentacles in the latter. This could indicate that iridophores, eyes and tentacles could be more visible to conspecifics (including potential mates) or cave competitors, as they could reflect the available light (which at depths or at night is mainly on the blue wavelength). Iridescence appears to

function in mate choice in the guppy (Kodric-Brown & Johnson, 2002), although this is at ultraviolet wavelengths/colours, which humans cannot see, but some fish can (clearly including the guppy).



10. *Ancistrus ranunculus*. Lars Jamne

Volpato *et al.* (2003) found eye colour was an indicator of social rank in Nile tilapia, and Flamarique *et al.* (2013) found that the blue iridescent eye in the male stickleback is a primary courtship signal in female mate choice. From what we have observed in the aquarium in these loricariids the eyes do not appear to change when nesting or differ in the sexes, but this has not been tested. Based on what we know about many fishes being able to alter their overall colour under physiological control (see earlier and Grant, 2019) and how the chromatophore units in eyes of fishes can be similarly changed, it is very possible that they could alter their eye colours at will for this purpose. As we do not clearly see what is happening in natural breeding caves, or see colours the fish can see, this cannot be ruled out.

Gur *et al.* (2018) stated that in *D. rerio* having both an ordered and a disordered layer enables a dual functionality of the iris: an efficient light barrier that also provides camouflage to the normally black pupil. Part of that barrier is reflecting mainly blue-green light (depending on the depth and constitution of the water as discussed under the section on colours). They found that the ordered reflecting layer, which is only  $\approx 3 \mu\text{m}$  thick, provides about 60% reflection of the blue-green light. In comparison, a melanin-based iris would require a layer of about  $15 \mu\text{m}$  in thickness to absorb a similar amount of light. Finally, the ordered crystal layer, which mostly reflects blue-green light, is

advantageous because these wavelengths / colours are the most abundant in their clearwater environments. Wucherer & Michiels (2014) found that the triplefin they studied that could emit fluorescent red light from its iris, and this was done because many marine environments below 10–20 m are essentially blue-green because of the shorter wavelengths / colours of light being absorbed by the water. This means that in the absence of long wavelengths none of the usual reflective pigmentation mechanisms can generate shades of red. Fluorescent pigments can restore those “lost” colours by absorbing the available light and re-emitting it at a longer wavelength / red colour. The mechanism is thought to be used for signalling to intraspecifics.

Doucet & Meadows (2009) studied the different functions of iridescence. They state that iridescence produced by iridophores in the skin and eyes of fishes has been proposed to function in underwater camouflage. They discussed the mirror effect of eye iridescence. Light in water is scattered such that beyond a certain depth, it becomes vertically symmetrical, regardless of the position of the sun. This phenomenon occurs at depths of 300 m or more in clear water on a sunny day, but can occur at shallower depths in turbid water or on cloudy days. In a light field of this kind, a vertically oriented mirror would provide perfect camouflage from all directions except directly above or below. They state that changes in viewing angle of the observer can dramatically alter the appearance of iridescent colours, producing considerable changes in hue, intensity or both. Iridescent colours usually appear brilliant and saturated at optimal viewing geometries but when the viewing geometry changes, the iridescence can disappear entirely, leaving visible only the colour produced by underlying pigments, which is often black (melanin). This is possibly why what looks like a vivid and shiny eye up close in an aquarium, can look dull or dark in their natural environments.

Could a similar set of structures and reasons for *D. rerio* or the triplefin apply to the blue and reddish eye hypostomin species? These would be: the ability to move the eye in the socket (therefore affecting the angle of light reflectance) and the possibility that similar chromatophore

units, could vary the intensity of the iridescence (therefore physiologically changing the colour and brightness of the eye to certain observers). The author cannot microscopically examine the structures of the eyes of hypostomins to prove it. So, this leaves clues from the possible environmental reasons why those colours would be reflected and therefore visible to us, the observer looking at fishes in an aquarium. Thankfully the author has been able to communicate with ichthyologists, explorers and aquarists who have personal experience of seeing and catching some of these species in nature. It is possible that if we can identify behaviours, and the depths, water clarity and composition where these species are found, it may provide some clues as to why their eyes can appear blue or reddish to us.

*Panaque suttonorum* Schultz, 1944 and *P. cochliodon* (blue eyes)



11. *P. suttonorum*, fish at Pier Aquatics, Wigan. SG

Dr Donald Taphorn (personal communication) states that as *P. suttonorum* comes from the Lake Maracaibo Basin, the waters there all come out of the mountains and in current times are quite muddy due to human impacts. Before this, most of the basin would have been heavily forested, which probably meant the water was only muddy during the peak of the rainy season, with clearer waters for most of the year. Donald explored around 400 sites in the area in the 1970s. Most *P. suttonorum* lived over a rocky substrate, with gravel and sand, and plenty of submerged wood. In those places the pH was almost 7. The depth of the waters they were found in is estimated to be between 2 to 15 meters deep. Donald has not sampled the Magdalena basin waters of *P. cochliodon* as much but believes that the conditions will have been similar. Thanks to Evers & Christian (2019) we know that in *P. cochliodon* even at 24 days / just less than 24mm TL, they eyes have a dull



bluish tinge, and at 60 days old / 35mm TL the eyes are blue and have an iridescent quality, indicating the iridophores are well developed at a small size/ early age (which is the case for other vivid eyed *Panaque*). The spawn occurred in a pipe with one enclosed end.

*Panaque nigrolineatus* (Peters, 1877) (reddish eyes)

Ivan Mikolji filmed this species in the Río Tiznados, Guárico, Venezuela (Llanos) and the video can be found here: [www.youtube.com/watch?v=B3cg9tGiFPA](http://www.youtube.com/watch?v=B3cg9tGiFPA)

An image is featured in Ivan's book (Mikolji, 2020) of the specimen on plants, but as can be seen from the video, the fish is first found on the bed of the river, presumably in the deeper part. The substrate is mainly sand and small rocks, with some scatterings of submerged wood, and plants. Where the fish is first found, whilst the water is clearwater albeit with a bluish tinge, as the fish swims off the visibility in the distance lessens. At a relatively close distance the eye is not conspicuous at this part of the river. When the Ivan catches up with the fish in shallower water, the water is clear and the visibility much better. Ivan shines his torch on the fish and one can observe that as he does this, the brightness (and therefore conspicuousness) of the eye changes. Without the torch, under natural conditions the eye colour is not as obvious or vivid.

*Panaque armbrusteri* Lujan, Hidalgo & Stewart, 2010 (pinkish to goldish eyes)



12. *P. armbrusteri* in nature. Oliver Lucanus

Oliver Lucanus took this fantastic photo of this species in a tributary of the Teles Pires River, Mato Grosso State, Brazil (same river basin as the holotype). The first thing that may be obvious to keepers of this species is that the strikingly bright body stripes that one normally sees in an aquarium, from a distance are actually not as noticeable in their natural settings, and combined with their dome-shaped bodies, they are well camouflaged, even in clearwater (although there is some slight turbidity). In the aquarium the eye of this species is not as reddish as some of the other reddish-eyed species; they appear pinkish or goldish in some settings, but the colour of the eye in the specimen photographed by Oliver is not distinctive (the DIO is closed too). Oliver advised (personal communication) that they (along with other congeners in the Guaviare and Xingu rivers) are often associated with rock, or beds of Podostemaceae plants in fast-flowing water, rather than wood, as most aquarists would think.

*Panaque cf. armbrusteri* 'Xingu'



13. *P. cf. armbrusteri* 'Xingu'. DKV

Dr Leandro Sousa states (personal communication) that in the Xingu adult *P. cf. armbrusteri* can be found very deep. Leandro saw them at 30 m deep (where he could see no visible light) where they live on the rocks (not on wood). The fishermen advised Leandro that they come to the shallow areas of flooded forests in rainy season. The young fish are found in shallower waters, usually on the rocks. Daniel Konn-Vetterlein (personal communication) states they are common to find at 0.5 m and the deepest one he witnessed was at a depth of 11 m. The larger they are, the deeper they live. The water in shallower areas is fast moving, and at

all depths is clear (not much turbidity / obvious suspended particles before being disturbed the fisherman), despite its turbulence. In parts of the system the water has a blue-green tinge.

*Hypostomus soniae* Hollanda, Carvalho & Weber, 2005 – L137



14. *H. soniae*. Haakon Haagenzen

Leandro Sousa states (personal communication) that in the Tapajos system he saw them in small creeks off the main river, in crystal clearwater, at shallow depths (1 to 2 m), but that they probably also occur deeper. The ones he saw were all in wood. The Tapajos main river is clearwater albeit with some tannins.

### **“Blue Eyes Crying in the Rain”**

There are some apparent commonalities between all 6 of these species. All of them live in clearwater environments, albeit with some of the larger specimens of the *Panaque* species habituating deeper depths where light and colours visible to humans is reduced, or even not visible. Most of them do live amongst rocks and in some cases wood, which provide some cover from downwelling light, but in most cases still being subjected to high levels of relatively unabsorbed and unscattered sunlight. Some of them sit in open water but when breeding probably breed in enclosed spaces. However, in some cases (e.g., Xingu) there are other species of hypostomins that sometimes occupy a similar or the same trophic functional trait space (Fitzgerald et al., 2017) most of which do not have conspicuously brightly coloured eyes. None of those other hypostomins develop the very

deep, dome-shaped head and body of *Panaque* or *H. soniae* (to a lesser extent).

### **“How Big, How Blue, How Beautiful”**

The complex structures of chromatophore units and control mechanisms, and the colours that they show to the observer, will not have evolved by accident. We have seen that conspicuous colouration can be associated with mate choice, species recognition and communication, crypsis, and vision improvement. Some bright colours such as red and blue can be aposematic (warning colouration to predators of unpalatability). Many colours are therefore a compromise between being visible to the intended receivers while avoiding the attention of the unintended, e.g., predators (or in the case of aposematism, getting the attention of a predator). These opposing forces drive the evolution of adaptive, context-dependent colouration (Wucherer & Michiels, 2014). The directionality of iridescent colours might allow fishes to direct their signals at intended receivers, such as prospective mates or rivals but also to avoid unnecessary conflict with nearby conspecifics (Doucet & Meadows, 2009).

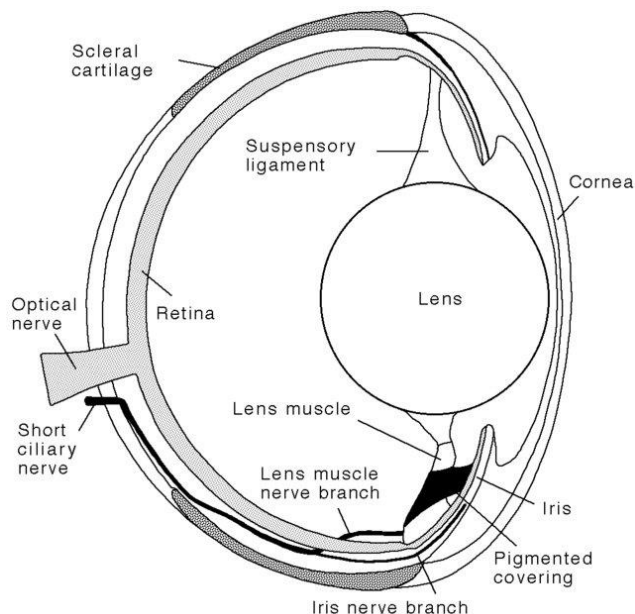
It is very likely that the iridescent unusual eye colours discussed here have also evolved for functional reasons. All of the species discussed live in clearwater, with little or no turbidity. All of them at least visit shallower waters where red-light spectrum is still abundant; most of them sometimes sit out in the open in shallow or deeper waters. As adults, most visit deeper waters where blue-light is most abundant and red light least abundant, and where non-iridescent colours may be less visible. All of them spawn in enclosed spaces, which would need defending from intra- and interspecifics, and would require the enticement of a member of the opposite sex.

The author’s hypothesis is that the iridescent blue and reddish eyes have evolved to carry out a variety of functions (which are under physiological control by the fish) dependent on the need at that time it is deployed: eye camouflage; filtering and enhancement of light for the varying lighting environments/depths they occupy; and intraspecific signalling. The latter may involve signalling to competitors for

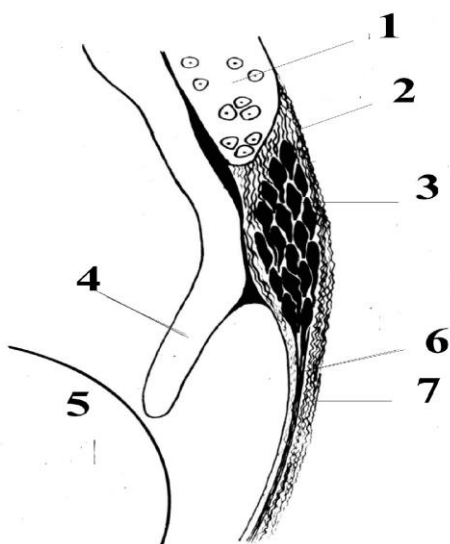


hiding and breeding spaces, and potential mates for breeding. The blue on the snout tentacles of *A. ranunculus* may be for the same purpose.

The author does not consider that the eye colours are aposematism as this is usually combined with other warning colouration, which at least in the blue-eyed species, is not present.



15. Vertical cross-section of a general fish eye from Nicol (1989)



16. Cross-section of corneal colour filter: 1 - Cartilaginous sclera.; 2 - Fibrous sclera; 3 - Cell mass of corneal chromatophores; 4 - Iris; 5 - Lens; 6 - Processes of corneal chromatophores; 7 - Fibrous cornea. Orlov, & Kondrashev (1998)

## Acknowledgements

Thank you to Daniel Konn-Vetterlein (DKV), Ralf Heidemann (RH), Haakon Haagensten (HH), Oliver Lucanus (OL), Erlend Bertelsen (EB), Lars Jamne (LJ), and Junior Chuctaya for us of their photos. Leandro Sousa, Donald Taphorn, Oliver Lucanus, Ivan Mikolji, Raphael Covain and Daniel Konn-Vetterlein for information on ecology and biotopes. Jeremy Basch and Max Pedley for assistance in obtaining two references.

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## ***Pseudacanthicus* L065 or let's say "50 shades of grey"**

**Markus Kaluza**



15 cm blizzard cactus pleco. Image by Markus Kaluza.

Cactus Plecos of the genus *Pseudacanthicus* enjoy great popularity. There are particularly colourful species, such as *Pseudacanthicus leopardus*, *Pseudacanthicus pitanga* (L024), *Pseudacanthicus* L273 or *Pseudacanthicus pirarara* (L025), and also the species with white spots on a black base colour. *Pseudacanthicus* L065 is a species that supposedly falls under the latter category, but is it actually so?

In fact, wild specimens of this species are hard to get, which makes this species rare in the trade. Most animals in the trade are offspring from a few experienced breeders, especially our chairman Mark Walters and my good friend and world-wide recognised *Pseudacanthicus* expert Ole Paulsen.

I am currently keeping a small group of these animals again, which I acquired from Mark at

the CSG convention in 2020. These individuals are also the reason why I am finally writing this text, because no *Pseudacanthicus* species that I have ever kept or seen in friends' homes is so variable. When Numrich (1990) found this catfish 31 years ago as a by-catch between *Peckoltia* species and presented it in DATZ, one of the juveniles showed beautiful large white blotches on a dark background, the second one, which was of similar size, already showed smaller spots on the dark-grey base colour. While in *Pseudacanthicus* L097 the clear pattern of dots only fades a little with age, but remains present, most *Pseudacanthicus* L452 from Peru and *P. sp.* "Alenquer" show a variance in the pattern; the small, clear dots, which the juvenile animals still had, can blur or join.





Young *Pseudacanthicus* L065. Karl Schwamm

In *Pseudacanthicus* L065, on the other hand, the dots or spots quickly turn grey or the coat of dots disappears almost completely.



Clearly visible variance within 5 young specimens of the same clutch. Markus Kaluza

Those who have already kept this species themselves know that specimens, which can be really pretty when young, can quickly become a "grey mouse". It is also remarkable that not all young animals have these beautiful large white blotches like the animal from DATZ. Even in one clutch the variance is quite large. There can be anything from large blotches to a fine pattern of dots or hardly any dots at all. When reaching a size of 10.0 cm TL, the large spots disappeared at the very latest in the last specimen I've kept. Seidel & Evers (2005) also pointed out in Catfish Atlas 2 that this species is very variable.

Hardman (2015) classified *Pseudacanthicus* L065 with *P. sp. "Alenquer"* and *P. L097*, but how closely these three types are really related to each other is still scientifically unclear. While *Pseudacanthicus sp. "Alenquer"* and *P. L097* are regularly imported, no new *Pseudacanthicus* L065 are currently entering the hobby. Current

information about the variance of wild-caught specimens is therefore not available at present. The propagation and spread of these specimens are still very welcome, even if they aren't colour wonders.



Young specimen with big blotches. Ingo Seidel



Young specimen with blurred spots. Ingo Seidel



Totally grey young fish. Markus Kaluza

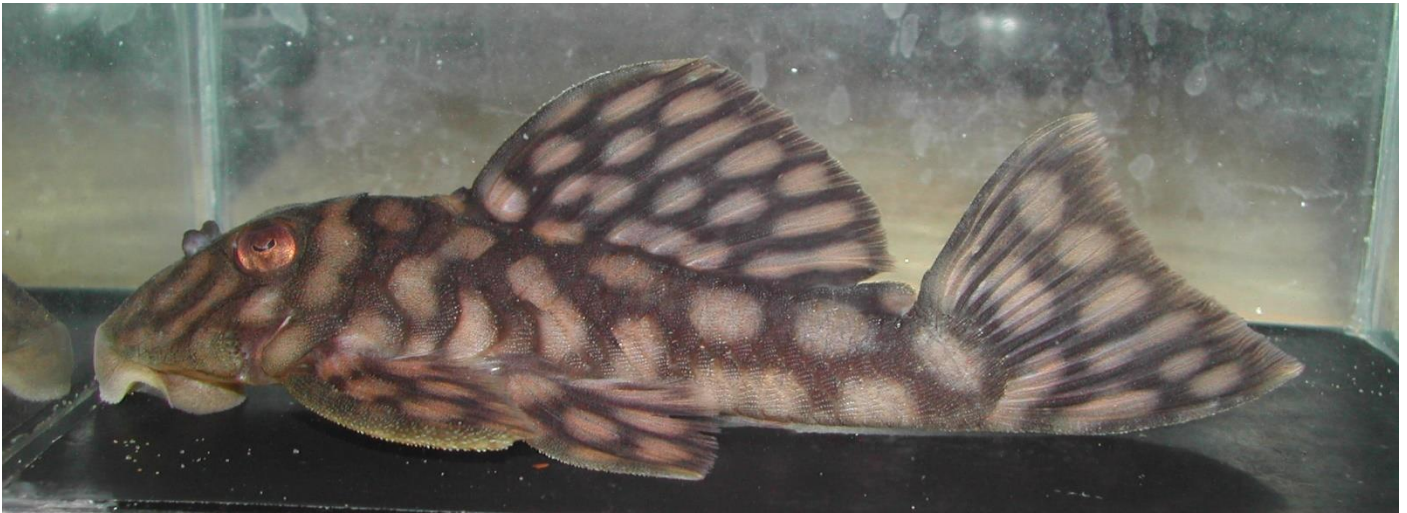
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# Chronic Recurrent Colour Change in *Spectracanthicus* L354

Craig Whitehead



Normal coloured *Spectracanthicus* L354. Image by Steve Grant

I started to keep *Spectracanthicus* L354 in 2016 when I purchased my first group of two males and two females from Pier Aquatics, Wigan. I then later added two more specimens from an aquatic shop local to me (Silksworth Aquatics) whilst also getting another one from a different shop (G.M Aquatics).

They are a genus I had never kept but I did my research on their dietary needs etc., whilst also messaging Dimitris Lysikatos, as he had recently done an expedition in Brazil and saw these beautiful fish in their natural environment. I really wanted to make sure I did my upmost with these fish as I had read that they could be fussy eaters, but they settled in straight away without any problems.

The tank I had setup for them was very basic and just full of rocks and caves with lots of flow, temperature was 30°C with well oxygenated water, TDS 95 - 100, PH 6.7.



Tank setup. Craig Whitehead

After a few months of keeping this species I noticed a light patch on one of the fish's head.

Initially I thought it was a heater burn or a possible injury from fighting. The white patch started to get bigger and spread more around the head and day by day it spread down to the body until the fish was almost white. Other than this the fish seemed perfectly healthy and was feeding just like it normally would. There was no change to their tank or environment, and I always change the water on my tanks regularly. After maybe 4 - 6 weeks of the colour change the fish started to get its original colouring back, and again after 1 week was completely back to normal.



Normal (left) and changing (right). Craig Whitehead



Compare to main image – The normal dark reticulations and light patches now seem reversed.  
Craig Whitehead

Whilst having one fish that colour changed was brilliant and unexplainable as time passed, I started to notice more of the fish also changing colour (starting again from the head) and at one point I had five out of eight fish that had colour changed all at the same time.



Dorsal view. Craig Whitehead.

As I started to take notes of when the fish would start to change, so I could look back on them, I noticed that it seemed to be the autumn / winter months the colour change would start to happen. Could it be down to atmospheric pressure?

I have had many long chats with people trying to work out what causes these fish to change but no one can seem to prove what the actual cause is; it even has some of the experts baffled.

Protein issues have been discussed (Konn-Vetterlein, 2016). Grant (2019) called this phenomenon Chronic Recurrent Colour Change (CRCC) and hypothesised that it could be caused by a defect affecting the release of the hormones that aggregate melanophores. Recently a viral infection was also mentioned as a possible cause, which would kind of make sense why five out of my eight fish had CRCC, but it's all just guesses unfortunately.



Almost fully changed specimen. Craig Whitehead.

CCRC has also occurred with another friend of mine (Wayne Goddard) whose *Hypancistrus* sp. did the exact same. Once again, the colour change would start from the head and lead down the back of the fish until it was completely changed (documented in Grant, 2019). Jacqueline Heijmen Bennett-Leaver (2020) also documented CRCC in *Parancistrus nudiventris*.

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# Egg and fry comparison of *Corydoras* CW111 and CW146

Steve Grant



Adult males of *Corydoras* CW111 (l). Image by Kdn Wong. *Corydoras* CW146 (r). Image by Erik Johansen

Most keepers of Corydoradinae catfishes will be familiar with the Zebra / Zebrina / Vulcan / Bonita *Corydoras*, which thankfully has the code number CW111. There is a very similarly patterned phenotype which has the code CW146. It is not clear at this stage if these represent colour variations of the same species. Dr Luiz F. C. Tencatt and his colleagues are working with wild specimens collected on a trip funded by donations from aquarists (see Grant, 2020).

Their export from Brazil is a sensitive subject, although it has meant that a small number of aquarists have been able to breed them both.

Whilst we wait for the scientific results the author thought it might be useful to document and compare the eggs and young from each code number. This is something Ian Fuller (1983) did many years ago, to show differences in the fry of *C. rabauti* and *C. zygatus* and he has been doing it ever since (Fuller, 2012). Thanks to Kdn Wong and Erik Johansen we can compare some similar ages of eggs, fry and juveniles.



CW111 eggs on imitation tree root. Kdn Wong



CW146 eggs on plant leaf. Erik Johansen





CW111 eggs stained with tannins for egg preservation.  
Kdn Wong



CW146 eggs stained with tannins for egg preservation. Erik Johansen



CW111 fry 1-week-old. Kdn Wong



CW146 fry 1-day-old. Erik Johansen



CW111 fry 3-weeks-old. Kdn Wong (no corresponding CW146 image)



CW111 juvenile 6-weeks-old. Kdn Wong



CW146 juvenile 6-weeks-old. Erik Johansen



CW111 juvenile approx. 9-weeks-old. Kdn Wong



CW146 juvenile 8-weeks-old. Erik Johansen



CW111 juvenile approx. 20-weeks-old. Kdn Wong



CW146 juvenile 16-weeks-old. Erik Johansen

The images and correspondence from the two breeders show that in the groups of fishes they have reared and spawned (more than once), the difference that can be seen in adults of the two code numbers is consistently repeated in the

juveniles. The adult pattern seems to be set at around 8 weeks old.

Whether this has any taxonomic value is not known at this stage.

### Acknowledgements

Thanks to Kdn Wong (Hong Kong) for the images and information on CW111, and Erik Johansen (Norway) for the same for CW146.

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# Possible first record of live *Bagrichthys vaillantii* (Popta, 1906) (Bagridae)

Cameron Laufman and Steven Grant



*Bagrichthys vaillantii* ? Male 13cm SL. Cameron Laufman

## Cameron Laufman

I'm a long-time catfish fancier and my good friend Steve Lundblad at the Cichlid Exchange in Portland, Oregon asked me to look at a shipment of *Bagrichthys* Bleeker, 1857 from Indonesia that were imported as *B. macracanthus* (Bleeker, 1854) but didn't look quite right. As I peered into the tank, I noticed that while badly beaten from shipping they lacked the distinctive white lateral stripe of *B. macracanthus*.



*Bagrichthys macracanthus*. Haakon Haagensen

After sitting and staring for a while and doing a quick dive through Google Scholar, along with confirmation they came from Indonesia I figured they were something weird but wasn't sure what. *Bagrichthys vaillantii* (Popta, 1906) seems to be the phantom of the genus in the hobby and as I stated before the face looks wrong for the other Indonesian *Bagrichthys* I could find photos for. In my tanks, they seem anecdotally to be a bit more outgoing than the *B. macracanthus* I've kept as well as the *Bagroides* I've had as well. The sheer black is exceptionally pleasing to the eye and they've taken to captive life with aplomb. I am excited for them to heal up and show their full potential, and hoping they're less full of conspecific hatred than other *Bagrichthys*, but I'm not holding my breath. Steve Lundblad imported *B. majusculus* Ng, 2002 before and behaviourally they seemed to be pretty similar. I was pleased to find them tremendously easy to sex, though to be honest I've never really attempted to sex the genus. The male papilla seems to vary in size quite a bit despite similar body size of individuals for some



reason. The males also have longer and thicker maxillary and nasal barbels. The batch received numbered about 40 fish; all beat up and at a quick glance, more male than female.



Males have thick and long nasal and maxillary barbels. Cameron Laufman



Females have thinner and shorter nasal and maxillary barbels. Cameron Laufman



Underside of male showing genital papilla. Cameron Laufman



Underside of female showing genital area. Cameron Laufman

Whilst trying to manoeuvre the fish in the photo tank I noticed that the fish used their pelvic fins against the substrate to sort of 'hop back' (punt) when they couldn't swim forward, which I haven't noticed in any of my *B. macracanthus* over the years. Currently they are all in tap water with a pH of about 7.0, maybe a tad lower or higher in each tank. Temperatures in the various tanks range from 75 to 78 degrees Fahrenheit. All are eating Hikari frozen bloodworms and Sera Vipagran with rice worms mixed in occasionally. Tankmates include *Dawkinsia rubrotincta*, several *Ancistrus triradiatus*, and a smattering of other catfish such as *Notoglanidium macrostoma*, *Heteropneustes fossilis*, *Kryptopterus macrocephalus*, *Mystus falcarius* and a few others until I get them into larger, more permanent housing for each. I haven't noticed any aggression so far, and the ones still at the wholesaler seem to have calmed down a bit as well, with less violent beatings and some healing.



Smaller male specimen 10cm SL. Cameron Laufman

### Steve Grant

If these catfishes are from Indonesian waters, that narrows the possible species down to *Bagrichthys hypselopterus* (Bleeker, 1852); *B. macracanthus* (Bleeker, 1854); *B. macropterus* (Bleeker, 1854); *B. micranodus* Roberts, 1989;

and *B. vaillantii* (Popta, 1906). Based on the key in Linder & Ng (2002) and the information in Ng (2000) these specimens appear to be *B. vaillantii* due to a combination of relatively steep dorsal profile, straight inner and outer mandibular barbels, relatively short dorsal fin spine, and no white line across the midline of the body.



Female specimen 12cm SL. Cameron Laufman

The only difference one can see is that Ng (2000) states that in preserved specimens the colour pattern is “dorsolateral surface of head and body almost uniformly brown, with very faint lighter-coloured bands located on sides of body below anterior part of adipose fin base and on caudal peduncle. Ventral surfaces paler. Fins hyaline.” However, these specimens are alive and we know that once adult *Bagrichthys* have been in an aquarium for some time, they can lose any pale vertical or diagonal body bands that can be seen when freshly caught in the wild and in juveniles. This could also account for the fins darkening up too. One of the larger males does show a faint diagonal body band.



Juvenile *B. macracanthus*. Muhammad Rasul Abdullah Halim

To the author’s best knowledge *B. vaillantii* has so far not been depicted alive and if these are that species this is a welcome record for aquarium and scientific literature. If they are *B. vaillantii* it means the specimens are from the Mahakam River basin, East Kalimantan. The type locality was “Tepoe”, edges of Mahakam River. Kottelat (2013) approximates that as Tring (0°04'10"S 115°38'40"E) but looking at the

map of the collector of the holotype Nieuwenhuis (1898), it could possibly be “Teba”, now Teluk Tebaq (0°06'11.1"N 115°30'33.3"E) although that is a longer journey up the river than quoted from Nieuwenhuis in Kottelat (2013).



Underside of mouth. Cameron Laufman

## Acknowledgements

Haakon Haagensen and Muhammad Rasul Abdullah Halim for the use of their photographs.

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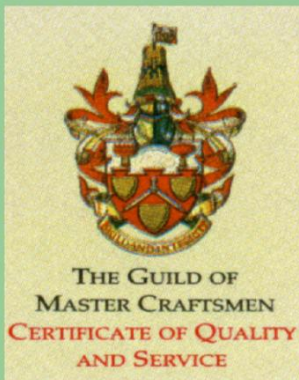
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