Journal of the Catfish Study Group

June 2019 Volume 20, Issue 2

In this Edition: Description of a new Corydoradinae; Colour changing Loricariidae; Gold and Silver Corydoras

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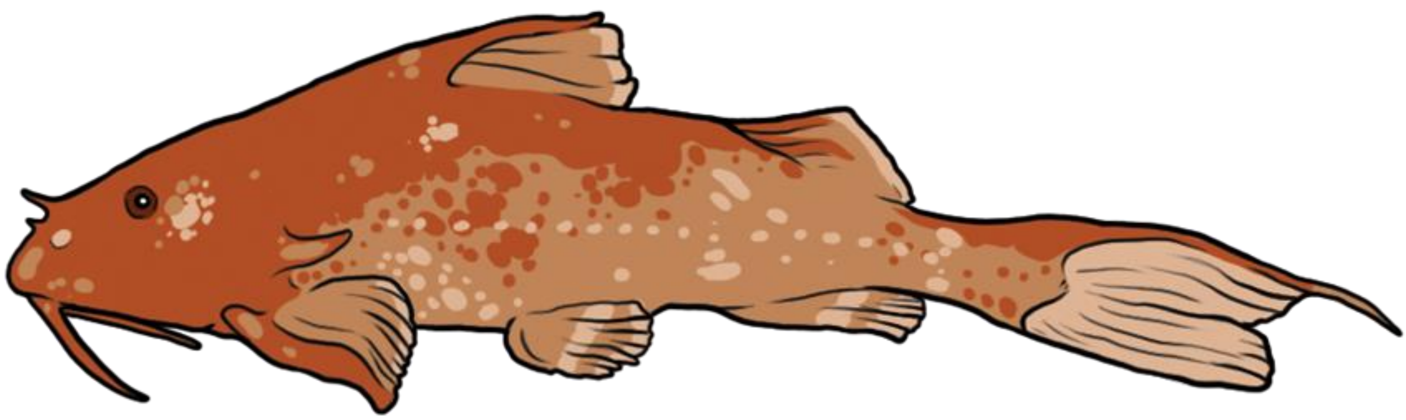
Contents

Cover image: *Corydoras granti*. Photo: Mark Walters

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



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Chairman's Report

The time following the convention is a welcome opportunity to catch breath and relax for a few months. Its not long though before deadlines start approaching to get ready for the next round of CSG activity. I expect I feel it more than most having acquired more committee responsibilities than I expected, but there is small hard working team behind the scenes assisting with the decision making and delivery who we should all be grateful for!

If any other members would like to get involved in the running and organisation of the club and its activities please get in touch, there are committee and assistant committee positions which can be carried out locally or remotely.

The big news is confirmation of our speaker line up for the 2020 Convention. You can find the promotional poster in the Journal, or on our Facebook site if you want to share the information further. The speakers include familiar faces and some new aquatic talent which the CSG is always keen to nurture.

Tha announcements of the Convention details was tainted with the sad news of two CSG regulars who will be fndly remembered and sadly missed. I have shared the sentiments below as I posted on our Facebook site.

John Hetherington

John was a familiar and friendly face on the show circuit, with a keen interest in Aspidoras. John is accredited with fixing the gold *Aspidoras* in the hobby after discovering a few gold fry among his C125 offspring.

John will be sadly missed by anyone who knew him. The CSG Committee's thoughts are with John's family and friends at this sad time.

John's close friend Bernard O'Neill remembers - 'John was a very knowledgeable but unassuming aquarist widely respected in aquatic circles. I never failed to be amazed at his knowledge, skills and ingenuity. John, Janet and I travelled the North to fish events and I shall miss him as a very dear friend.'


John Hetherington receiving awards at a CSG show

Keith Myers

Keith and his wife Bonnie were regulars at CSG events sharing some of the best quality Yorkshire bred catfish at ours auctions I have ever seen.

Keith was an amazing aquarist churning out countless rare catfish including *Corydoras weitzmani*, *eques*, *duplicareous*, sp. black, *Scleromystax barbatus*, *Aspidoras*, *Ancistrus* L183, L184 and other non-catfish species including hillstream suckers. I have a few groups of Keith's fish in my tanks, as will many of you.

I travelled over to their house in East Hull about 8 years ago with my kids to pick up some surplus tanks and was overwhelmed with their kindness and hospitality to my boys.

I picked up some great tips on breeding and feeding the countless young fish in his tanks whilst I visited. I was also pleased to receive a monster cucumber at each of our September show and auctions, home grown to feed to my plecos!

I am sure you will all have your find memories of John and Keith, who were two of the best fish keepers and breeders in the North of England.

Mark chairman@catfishstudygroup.org

CATFISH STUDY GROUP

Kilhey Court Hotel,
Wigan, UK

Description of a new Corydoradinae catfish

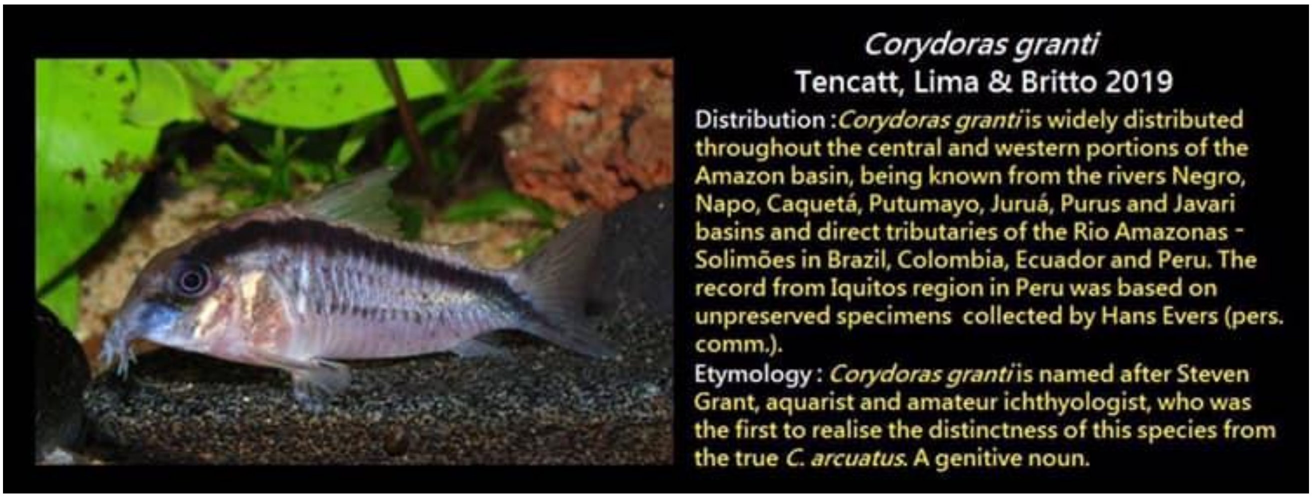
Corydoras granti, Tencatt, Lima, Britto 2019

Whilst we are quite used to the pleasingly regular description of new catfish species, the naming of a fish after a living aquarist is not so common. Even less-so the naming of a fish after an aquarist, rather than a professional scientist.

The honour is even more pleasing when it is bestowed on one of the CSG's longest standing members who contributes so much to the furthering of the study of catfish, and is a great friend to me and many other people involved in the catfish world.

I'm sure that unless you had been locked in a room devoid of contact with the outside world you will have already heard the news that Steven Grant has been forever immortalised following the work he did to identify that a relatively common fish we knew in the hobby had been incorrectly named, or at least lumped in with another obviously different species based on their differing morphologies.

The result is the scientific work of the last few years by Luiz Tencatt and colleagues who described *Corydoras granti* (formerly C020) as distinct from *Corydoras arcuatus* in a recent paper. The Catfish Study Group provided financial support to Luiz during his visit to British Museum of Natural History. The paper is highlighted below in the image and abstract:

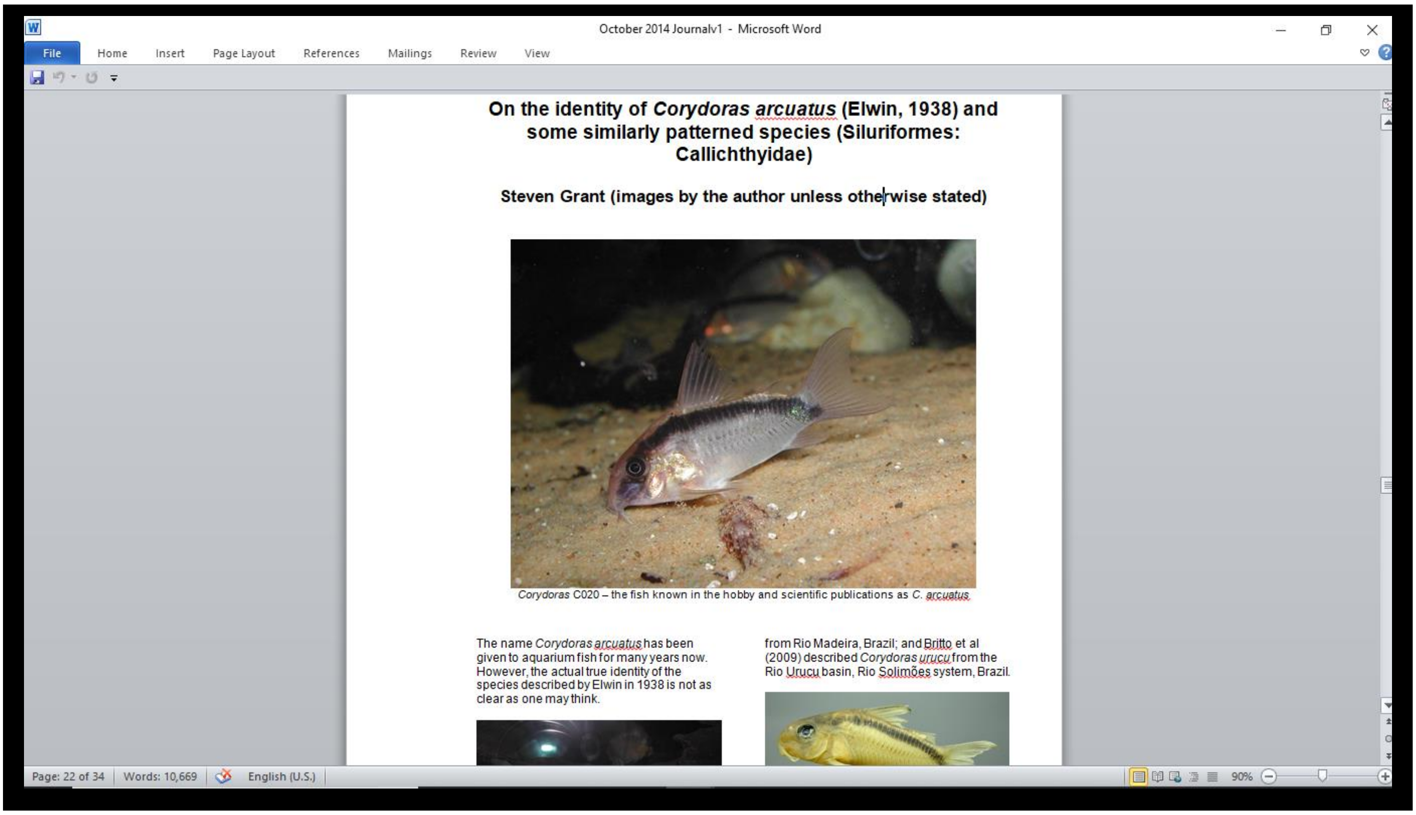


'After 80 years of misidentifications, the analysis of the holotype of Corydoras arcuatus plus several non-type specimens attributed to this species allowed its recognition and also revealed a new species, both sharing the following diagnostic features: a long, arched, continuous black stripe that runs parallel to the dorsal profile of the body and extends at least from the anterior margin of the first dorsolateral body plate to the posterior portion of caudal peduncle; absence of transverse black bars on caudal fin; infraorbital 2 in contact with sphenotic and compound pterotic.

In addition to these features, C. arcuatus can be distinguished from congeners by having the posterior margin of both dorsal and pectoral spines with laminar serrations directed towards their origins.

The new species can be additionally distinguished from its congeners by presenting the following combination of features: ventral surface of trunk entirely or partially covered by relatively large and coalescent platelets; absence of spots or blotches on dorsal fin; and posterior margin of both dorsal and pectoral spines with serrations directed towards their tips. Finally, an identification key to all arc-striped species of Corydoras is provided.'

The work was initiated in response to an article Steve produced for the CSG Journal back in 2014, (image below) and can be accessed from our website.



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On the identity of *Corydoras arcuatus* (Elwin, 1938) and some similarly patterned species (Siluriformes: Callichthyidae)

Steven Grant (images by the author unless otherwise stated)

Corydoras C020 – the fish known in the hobby and scientific publications as *C. arcuatus*.

The name *Corydoras arcuatus* has been given to aquarium fish for many years now. However, the actual true identity of the species described by Elwin in 1938 is not as clear as one may think.

from Rio Madeira, Brazil; and Britto et al (2009) described *Corydoras urucu* from the Rio Urucu basin, Rio Solimões system, Brazil.

Page: 22 of 34 Words: 10,669 English (U.S.) 90%

Well done Steve for joining the ranks of the few, the great and the good of the fishkeeping world who have been immortalised with the honour of a description!

References

Grant S. 2015. On the identity of *Corydoras arcuatus*. The Journal of the Catfish Study Group, Volume 15 issue 4

Luiz F.C. Tencatt , Flávio C.T. Lima, Marcelo R. Britto. 2019. Deconstructing an octogenarian misconception reveals the true *Corydoras arcuatus* Elwin 1938 (Siluriformes: Callichthyidae) and a new *Corydoras* species from the Amazon basin. Journal of Fish Biology. doi: 10.1111/jfb.1398

20th ANNUAL CSG OPEN SHOW…

Sunday 15th September 2019

Derwent Hall, George Street
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CATFISH STUDY GROUP OPEN SHOW RULES

Submission of an entry implies acceptance of all of the rules.

1. Fish will be judged to Catfish Study Group Show Size Guide
2. Fish will be exhibited in clear, flat-sided containers, the smallest of which will be 100mm x 100mm x 100mm. Jars will not be accepted. Exhibitors are requested to label their show tank with the Latin and/or Common name of the fish.
3. Gravel/Sand is allowed. Aeration may be used.
4. Show tanks must be of sufficient size to allow fish to swim and turn. Exhibitors may be disqualified if the fish is poorly presented, in poor or cramped conditions. Fish will not be fed on the show bench.
5. Breeders teams will consist of four fish, minimum age three months, maximum 15 months. Date of hatching and name of species must be shown on tanks.
6. Entries may not be moved, or interfered with once judging has commenced, except by order of the Judges or the Show Secretary.
7. Debenching is not allowed until the Show Secretary makes the announcement, except by prior arrangement with him.
8. The show organisers reserve the right to re-bench any fish into their appropriate class.
9. Photography of entries will be permitted after judging is completed.
10. Time will be allocated to allow viewing of the judges' decisions.
11. The Judges decisions are final. Judging sheets will be displayed in the hall.
12. Any complaints, comments, etc., should be directed to the Show Secretary.
13. No prohibited fish can be displayed or sold at CSG events e.g., Ictaluridae, *Tachysurus*, *Siluris glanis*.

Whilst every care will be taken, the Catfish Study Group will not be held responsible for the loss of or damage to fish, equipment, or persons.

Chronic Recurrent Colour Change in Hypostominae (Loricariidae)
Steve Grant

A fully morphed *Parancistrus aurantiacus* – Steve Grant

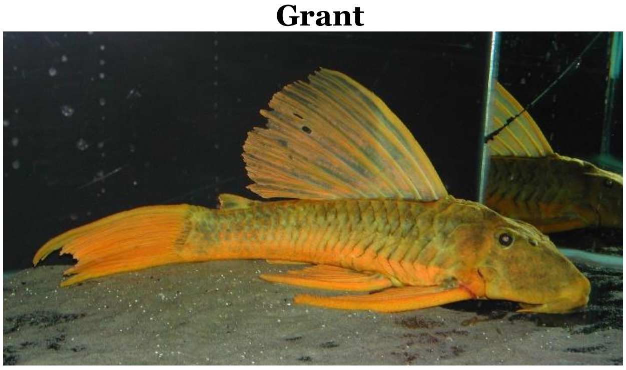
Chronic Recurrent Colour Change (CRCC) that occurs over the course of days, weeks, or months in loricariids with no apparent reason (e.g. not the common sudden reaction to changes in light/dark exposure or substrate change) is of interest to aquarists, particularly the reason for the change (Konn-Vetterlein, 2016; Deuschle, 2018). The change in question usually involves changing from dark to a yellow/white base colouration (fully or in patches) and back again. In this article the phenomenon is discussed and a hypothetical cause suggested.

Examples of colour changes in Hypostominae

The majority of loricariid species with CRCC are relatively few when compared to the number of species, but the examples known appear to mainly fall within genera of the subfamily Hypostominae i.e. *Parancistrus* Bleeker, 1862; *Hypostomus* Lacepède, 1803 (e.g. *H. luteus* (Godoy, 1980)); *Pseudacanthicus* Bleeker, 1862 (e.g. *P. spinosus* (Castelnau, 1855)); *Hypancistrus* Isbrücker & Nijssen, 1991 (e.g. *H.* cf. *debilittera*); and '*Hemiancistrus*' Kner, 1854 (e.g. *H. guahiborum* Werneke *et al*., 2005); (Konn-Vetterlein, 2016; Deuschle, 2018; author's own observations). The Hypostominae are the most distal (most recently evolved) branch of the Loricariidae subfamilies (Armbruster, 2004; Lujan *et al*., 2015; Roxo *et al*., 2019), diverging at an estimated 38 Ma. It could be coincidence that they appear to form the bulk of examples of this particular form of colour change, but this warrants further investigation as it may be linked to their relatively recent evolutionary development.

***Hypostomus luteus* beginning change – Steve Grant**

***Hypostomus luteus* part changed – Steve Grant**



***Hypostomus luteus* fully changed – Steve Grant**

The reported leucistic occurrence in *Rhinelepis* Agassiz, 1829 (Nobile *et al.*, 2016) could have been a fully morphed colour changed specimen rather than a true leucistic one, but this is speculation.

Wayne Goddard purchased a group of six adult *Hypancistrus* cf. *debilittera*. One of the six started with a yellow spot on the top of its head and over the course of three months other parts of the body turned yellow, until it became fully yellow, apart from the eye. The head and the fin spines changed first, then the rest of the fins and body. It stayed fully yellow for over a year and then changed back. It has morphed three times in total, and is currently on seven months of normal dark colouration.

***Hypancistrus sp.* before colour change - Wayne Goddard**

***Hypancistrus sp.* part changed - Wayne Goddard**

***Hypancistrus sp.* fully changed - Wayne Goddard**

The most famous example of the colour change in question in Hypostominae is that of *Parancistrus* Bleeker, 1862 because this genus has had all its described and coded species with documented examples of colour change, and also because of the occurrence rate of specimens is high (Deuschle, 2018), although it does not happen in all specimens, even those kept together.

Konn-Vetterlein (2016) described catching a fully yellow *Parancistrus nudiventris* Rapp Py-Daniel & Zuanon, 2005 in the Rio Xingu, 20km upstream from Altamira, Brazil. After a few days it showed the first bright dots and became darker overall. After ten days, it had regained its dark base colouration and was almost indistinguishable from normally coloured *P. nudiventris*. Such specimens no longer seem to be able to fully accept the normal dark colour with distinct white dots as the dots have a bright border to them and the dots become fine spots. The eye lens/iris (from now on referred to as eyes but doesn't necessarily involve the skin around the lens/iris) doesn't normally change (but the author has seen fully morphed *Parancistrus* with gold eyes). Daniel reported other specimens he had acquired as morphing full circle every five to six months, always following the same scheme. The change began on the pectoral and dorsal fin spines and spread in all directions. Daniel also discussed the breeding of *P. aurantiacus* (Castelnau, 1855) of a golden female with an almost completely golden male. All offspring, however, were dark grey and didn't change later. In another spawning of golden parent animals, the young animals began to show yellow colour accents at the age of two months, at the age of 10 months and at 60-80 mm, the golden coloration increased on a large scale and continued into adulthood.

Parancistrus nudiventris **from normal colour through to full change – Fabian Deuschle**

Parancistrus nudiventris **with dark rings around spots – Daniel Konn-Vetterlein**

Jacqueline Heijmen Bennett-Leaver is a keeper and breeder of *Parancistrus* and has confirmed that most of *P. nudiventris* that change never actually go jet black again, but stay greyish. *P.* sp. aff. *aurantiacus* (LDA046) go back to their normal colouration, and *P. aurantiacus* sometimes stay patchy. Most of Jacqueline's can turn grey when a water change is due. After the water change, they go back to bright yellow. When she catches them out of the tank and handles them, they often turn back to grey/black. She has also confirmed that both sexes and juveniles and adults can change, but not all specimens.

P. **sp. aff.** ***aurantiacus*** **35mm – Fabian Deuschle**

Chromatophores in catfishes

To try and understand the possible cause of CRCC it is necessary to understand how colours in fishes function.

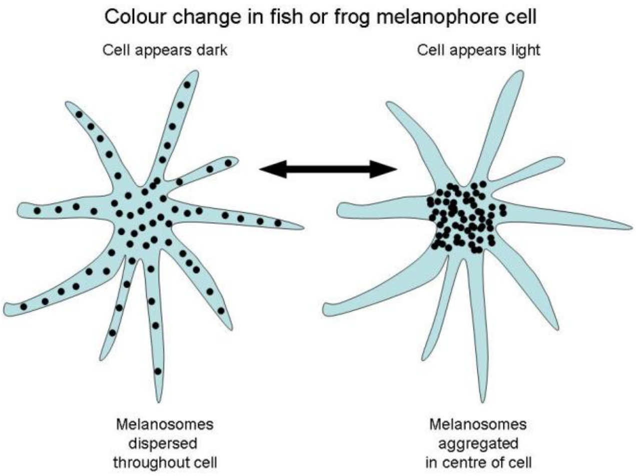
Leclercq *et al*. (2010) and Sköld *et al*. (2012) provide a detailed discussion of the structure and function of chromatophores in fishes so in the interests of brevity I will not repeat a full breakdown of them here. Ligon & McCartney (2016) provide a broad discussion of how chromatophores function and how they show different colours when light hits them.

As the colour change under discussion involves a dark and yellow/white change I will briefly discuss the three main chromatophores involved in those colours. Melanophores show black/brown colouration through melanin (specifically eumelanin) in their melanosomes; xanthophores show ocher–yellow through pteridines and sometimes caretenoids; and leucophores show white/creamy colour though purines and tend to be white light reflecting cells rather than light absorbing cells.

Garg *et al*. (2010) provide a breakdown of the structural organization and histo-cytochemical features of the dorsal skin of a member of the Hypostominae, albeit the tribe Ancistrini (*Ancistrus*). They found only "melanocytes" and

that they were distributed randomly throughout the deeper layers of the epidermis and in the dermis.
They stated that those cells were most evident as an almost continuous layer just beneath the basement membrane. In view of this finding and the fact that most of the normal base colouration for the hypostomins in question is dark, I will assume that the rest of them also have a predominance of melanophores. Ligon & McCartney (2016) also state that melanophores are the primary chromatophore involved in Morphological colour Change (MCC, see below). However, as white or yellow colours are displayed in these fishes when they change, it is likely that leucophores and/or xanthophores are also present. Ligon & McCartney (2016) state that leucophores are known to contribute to natural colour change in only a handful of vertebrates, which are predominantly teleosts, so their presence is likely, despite not being identified by Garg *et al.* (2010).

Melanophores are dendritic cells and work by dispersing or aggregating the melanin so the fish looks dark or light respectively (see figure).

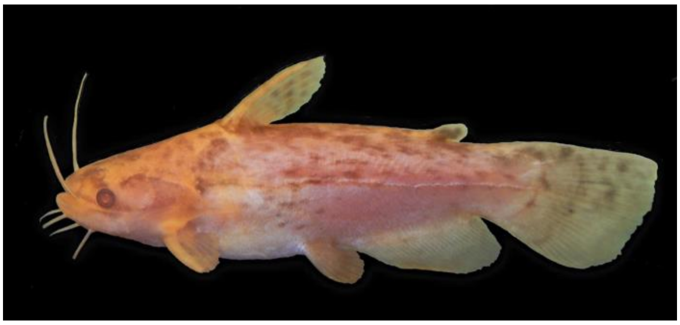


Melanin is generated in a series of catalysed chemical reactions. The key enzyme in melanin synthesis is tyrosinase. When this protein is defective, no melanin can be generated resulting in albinism (see below). Studies on *Ameiurus* catfishes found that transitory blanching/paling was caused by concentrating actions on melanophores by nerve-fibres and possibly then by some adrenaline like hormone, and darkening in consequence of the expanding action on the melanophores of dispersing autonomic nerve-fibres (possibly involving acetylcholine, a neurotransmitter) and then of intermedine pituitary hormone (identified later as Melanophore-stimulating hormone (MSH)) (Parker, 1948). Sköld *et al.* (2012) list Melanophore concentrating hormone (MCH) as being present in most fish species studied. MCH makes melanophores and erythrophores aggregate, but not xanthophores. Xanthophores also disperse and aggregate and appear to be affected by different nervous and hormonal control/substances than melanophores and independently of them (Parker, 1948; Fujii, 1969). Sköld *et al.* (2012) list six factors that can make fishes turn pale but the factors don't apply the same to all teleosts, so the different findings on melanophore control in *Danio rerio* to that in Parker by Logan et al, (2006) doesn't necessarily apply to Loricariidae. Certain chemicals can also aggregate chromatophores in fishes e.g. Potassium, Sodium and Magnesium (Fujii, 1969).

Types of malpigmentation in catfishes

'Fixed Colour Defects' (FCD)

Aberrant colouration has been documented in catfishes (Leal *et al.*, 2013; Nobile *et al.*, 2016; Slavik *et al.*, 2015; Manoel *et al.*, 2017).



Albino *Trachelyopterus teaguei* caught by Jamie Horne in Uruguay – Steve Grant

The most common forms found in fishes are albinism (a genetic disorder causing failure to synthesise the pigment melanin in the eyes and integument); leucism, sometimes called partial albinism (a defect of cell / chromatophore development causing partial loss of pigmentation, not always just melanin, resulting in white, pale, yellowish, or patchy coloration of the integument, but usually not the eyes, because the cells in the eyes have a different structure); xanthism (genetic reduction in erythrin and /or melanin and/or increase/dominance of xanthin leading to increased yellow or orange colouration); and melanism (the presence of an excessive amount of melanin resulting in dark patches or total unnatural dark coverage).

Albino *Hypancistrus* sp. L400 – Daniel Konn-Vetterlein

Albino *Hypancistrus* sp. L333 – Daniel Konn-Vetterlein

Leucistic *Synodontis* sp – Steve Grant

A recent aquarium strain of the callichthyd *Megalechis thoracata* (Valenciennes, 1840) has a white and body with a yellow (xanthophores) and blue (iridophores) sheen, with dark spots, but red eyes. This is the first example in fishes that the author is aware of with this combination of colours. The presence of some melanin may be that it is leucistic rather than albinistic, but with malformation of the colour cells of the eye. Alternatively, it could be an albino but with the melanophores responsible for the spots able to synthesise melanin, but the base colour melanophores unable to do so. This strain would make a good study subject for those interested in chromatophores.

Albino? *Megalechis thoracata* – Steve Grant

There are several documented occurrences in wild catfishes of albinism and leucism (Nobile *et al.*, 2016; Milessi *et al.*, 2013; Leclercq *et al.*, 2010), and there are numerous examples caught by aquarists and at exporters. In the wild these mutations are rare, but are more common among nocturnal or cryptic fishes as they are less susceptible to predation, increasing the chances of reaching the adult stage (Nobile *et al.*, 2016), and may also be because of the benthic existence of some species. This is what accounts for a large proportion of wild albino or leucistic catfishes, although Slavik *et al.* (2015) found that albino *Siluris glanis* were ostracised by their normal pigmented conspecifics. They stated that the motivation for the normal specimens excluding the albino from the group appears to be the avoidance of the increased predation risk that of being near an albino. Albino fish also show lower aggressiveness (Slavík, Horký, & Wackermannová, 2016). In the aquarium hobby they are more common because they are selectively bred by aquarists and are at far less risk of predation or starvation.

These conditions are generally 'fixed' in adult specimens, with little or no variation in presentation and this is because the defects that cause the issue are hereditary or environmentally (e.g. by heavy metals) caused genetic defects. The subject of this article concentrates on other types of change because of the transitory nature of it, but FCD are relevant to note, because of the effects pigment problems can have on the overall appearance of catfishes.

There is a possible third type of defect that affects colour in fishes, albeit the visual results are not 'fixed'. Rowlands (2019) discusses the 'marble' trait in domestic strains of *Betta splendens* Regan, 1910. The trait displays two main characteristics, "the ability to cause an individual fish to drastically change colour overtime, and secondly, the apparently random or untraceable inheritance patterns that the trait seems to express." Rowlands investigates the possible causes of this and shows some fascinating images where the different pigments can be seen leaching from the fish's scales turning the fish white. The normal coloration can return due to cell regrowth. Rowlands proposed that the marble trait "is a form of vitiligo, caused by the knockout/inhibition of the CTLA-4 gene by a retrotransposon". Vitiligo in humans is an idiopathic autoimmune disease (probably genetic) that results in destruction of melanocytes leading to patches of depigmentation, but the melanocytes can regrow (Birlea, 2017). Rowlands (2019) states that there are candidate genes which increase an individual's chances of developing the trait. The transposable element could lay dormant in the gene until an environmental stress or stage in development causes the T cells to become autoreactive and attack the chromatophore over time, producing the phenotype. Separate individuals react differently to environmental and genetic stresses epigenetically, which would account for the apparently random expression of the phenotype. A fish may possess the transposable element in its genotype, but never develop the phenotype, allowing the trait to be passed onto the next generation unintentionally (Rowlands, 2019), or it could be a recessive trait. Cooper (2017) found defects in melanophore survival in three colour mutants of *Danio rerio*, which could be linked to or useful in the treatment of vitiligo.

Physiological Colour Change (PCC)

PCCs are acute transient events caused by the motility of pigment vesicles or reflective structures within their cell. (Leclercq *et al.*, 2010). Ligon & McCartney (2016) state it is "the result of dynamic pigment movement of multiple chromatophores and their interactions with each other within the dermal chromatophore unit. Regulated by hormones, neurotransmitters, and even environmental cues such as light, and temperature, chromatophores undergo rapid pigment reorganisation to produce a wide array of chromatic changes. Depending on the stimulus, different chromatophore types respond with either dispersion to maximize their relative contribution to the overall colour produced, or aggregation to minimize their effect."

Primary PCC refers to the direct effect of environmental factors, such as light, on pigment migration; whereas Secondary PCC refers to the nervous and endocrine control of pigment translocation with a number of factors involved such as hormones (Leclercq *et al.*, 2010). Responses mediated by the nervous system have virtually an instantaneous effect while the endocrine control is typically visible within minutes or hours.

***Baryancistrus xanthellus* shortly before and after going onto a light surrounding – Steve Grant**

It has been proven that water temperature can have an immediate PCC in fishes (Pye, 1961 & 1964; Kulkeaw, 2011) but not all species' chromatophores react in the same way to either a low or a high temperature when compared to other species (Smith, 1928; Parker, 1948; Burton, 2006). Fishes are poikilotherms and colour change can also serve in a homeostatic capacity by helping to regulate body temperature. The vertebrates that undergo true physiological colour change (i.e., through pigment translocation rather than increased or decreased blood flow) are typically ectothermic, and are thus dependent on external sources of heat for thermoregulation. Darkening the integument increases the amount of light (and heat) absorbed, whereas a lightening of the skin increases reflected light and less heat will be absorbed (Sköld *et al.* 2012). Burton (2006) studied Winter Flounder that are adapted to cold ocean temperatures between – 1° C and + 15° C, compared to a tropical sailfin molly adapted to temperatures up to about 30° C. Melanophores from two species were physiologically adapted to function in contrasting thermal environments. Consequently, the optimum temperature for melanosome aggregation in Winter Flounder is approximately 20° C, and that of the tropical species approximately 40° C.

'Morphological Colour Change' (MCC)

By contrast with PCCs, MCCs are defined as occurring from "variations in skin pigment concentrations and in the morphology, density and distribution of chromatophores in the three-dimensional organization of the integument (Leclercq *et al*., 2010). Fujii (1969) states that MCC is a decrease or increase in either the net content of pigmentary substances or the number of pigment cells caused by stimuli. Such colour changes are comparatively slow, occurring within days and weeks, with a more fundamental and long-lasting impact on external coloration and can be separated into two categories: Ultimate MCC and Proximate MCC (Leclercq *et al*., 2010):

Ultimate MCC is "transition between two life-stages phenotypically adapted to their ancestral ecosystems such as the larvae/juvenile, juvenile/adult, immature/nuptial metamorphosis. They are often concomitant with niche-shift and related alterations e.g. feeding habit, prey/ predator relationship, abiotic characteristic of the environment and/or with a new life-stage strategy e.g. growth to reproduction."

Proximate MCC in *Tympanopleura* sp. caused by high carotenoid aquarium foods – Steve Grant

Proximate MCC is defined as "morphological modulations of a given life-stage skin colour in response to occurring variations in biotic and abiotic environmental factors". They list a number of factors that can cause Proximate MCC (and how) and categorise them further into Primary factors (nutrition, UV light) and Secondary (surrounding light, light cycle, and conspecific interactions (mainly through the melanogenic effect of stress due to subordination or territoriality)). The varying stimuli are UV radiation, food borne substances such as carotenoids, or hormones. Dong *et al.* (2012) provide a discussion on the varying causes of Proximate MCC in farmed catfishes; predominantly a change from dark to yellow or white colouration due to poor or imbalanced nutrition. However, this nutrition stimulated MCC normally affects all specimens subjected to it.

Possible causes of CRCC in Hypostominae

The permanent total body changes of very pale to dark in some species of *Panaque* Eigenmann & Eigenmann, 1889 (e.g. *P. bathyphilus* Lujan & Chamon, 2008); *Acanthicus* Agassiz, 1829 (e.g. *A. hystrix* Spix & Agassiz, 1829); and *Peckoltia* Miranda Ribeiro, 1912 (e.g. *P. pankimpuju* (Lujan & Chamon, 2008)) appear to be due to coming from deep/dark waters to lighter waters. This fits the criteria of PCC followed by Secondary Proximate MCC for cryptism/camouflage due to surrounding light changes and/or Primary Proximate MCC of photoprotection due to UV light. These examples are not the main subject of this article.

The permanent or non-recurrent total body changes in *Leporacanthicus* Isbrücker & Nijssen, 1989 (e.g. *L. triactis* Isbrücker, Nijssen & Nico, 1992); *Baryancistrus* Rapp Py-Daniel, 1989 (e.g. *B. xanthellus* Rapp Py-Daniel *et al*., 2011) discussed in Konn-Vetterlein (2016) and Deuschle (2018) are possibly PCC and/or Primary Proximate MCC based on nutrition.

Parancistrus are the ideal study genus for the phenomenon of Chronic Recurrent Colour Changes that occur over the course of days, weeks, or months with no obvious cause. The information provided by Daniel, Fabian and Jacqueline on this genus, along with the information from Wayne on *Hypancistrus*, can provide some hints towards the possible cause of CRCC.

Based on the usual overall coverage and the cycle it normally follows (starting in the fin spines or the head) of the changes it does not appear to fit the form of vitiligo identified in Rowlands (2019), but this would need further study to rule it out.

Based on the relatively long length of time taken to change, that there is no identifiable proximate acute trigger, that there is usually some long lasting malpigmention impact on the colour/pattern, and the fact that not all specimens change (small proportions) it is unlikely to be PCC.

The fact that not all specimens change leads towards ruling out MCC as the cause. Also, because both sexes and all life stages change it is unlikely to be Ultimate MCC, and if it was light, temperature nutrition stimulated Proximate MCC then it is likely that more specimens within a group would change too. Daniel has found that adult *P. aurantiacus* and *P. nudiventris* turn gold under T8 full lighting as well as without any light in his dark cellar. They are also changing colour under normal aquarium lighting conditions, but others are not. Daniel's theory is that the cause of the change is the use of high protein foods and that it is an auto-immune response. Dong et al. (2012) showed that carotenoid in natural food (algae); vitamin deficient foods; xanthophylls added to commercial foods; foods with high or insoluble or oxidised fats, can all turn naked catfishes yellow. However, wild specimens of the Hypostomins are found (some fully morphed), and Jacqueline and Wayne do not feed high protein or fatty foods and their specimens regularly change. If it was the trigger it would likely be too many carotenoids in natural or aquarium foods, but it is unlikely to be the cause in the author's opinion.

Possible cause

After effectively ruling out FCD, Vitiligo, PCC, and MCC this leaves no remaining possible documented cause. The factors that have led the author to propose a new possible cause are:

1. Specimens in the wild are affected
2. Not all specimens in a closed aquarium system are affected
3. There is no obvious trigger
4. Not all, or no young from one spawning are affected (indicating a recessive trait)
5. The change usually starts in the head and/or fins then spreads (indicating a systemic nervous or circulatory spread)
6. The main CRCC is slow (not within minutes/hours), possibly indicating humoral (hormone led) instead of neuronal (nerve led) changes
7. The melanophores are affected but apparently not leucophores and/or xanthophores
8. Some affected specimens still have some, but inhibited, control of pigment (e.g. when handled or after water changes)
9. There is sometimes some lasting malpigmentation even if the main base colour has returned

The above have led me to hypothesise that CRCC is caused by defects in the humoral system, namely the endocrine system associated with the pituitary gland. The defect appears to be a recessive trait. The defect could be in the release of the hormones that aggregate melanophores. As discussed earlier this is possibly Melanophore Concentrating Hormone. The defect could be unrelated to stimuli or a defective response to stimuli. The partial changes sometimes noticed after water changes and whilst handled could be normal neuronal PCC due to temperature drop and stress respectively, but with the normal changes unable to take place because of the hormonal defect. In the case of Xingu *Parancistrus*, the normal water temperatures are 28 or 29 Celsius in rainy season, and 32 or 33 Celsius in the dry season, with only slight drops at night (Sousa, personal communication). Therefore, a regular substantial drop in temperature associated with water changes in an aquarium would likely illicit a chromatic response.

This phenomenon needs further study by way of experiments by qualified biologists in order to prove or disprove this hypothetical cause, but hopefully readers will have a better understanding of colour changes in catfishes. If the hypothesis was proven, any links between the phenomenon and the evolutionary stage of Hypostominae could be of interest.

Acknowledgements

Thanks to Abi Rowlands for information and inspiring my research for this article; Daniel Konn-Vetterlein for images and a translation of his 2016 article; Jacqueline Heijmen Bennett-Leaver and Wayne Goddard for images and information; Fabian Deuschle for images; and Leandro Sousa for information.

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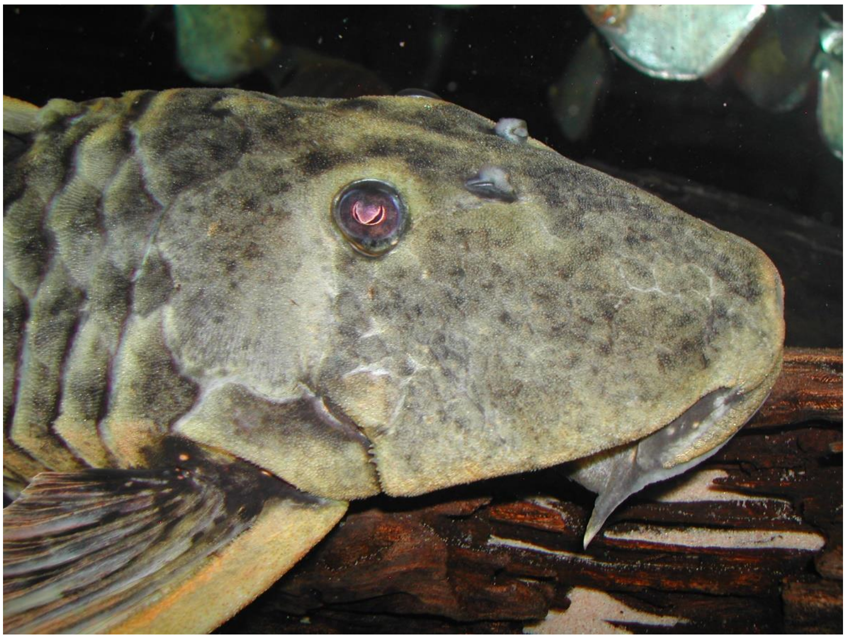
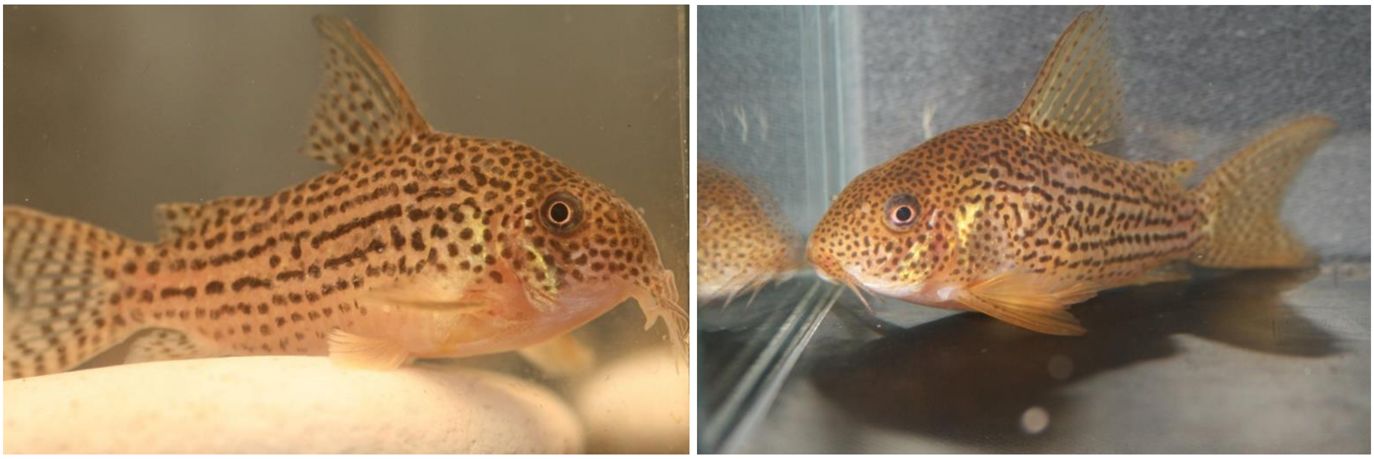


***Hypostomus luteus* part changed – Steve Grant**

Experiences with Corydoras eversi (Tencatt and Britto 2016) and *Corydoras araguaiaensis* (Sands 1989) – Gold and Silver Sister Species

Mark Walters



Left: *Corydoras araguaiaensis*; Right: *Corydoras eversi*

Corydoras eversi

Hidden in one of my tanks is a group of catfish which rarely show themselves, but when they do I tend to spend an inordinate amount of time transfixed watching them. Just another group of *Corydoras* to many people but the little 'guarana' Cory has proven to be a special fish for many catfish keepers over the years.

Commonly named after a popular South American fizzy drink who's colour resembles the golden hue of the fish, the fish received the ultimate accolade of being described to science in 2016, and was named after the main man as far as catfish publications go in the last few decades – Hans Georg-Evers.

The formal description has only added to the popularity of the species, which remains reasonably elusive for most aquarists to get their hands on.

Guarana drink and fruit

Part of the reason for the lack of availability is that they have not been imported since the first specimens were collected and brought into Europe in 1998. Indeed, all available fish are said to be derived from these specimens. Hans was directly responsible for discovering, collecting, breeding and distributing the fish. They were subsequently coded as C065.

I had been looking to get hold of some specimens for a few years, it seemed the few people who did keep them either didn't breed them very frequently or passed on their offspring through channels not open to me.

The first time I saw them available was at a Catfish Study Group meeting in Scotland where I found a bag of 2 C065's on sale at the event. A few months later, another 2 popped up at a CSG auction and I managed to successfully buy them.

Luckily, the 4 fish ended up as 2 females from Scotland and 2 males from the CSG auction – so good luck that I managed to bring them together!

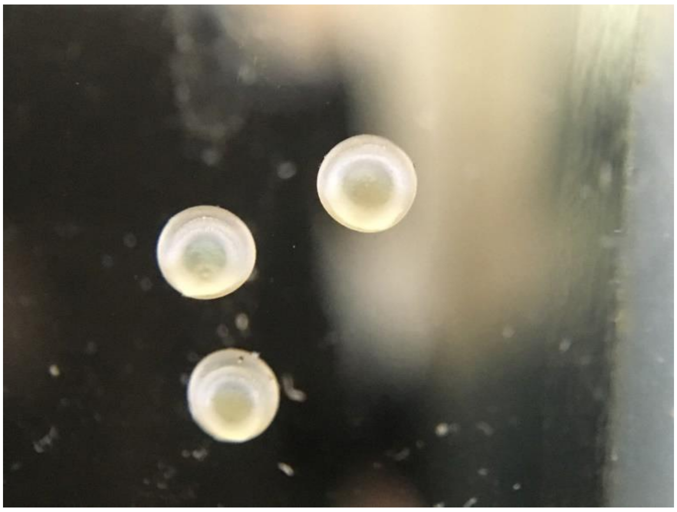
It was another 12 months before the fish had matured and 'paired-up' and in October 2017, after heavy feedings of daphnia and white worm plus a few cold water changes later I was rewarded with around 50 eggs.

Most were laid on the upturned leaves of floating *Anubias* plants, with a few on the tank sides. My usual method of hatching eggs is to carefully remove the eggs and adhere them to the side of a hatching tub with tank water and a drop of methylene blue.

The hatch rate was nearly 100% and the fry were offered microworm after 3 days. The following images show the breeding tank, egg development (days 0-4), and fry growing in the floating breeding ring.

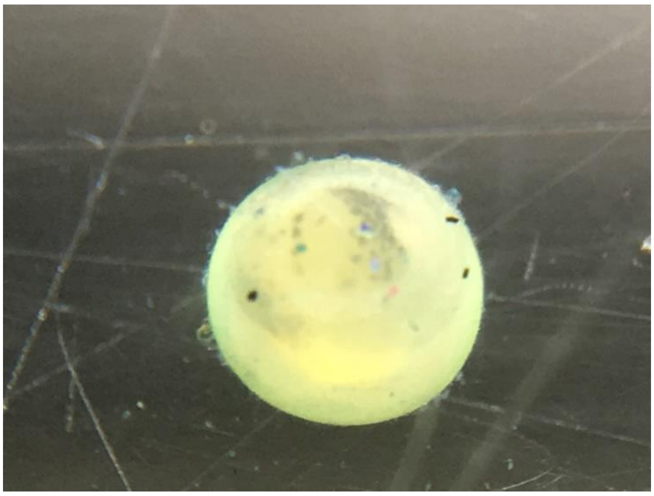

Breeding tank

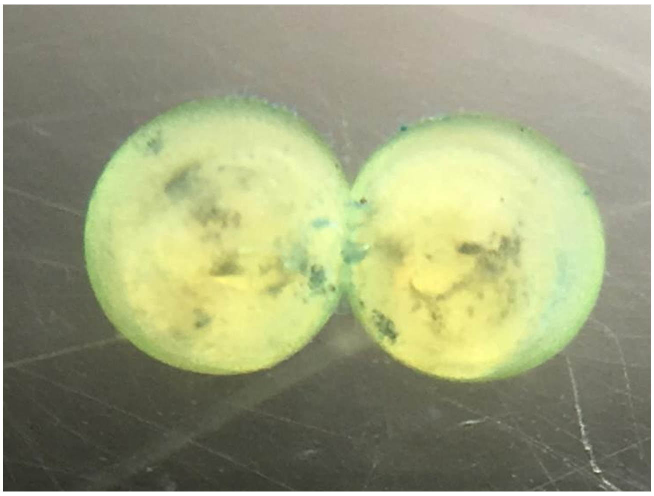

Eggs deposited on glass and in *Anubias* plants


0 day egg


1 day egg

After a week, the fry were transferred to a floating trap – the type used for raising loricariid fry with a gauze base allowing constant flow of water. I was pleased that the fry were relatively easy to raise and after around 6 months they were ready to be distributed to other aquarists at the CSG Convention. Since this time, I have had a small number of spawnings, at the same time of the year.


3 day egg


4 day egg


Fry in the floating breeding ring


1 month old *C. eversi*

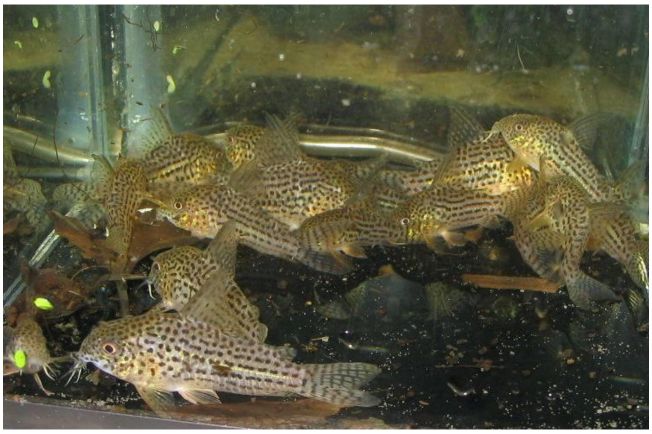

1 year old *C. eversi*

There appear now to be a good number of experienced aquarists who maintain breeding groups of *C. eversi*, hopefully securing the species in captivity. In the wild, the picture is unknown with the original collection site severely impacted by intensive agriculture.

Corydoras araguaiaensis

For some time, the guarana Cory was suspected to be a 'colour form' of another similar looking species – *Corydoras araguaiaensis*, described by former CSG president David Sands in 1989.. The fish is very similar to *C. eversi* in appearance, although the base colour is silver compared to gold. Both 'lineage 8' species originate from tributaries of the same river – the Rio Aragauia in SE Brazil.

I acquired a breeding group of wild adult fish from a fellow fish keeper over 12 years ago and shortly after introducing them to their tank they bred, produced masses of eggs. The presence of an internal power head seemed to encourage their spawning activity and eggs were deposited in the areas of heaviest water flow.


Group of *C. araguaiaensis*

Again, the fry were easy to raise and I soon had a few hundred youngsters ready to be spread around the hobby. A striking feature of the *C. araguaiaensis* youngsters is the presence of a tall dorsal filament, which reduces in appearance as the fish mature.

The function of the dorsal ribbon is not known, although it could be assumed to provide a distraction to predators when large shoals of young corys exist.

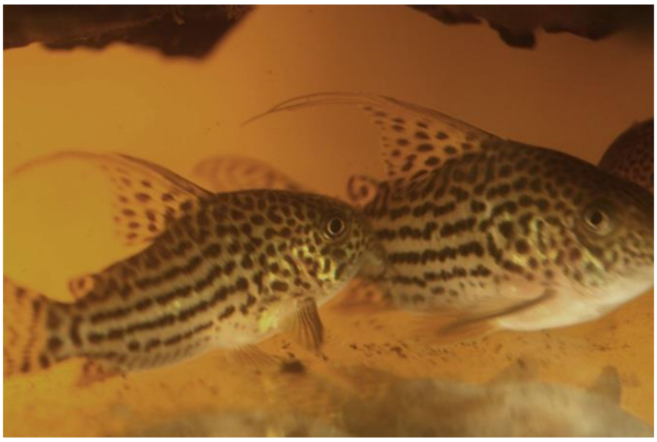


Image showing dorsal extension on *C. araguaiaensis*

Some recent correspondence on Facebook has highlighted the longevity of Corydoras, with the original breeding group of wild fish still thriving in the tanks of a fellow hobbyist. The group can be traced back over 20 years, through different fish keepers in the UK!

The species has also captured the attention of scientists who have used *Corydoras araguaiaensis* and similar species including *C. multimaculatus* and an unidentified long snouted species (see image below, from 2013 CSG Convention presentation by Martin Taylor), to describe the hypothesis around Mullerian mimicry amongst vertebrates (Alexandrou et al 2011).

Although distinct species, they share almost identical patterns which often lead to confusion in identity. *Corydoras eversi* would likely fit into the research as another example of a species sharing a pattern with this species group.

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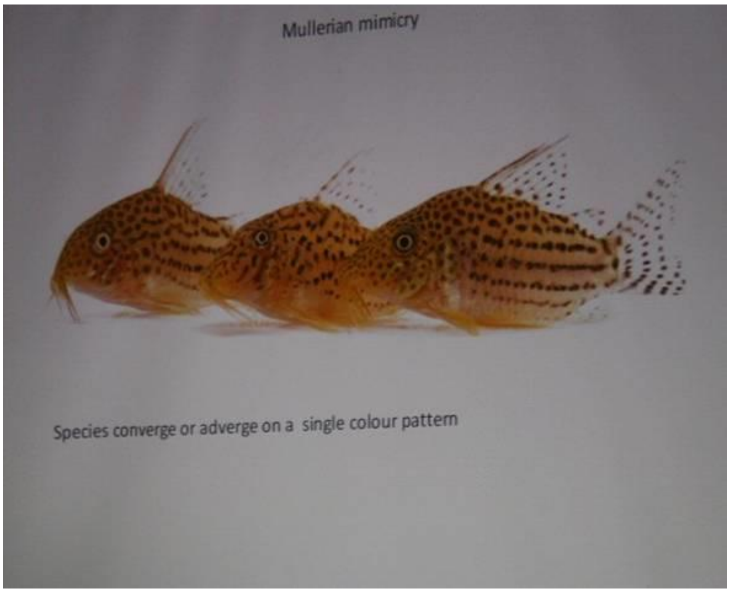


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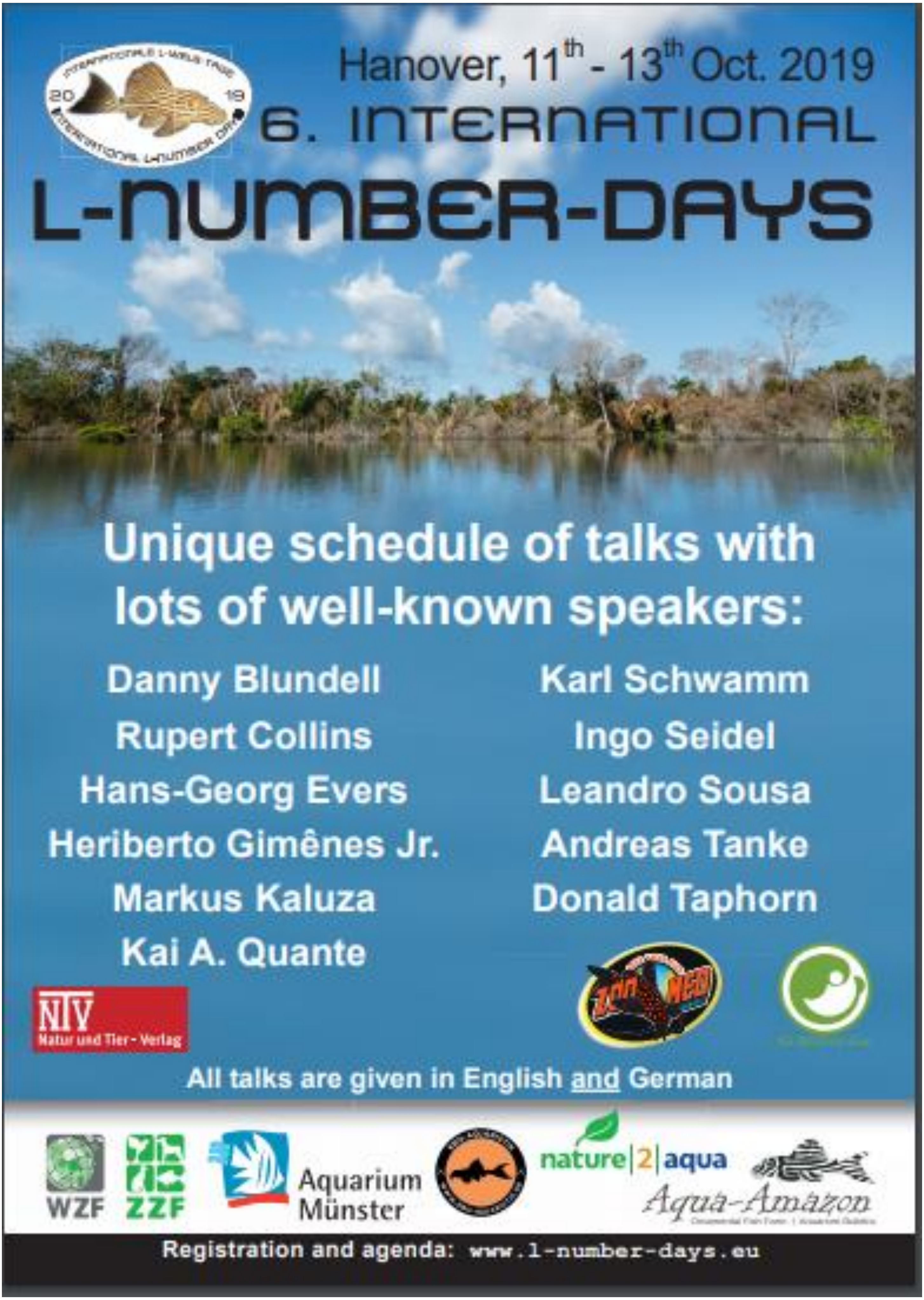

Hanover, 11th - 13th Oct. 2019
6. INTERNATIONAL
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Convention Packages

A) Convention Package "Complete":

Friday:	Dinner Buffet	(22.50 €)
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Purchased individually: 177.00 €

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Same like **Convention Package "Complete"**

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Friday:	Dinner Buffet	(22.50 €)
Saturday:	Lunch Buffet	(22.50 €)
	Coffeebreak with Cake	(7.50 €)
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Sunday:	Lunch Buffet	(22.50 €)
Misc.:	Participation Fee (all Days)	(45.00 €)
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D) Convention Package "Friday":

Friday:	Dinner Buffet	(22.50 €)
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Catfish Study Group on the Road – Pier Aquatics, Wigan, UK. June 2019

For the past three years, the CSG has extended its reach with meetings in Scotland, Wiltshire, Stoke-on Trent and Denmark. After asking where could we go in 2019, our friends at Pier Aquatics offered to host an open meeting at their amazing premises in Wigan, UK. Pier Aquatics have been long-time sponsors of the CSG and this year funded Rajanta Rahardja to travel from Indonesia and talk at the 40th CSG Convention.

The meeting followed another CSG supported event at the shop in February which was promoted by another Facebook group and proved a great success, with aquarists from across Europe coming together to talk about their hobby and the fish on display. The June meeting was as equally friendly and welcoming and everyone who attended had a great time and took home some fantastic catfish.

Thanks to Neil Woodward and his team for their amazing hospitality and continued support of the CSG and its activities. If any other clubs, groups or aquatic establishments would like to host a CSG meeting, contact: chairman@catfishstudygroup.org.

CATFISH STUDY GROUP Research Support Fund

To enhance the role that the CSG plays in supporting research into catfishes and to foster a closer relationship between scientists and aquarists, the committee is proposing a Research Support Fund (RSF) be established in 2018. The RSF will provide small sums (e.g., £500) to students and other researchers to support fieldwork, museum visits, laboratory work and page charges in peer-reviewed journals. Award recipients will agree to provide two articles for the CSG journal OR present their research at a CSG event via poster or talk. Like any new program, the RSF is a work in progress and we welcome the input of subscribing members. Email us at: secretary@catfishstudygroup.org

Where does the money come from?
RSF awards will be drawn from journal subscriptions, advertising revenue, member and corporate contributions, back issue purchases, donated auction lots and other fund-raising activities.

How often will we make awards?
We will invite applications on an annual basis in September, with the successful applicant(s) being announced via social media and at our annual convention the following March.

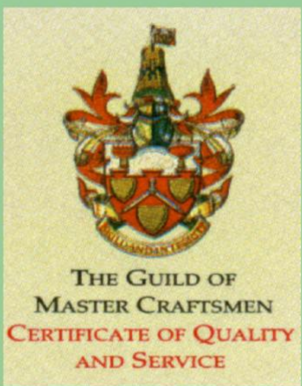
Who is eligible to apply?
Initially, we will open this to students and junior researchers. The committee discussed opening the competition to advanced aquarists, and we may try this in the future. But for now, we will invite applications from those enrolled or working with catfishes in a registered school, university, research institute or natural history museum. Applicants must be at least 18 years old at the time the award is made.

What items, services or expenses should the award be used for?
Awards will be used to offset travel costs for fieldwork (e.g., specimen collecting, museum visits or environmental measurements), equipment purchases (e.g., nets, meters, cameras, lenses, aquaria, lab consumables, software licenses, etc.), services (e.g., DNA sequencing and genome assembly, page charges in journals) and possibly the purchase of specimens (e.g., for observation, DNA samples, etc.).

What do we need in an application?
The application will involve completing an electronic form available from the CSG website. The form will include a brief description of the intended research project or trip, an itemized budget and a brief explanation for how the award will enable or enhance the work.

How will applications be judged?
The committee and invited reviewers will independently review applications and assign scores on the basis of their merit, feasibility and appeal to CSG members. Scores will be assigned, and the highest ranked application(s) will be funded in full or to the maximum amount available. None, one, or more than one application may be funded during each cycle. If no applications are received or less than the maximum amount is awarded, the RSF will transfer funds to the next cycle and increase the number or size of awards accordingly. Finally, in order to receive the award, the successful applicant must agree to provide two articles for the CSG journal describing their project, its results, and how the award helped them in their work, or a talk or poster to be presented at a future CSG event.

G.B.W
Products & Services



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