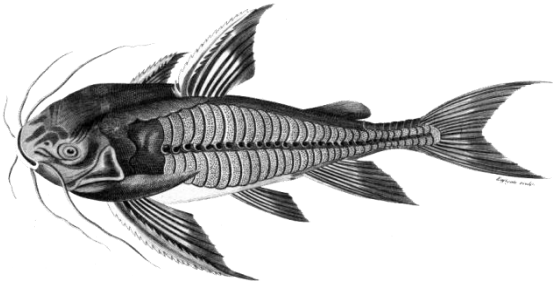
Journal of the Catfish Study Group



December 2015 Volume 16, Issue 4

Convention 2016

Fri 11th, Sat 12th & Sun 13th March

Venue

Kilhey Court Hotel
Chorley Road
Standish, Wigan
Lancs, WN1 2XN

Speakers

Dr Roberto Reis	**:**	***Brazil***
Daniel Konn-Vetterlein	**:**	***Germany***
Eric Bodrock	**:**	***USA***
Regina Spotti	**:**	***USA***
Benny Hubel Hansen	**:**	***Denmark***
CSG short programme	**:**	***4 UK Members***

Breeders award programme display,
Trade Stands, Specialist Societies, Sales Tanks

For more information go to:-
www.catfishstudygroup.org

Aqua One

PIER AQUATICS

Tetra

Contents

Cover image: *Panaque cochliodon*. Photo: M. Hardman

- The Journal of the Catfish Study Group (JCSG) is a subscription-based quarterly published by the Catfish Study Group (CSG). The journal is available in print and electronic platforms. Annual subscriptions to JCSG can be ordered and securely paid for through the CSG website (www.catfishstudygroup.org).

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- Please support the CSG by contributing original articles concerning catfishes that might be of general interest to JCSG subscribers. Word processor files (e.g., .doc, .docx) and high-resolution images (at least 300 dpi and 8.5 cms wide) can be sent as email attachments to editor@catfishstudygroup.org. If necessary, the Editor will work with contributors to structure and polish text and format images for inclusion in the journal. The Editor reserves the right to edit submitted text and images to improve flow and comply with the layout and page limits of the journal. Any manuscripts that propose taxonomic or nomenclatural changes will be forwarded to a qualified professional for evaluation.

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Editorial

Welcome to the fourth issue of our journal. The pleco-collecting season is well underway and this issue contains a boon of articles on these and other popular catfishes.

I am delighted to include an article from Luiz Tencatt, a young Brazilian ichthyologist that is coming to terms with *Corydoras*. The CSG was well represented at the L-number-days event in Hannover, and Mark Walters has contributed a detailed account of the speakers and highlights he and others enjoyed in November. Keeping with the pleco theme, I have written a review of the diversity in a genus with a great history – *Pseudacanthicus*.

As always, welcome to our new subscribers and members. Journal subscriptions help to fund group activities and events during the year, so please encourage your colleagues and friends to join the CSG and subscribe to the journal. If you have any suggestions for how to continue improving the content and format of the journal, please contact me via email.

Thanks,

Michael

editor@catfishstudygroup.org

AGM 2016

Amendments are broadly categorised as administrative "clean-ups" following a year of operating under the new constitution or as changes introduced in line with the transformational remit. The amendments are summarized here in the context of an updated constitution, and their approval will be sought at the 2016 AGM.

1. Applications for membership are made in person during CSG events or by completing an online form; the ability to join by post or email has been removed. Reference to *annual membership* has been simplified to *membership*. To avoid any confusion, the CSG Facebook group is now fully open and does not constitute membership of the CSG.

2. The concept of lay-members (i.e., committee members without portfolios) has been removed. There remains provision within the constitution to appoint assistant or vice roles in support of the principal committee positions. This is seen as sufficient provision for appointing ad-hoc "helpers".

3. The position of *President* has been retired to improve operational clarity within the committee, and the position of *Chairman* has responsibility for coordinating effort to secure sponsorship and advertisement revenue for CSG events and products (e.g., the quarterly journal).

4. The constitution currently states that the *General Secretary* will issue committee meeting dates within two weeks of the AGM. Since committee meetings now take place online, this statement is no longer required.

5. The position of *Membership Secretary* has been retired. The *IT Secretary* is now responsible for managing the online membership. The *General Secretary* has assumed responsibility of liaison between membership and the committee. The *Editor* is now the initial point of contact for subscription and back-issue related queries.

Julian Dignall *CSG General Secretary*

secretary@catfishstudygroup.org

From the depths of MZUSP: The true identity of *Corydoras flaveolus* Ihering, 1911 (Siluriformes: Callichthyidae) uncovered

By Luiz Fernando Caserta Tencatt

Fig. 1. Holotype of *Corydoras flaveolus*, MZUSP 424, 33.4 mm SL. Photo by Eduardo Baena.

In my rush to become an expert in *Corydoras*, I traveled to different museums and collections trying to examine and recognize as many species as possible. The Museu de Zoologia da Universidade de São Paulo (MZUSP) is one of the most important and beautiful (in every possible meaning of the word) museums in Brazil, harboring a huge neotropical fish collection, including many type-specimens, being thus an obligatory stop for an aspirant like me.

The fish collection is located in the basement and looks like a big maze full of knowledge and puzzles. A stroll through the same halls that were once crossed by Ihering brought me a mixture of feelings but especially honour. It is really a paradise with tons of material waiting to be explored.

The MZUSP type specimens are kept in a special room within a large tomb-like locker. I examined as many type-specimens of *Corydoras* and *Hypostomus* (my other obsession) as I could during my short stay there. One in particular perplexed me. There he was, weather-beaten but with that great magnificence only displayed by a type specimen; Ihering's *Corydoras flaveolus*. Immortal. I think it's time to return from my reverie and tell you what I found.

Corydoras flaveolus is a small-sized species described from small tributaries of the rio Piracicaba, upstream of the Salto Piracicaba in São Paulo state. Ihering mentioned that *C. flaveolus* has the dorsal surface of the anterior third densely covered with small brownish spots, a dorsal series of three dark blotches, and three to four dark blotches along the middle of the flanks. Additionally, he mentioned the presence of spots and bars on the surface of the dorsal, pectoral, adipose and caudal fins.

Many specimens captured in the rio Tietê basin have a color pattern matching Ihering's original description and have been identified as *C. flaveolus* by experts and aquarists for over a hundred years.

A recent visit to MZUSP allowed me to take a closer look at the holotype of *C. flaveolus* (fig. 1). The specimen displays some uncommon features among corydoradines: a space between the tip of the parietosupraoccipital and the nuchal plate (fig. 2); infraorbital 1 with a large ventral laminar expansion (fig. 4); infraorbital 2 with a large posterior laminar expansion contacting the sphenotic and compound pterotic (fig. 4); pectoral spine with poorly developed serrations restricted to the proximal portion of the posterior margin. The only other *Corydoras* exhibiting this combination of characters is *C. difluviatilis*, a species described from the upper Paraná and upper São Francisco river basins. In addition to morphology (fig. 3), cytogenetic and molecular sequence data indicate that *C. difluviatilis* may be a complex of species (C. Oliveira pers. comm.). Thus, a taxonomic review of *C. difluviatilis* and *C. flaveolus* is necessary to solve this puzzle.

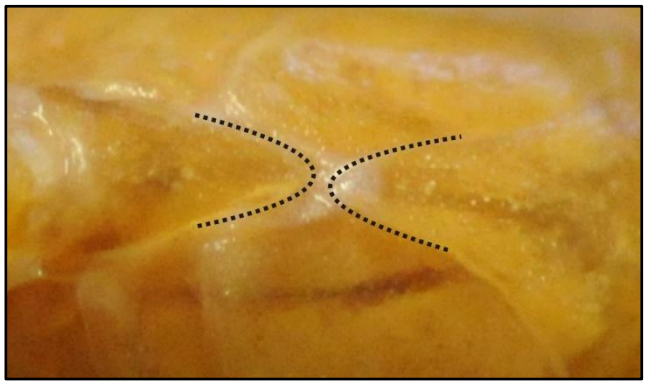


Fig. 2. Predorsal region of the holotype of *Corydoras flaveolus*, MZUSP 424, 33.4 mm SL.

Although *C. difluviatilis* has never been recorded from the rio Tietê basin, there are two samples collected in the upper rio Paraná basin. This area – Araras, São Paulo State – is drained by tributaries of the rio Paraná and of the rio Piracicaba (itself a tributary to the rio Tietê), and it is possible that in some especially wet times their headwaters can connect and allow species from both drainage basins to mix. With this in mind, we might expect to find young species in these adjacent drainage basins that may still be actively speciating. A close relationship between *C. difluviatilis* and *C. flaveolus* would be an example of this phenomenon, and offer a great

Fig. 3. Morphologic and colour pattern variation in *Corydoras difluviatilis*. (a) Holotype of *Corydoras difluviatilis*, 39.8 mm SL, showing the typical pattern of the species, (b) DZSJRP 9079, 39.1 mm SL, (c) MCP 47193, 37.9 mm SL, (d) MCP 28338, 32.1 mm SL, (e) NUP 1105, 37.3 mm SL e (f) DZSJRP 8674, 36.7 mm SL, showing the variation in atypical populations. Photos by Celso Ikedo

opportunity to study evolution in action!

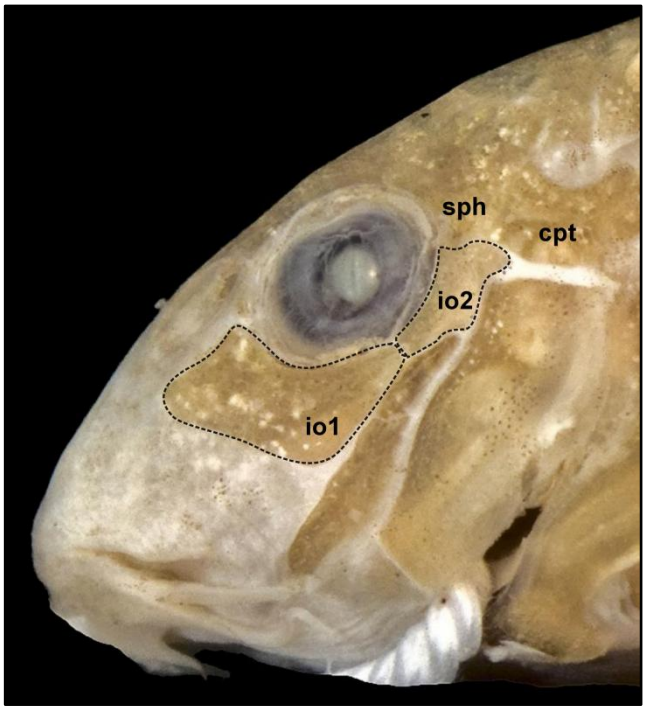


Fig. 4. Predorsal region of the holotype of *Corydoras flaveolus*, MZUSP 424, 33.4 mm SL.

Some specimens attributed to *C. flaveolus* (fig. 6A) have characters that are at odds with those that diagnose the species, i.e., a contact between the tip of the parietosupraoccipital and the nuchal plate; infraorbital 1 with moderately developed ventral laminar expansion (fig. 6B); infraorbital 2 with small posterior laminar expansion, only contacting the sphenotic (fig.6B); pectoral spine with well developed serrations along its entire posterior margin (fig. 6C). As such, these specimens represent a different and possibly new species more similar to *C. lacrimostigmata* (fig. 5), another species from the upper rio Paraná.

Many of the ichthyologists that work in the rio Tietê basin know that no specimens assignable to *C. difluviatilis* were ever captured there; a notion supported by the MZUSP collection. However, Ihering stated that the type locality of *C. flaveolus* is "small tributaries to the rio Piracicaba upstream of the Salto (= Salto Piracicaba); São Paulo State". Above the Salto Piracicaba, the rio Piracicaba splits frequently into a vast network of small tributaries.

Fig. 5. Topotype of *Corydoras lacrimostigmata* photographed in life. Photo by Marco Antônio Deprá.

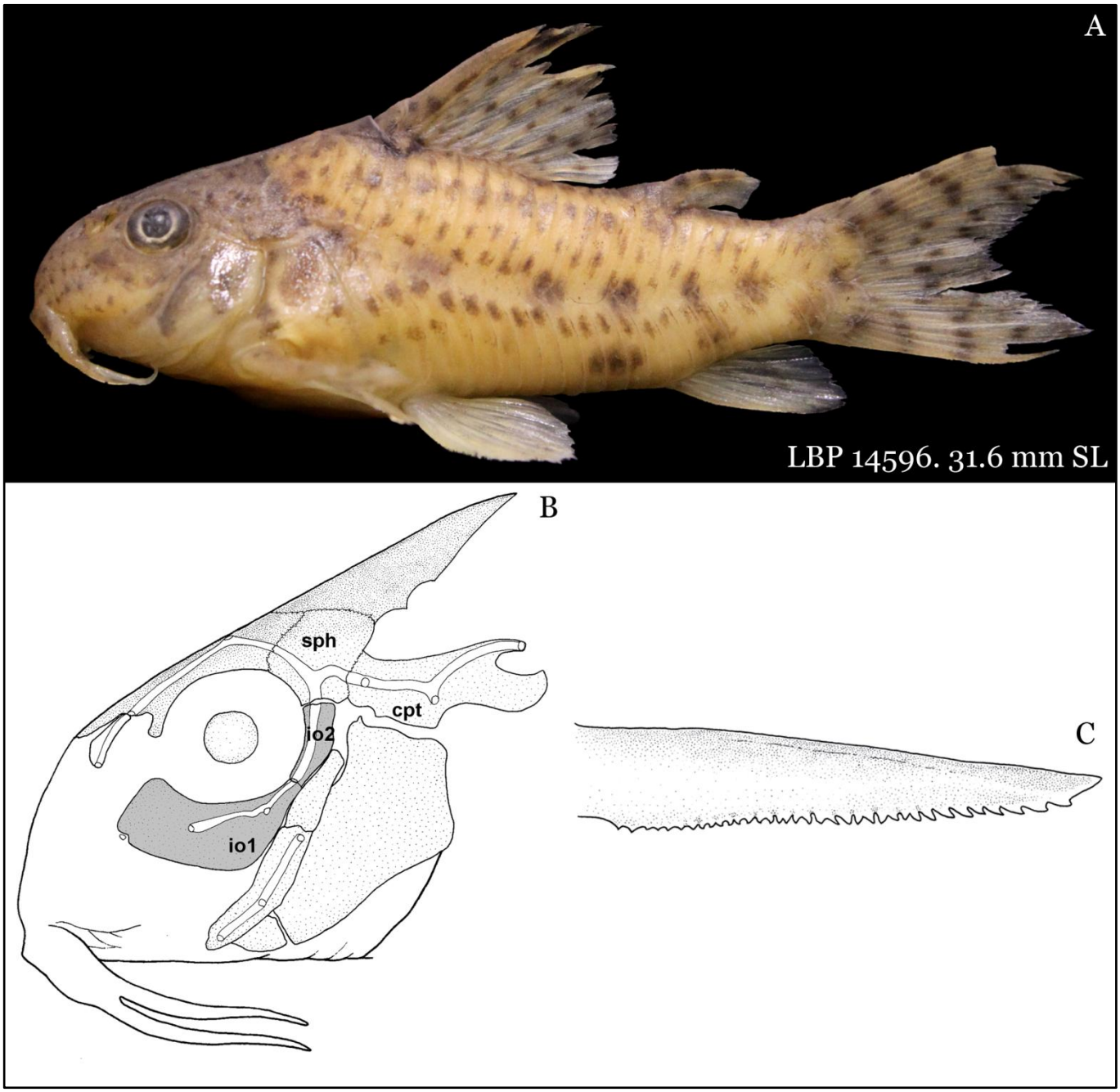


Fig. 5. Specimen currently identified as *Corydoras flaveolus*, LBP 14596, 31.6 mm SL. Photo from Tencatt *et al.* (2014a: 93, fig. 4).

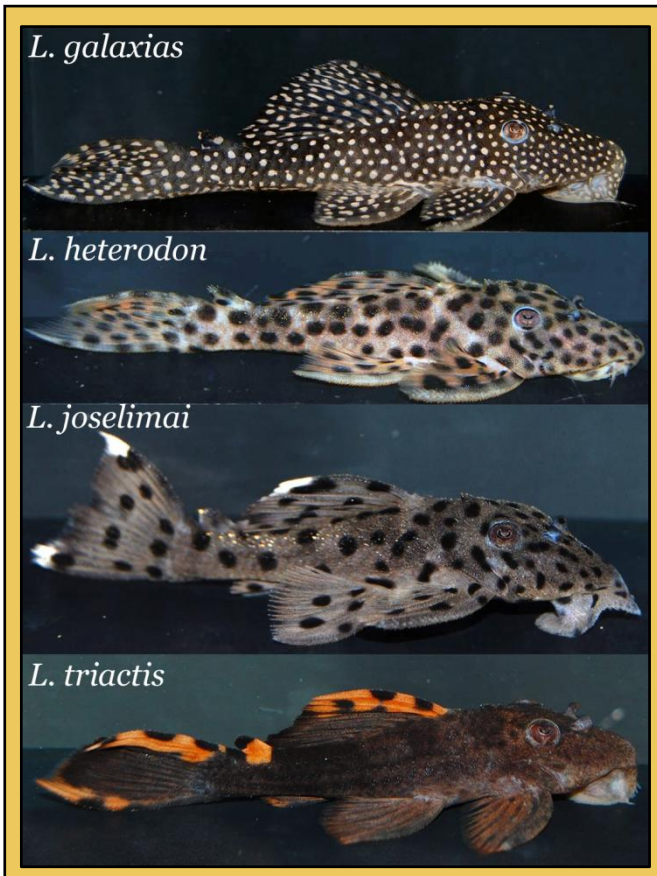
The absence of specimens identifiable as *C. difluviatilis* from the rio Piracicaba basin does not necessarily mean the species does not occur there. Another important point is that some tributaries of the rio Grande, mainly from the rio Mogi-Guaçu (= Mojiguaçu, Moji-Guaçu) where *C. difluviatilis* is a very common species, are very close to the headwaters of the rio Piracicaba basin. Thus, there is a chance that the actual location where the holotype of *C. flaveolus* was captured belonged to the rio Grande basin rather than the rio Piracicaba.

Acknowledgments

The Núcleo de Pesquisas em Limnologia, Ictiologia e Aquicultura (Nupélia) of the Universidade Estadual de Maringá and the Laboratório de Zoologia da Universidade Federal de Mato Grosso do Sul provided logistical support. I am also grateful to my mentors Carla S. Pavanelli, Marcelo R. Britto and Flávio C. T. Lima for all their teachings. To Weferson J. da Graça and Claudimar J. dos Santos by join me in this hard task. The Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) provided fellowships to LFCT (process #141061/2014-6).

UK Import roundup

A selection of new or rare catfishes recently imported to the UK.



Leporacanthicus. Photo: Pier Aquatics

The pleco season is well underway, and importers are enjoying longer lists of these perennial favourites. In the June issue of the CSG journal, we featured a review of the taxonomy and care of the vampire plecos, *Leporacanthicus*.

All four species are now available, so those of you that are taken by this fascinating group of meat-eating plecos should check out your local dealers. Or better still, our main convention sponsor (pieraquatics.com) has all four species under one roof and vast experience as an importer of these and other catfishes over the past 20 years.

Vampire plecos need large, clean, turbulent aquaria and a diet containing lots of shellfish and animal protein. They spawn in cavities like other plecos, but can be aggressive towards other plecos and especially their own species.

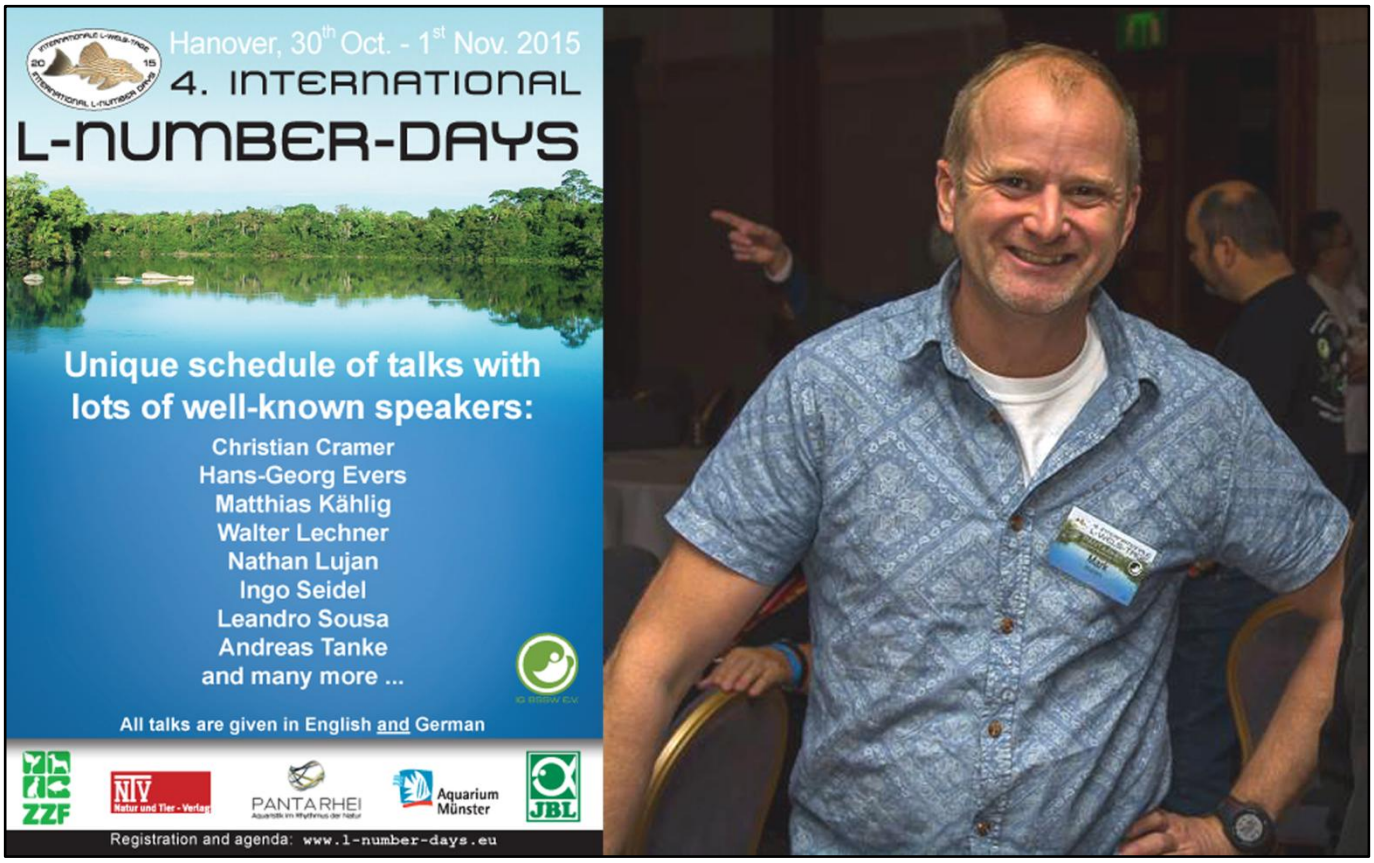
Megalancistrus sp. Photo: Pier Aquatics

As the name implies, *Megalancistrus* are among the largest plecos, reaching at least 60 cms. These are close relatives of *Acanthicus* and *Pseudacanthicus*, but are found in more southerly basins of South America (e.g., Parana, Paraguay, Uruguay and Sao Francisco).

These plecos need large aquaria, but acclimate to life in captivity very well, feeding on most fresh and prepared foods.

4th International L-number Days: 29 Oct–02 Nov 2015

By Mark Walters



I had looked on in awe at previous conventions held in Germany discussing my favourite group of fish, but had always considered it to be out of reach geographically and from a financial perspective! Host Andreas Tanke had piled on the pressure, along with numerous European fishkeeping friends who had come to the CSG Convention year after year. I felt almost embarrassed to refuse the hospitality they offered and when my wife supported my obvious yearning to go I started to make arrangements. I found the whole package of arranging plane tickets, hotel accommodation and convention tickets to be surprisingly affordable, although waiting to book my flights three weeks before the event meant I probably didn't get the best deals available!

I bumped into a posse of five UK-based catfish enthusiasts at the airport in Hanover. We reached the convention centre on the Thursday night and got stuck into serious catfish discussions with the organisers and delegates who couldn't wait for the official opening on Friday evening!

Panta Rhei Aquarium

Andreas and his team had thought about those arriving early and arranged a meeting on the Friday at Panta Rhei, a local aquarium store that rivals many public aquaria with beautiful biotope sales tanks. The thing that really gets the Panta Rhei staff excited though is flow dynamics and attempting to create the perfect flow environment for aquarium fish. Hence the numerous aquaria dedicated to different flow scenarios using a variety of internal and external pumps and filters.

Suffice it to say, the fish on offer were exceptional quality including many rare Loricariidae and other unusual catfish. The team at Panta Rhei were very happy to provide information, knowing the catch locations of most of the fish on offer. The owner of Panta Rhei, Matthias Kahlig, presented his research as

the last talk at the convention and gave us plenty of ideas for our own aquaria.

Friday night

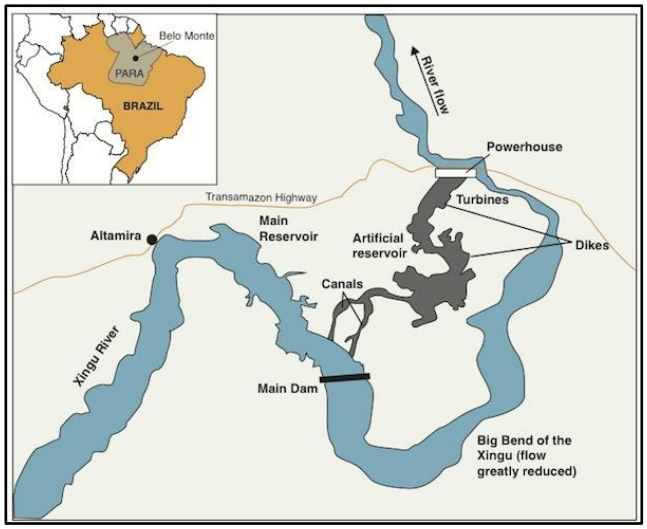
Back at the convention, 170 delegates were booking in, receiving their convention packs and donning their L-Welse 2015 T-shirts. Colour coded for speakers, facilitators, interpreters and of course our masters of ceremony, Andi and Ingo Seidel, in special red shirts. They made great hosts entertaining us with their banter and slick presentation skills! Themes for the weekend were exactly the mix I hoped for, and I'm sure other delegates felt the same way. Specialist talks on wood-eaters (*Panaque* group), *Hypancistrus*, *Pseudacanthicus*, Rio Orinoco species, Peruvian species, Brazilian river systems, large- and small-scale aquaculture and breeding reports on some very desirable L numbers. All talks were presented in German and English, with Andi, Ingo, Hans-Georg Evers and Daniel Konn Vetterlein provided the translations and some of the most entertaining moments of the weekend!

Redmen: Andreas Tanke (left) and Ingo Seidel (right) organize and host a fantastic event for catfish fans. Photo: Stefan Hetz.

Belo Monte

Leandro Sousa was first to speak on Friday night, and captivated the audience for almost two hours providing an update to the subject he presented at the 2015 CSG Convention. I didn't expect a good news story and the recent progress with the construction of the dam (and destruction of the river) has been rapid. The stretch of the río Xingu that flows from the Pimental diversion dam to the outflow of the Belo Monte hydroelectric dam is a unique series of rapids and cataracts stretching for hundreds of kilometers; the Volta Grande, or Big Bend.

The Pimental dam diverts water from above Volta Grande to fill the reservoir that drives the turbines at Belo Monte, which is then returned to the Xingu downstream of the rapids. Pimental will restrict the flow of water through the rapids, and severely dampen the high-flow pulse the rapids currently receive during the rainy season. It remains uncertain how endemic fishes adapted to life in Volta Grande will respond to the new flow regime… but few scientists think it will be positively.



Schematic of the Pimental (main) and Belo Monte (Powerhouse) dams on the río Xingu with respect to Volta Grande (Big Bend). Reproduced from Rio Times Online.

However, there are threads of hope for some ornamental species we keep which occur above and below the impact zone, but the future of *Hypancistrus zebra*, *H.* sp. L174 and a number of other well-known species is in the lap of the gods. Later talks on commercial captive breeding efforts convinced me that *H. zebra* will likely survive in captivity, but their existence in the Xingu is far from assured.

Progress with the *Hypancistrus* breeding facility on the banks of the Xingu has been significant although issues with a clean water supply are posing problems. Any thoughts of rain water harvesting from what should dependable feature of this region were placed in stark relief after learning that the region much less rainfall than expected, and climate change could cause even greater threats to this incredible river, as well as the operational efficiency of Belo Monte.

The Wood Eaters

On Saturday Ingo and Andreas introduced the phylogeny of some of their favourite plecos; the wood-munching *Panaque* and its relatives. Firstly, the log-busting *Panaque*, then the dwarf *Panaqolus,* and finally – a difficult subject for many taxonomists – the *Cochliodon* group. Despite their apparent similarities, they are three genera which that have each converged on a similar morphology. The *Panaque* being closely related to *Hemiancistrus*, *Cochliodon* to *Hypostomus,* and *Panaqolus* within a clade composed of *Peckoltia* and *Hypancistrus*!

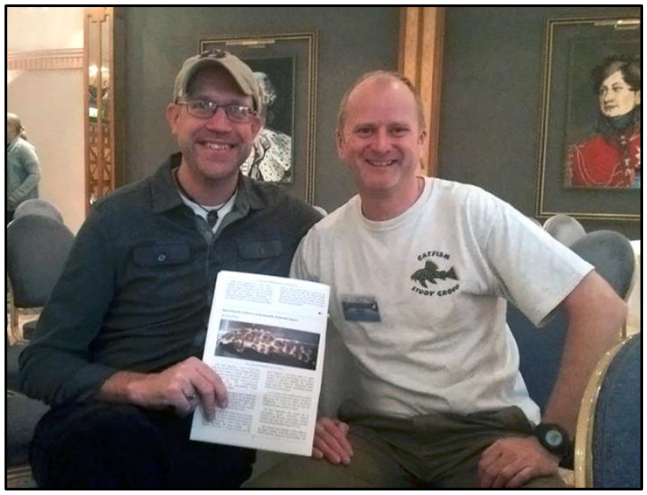
Andreas and I share a passionate interest in *Panaqolus*, a genus distributed throughout the Amazon basin showing lots of local endemism. *Panaqolus* can be split into four main groups on a morphological basis (and corroborated genetically). 1. Tiger plecs such as L169 and L002 and the attractive L397 are popular among aquarists for their vivid colouration. 2. Clown plecos including the first 'L' number kept by aquarists – *P. maccus*. 3. Lyretail *Panaqolus* (e.g., L453). 4. The black-and-white-spotted group including *P. albomaculatus* and *P. albivermis*. Diet and preferred habitats were discussed although later talks covered these aspects in even greater detail.

The 'beastie boys' were followed by another helping from Leandro, this time joined by Christian Cramer – a relative New Kid on the Block (to continue the hip hop theme!). Christian has followed the path of many ichthyologists with an early passion for fishkeeping and natural history.

Panaqolus sp. L397. Photo: S. Grant

With help from Nathan Lujan, Christian has worked to resurrect *Panaqolus*, following years of debate among scientists.

Christian presented his molecular research into the group and showed convincing support for the distinction of this group from *Panaque.* Christian has described an existing L number as *Panaqolus nix*, a very attractive spotted member of the group. Leandro and Christian also linked the Xingu theme with useful collection information and locality of *Panaqolus* sp. L398, which is also close to receiving a scientific name.



Nathan and Mark discussing the spawning report for *Panaqolus lujani*. Photo: C. Whitehead.

An Andean Adventure

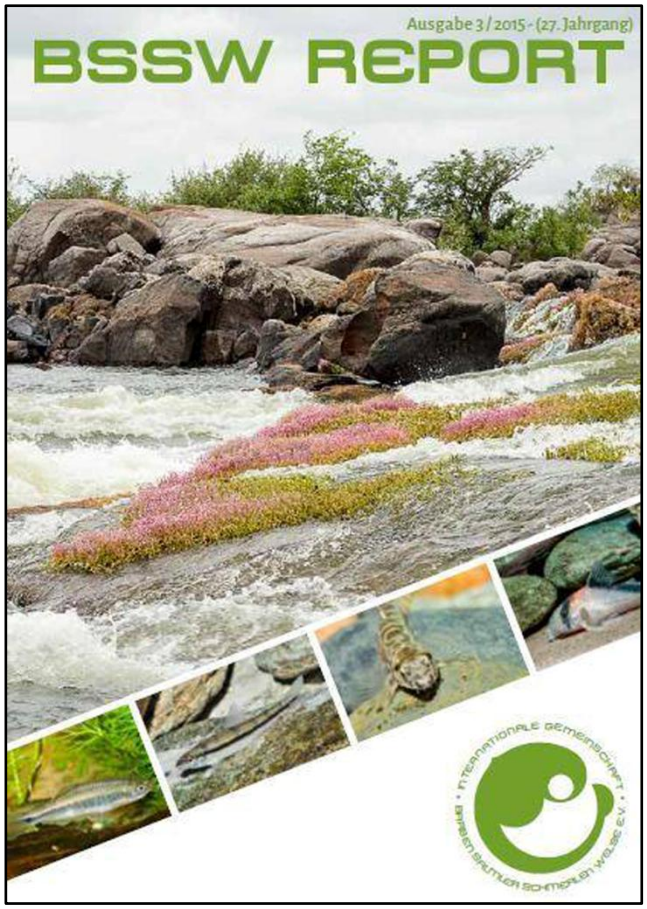
To round off a packed Saturday morning, Nathan Lujan treated us to a trip along the Andes from Bolivia, through Peru and into the Guiana Shield and introduced us to some high-altitude loricariids such as *Chaetostoma*; many which were new. Nathan's main interest concerns the impact the rise of the Andes has had on the fish fauna of the region and he explained how one species was split in two as the geological uplift caused new watersheds to form. To keep on theme, Nathan concentrated on the species which were known to ingest wood and explained how nitrogen and carbon isotopes were used to investigate how species derive nourishment from this apparently indigestible food source.

After lunch, Nathan presented his second lecture on various expeditions conducted in the Orinoco. Many L-numbers hail from here, such as L200, L128, L239 and numerous

Hypancistrus, *Peckoltia*, *Leporacanthicus*, *Pseudolithoxus* and *Ancistrus* species. Their location within the drainages is important with white, black and clear waters converging to form the Orinoco proper. Each stream system has its own species adapted to the particular chemical and physical characteristics. The Orinoco proper has a mixture of these systems, and more general species to match. Species such as *Ancistrus macropthalmus* and *Peckoltia lujani* are found in the main Orinoco drainage, useful to know in their upkeep. In addition, there are several less familiar species including the very unusual *Hypancistrus vandragti, Pseudancistrus pectegenitor* as well as upland rheophiles like *Lithoxus, Pseudolithoxus, Exastilithoxus* and *Neblinichthys*.

Nathan continued with his epic adventure and explained the geological history of the Guiana Shield and the species that occur there. One species represents the only member of its genus in Venezuela, with its closest relatives isolated over 600km to the east in Guyana, Suriname and French Guiana. The species was discovered by Nathan and named *Lithoxus jantjae*, found in torrential habitats above Salto Tencua, a waterfall in the upper Ventuari River in southern Venezuela.

Nathan described the personal nature of the description of the species: *'I named this species after my mother, Jeanne Hekman-Lujan, who was born in the Netherlands and nicknamed "Jantja" as a young girl. Just as my mother was dislocated far to the west of many of her relatives when she immigrated to the United States in 1951, the apparently disjunct distribution of this genus on opposite sides of the western Guiana Shield provides an important clue to the existence of an ancient river basin, called the proto-Berbice. The proto-Berbice may have been almost as large as the modern Orinoco River, but flowed east around the southern side of the western Guiana Shield and exited out the mouth of the modern Berbice River. Early geologic evidence for this river came from oil exploration off the coast of Guyana, where cores into the ocean floor near the mouth of the modern Berbice River indicated that a much larger river had once exited there. In 2010 I traveled further up the Ventuari River to search for more biogeographic evidence of the proto-Berbice, and in January 2016 I'm planning to visit the Ireng River in Guyana for the same reason. By combining field work throughout the western Guiana Shield with well-resolved, time-calibrated phylogenies for a broad diversity of taxa, we should be able to reconstruct the breakup history of the proto-Berbice based on relationships among the many disjunct fish populations it left behind.'*



The BSSW group supports the L-number days and produces its own magazine in German and English.

PlanetAncistrus

The final speaker of the day was Walter Lechner, and he performed a wonderful double act with his translator Daniel Konn-Vetterlein. Walter is an Austrian, who appears to have spent much of his life underwater in both marine and freshwater habitats studying bioacoustics. His research took him to the Rio Negro where he sampled many locations. Loricariid diversity appears to be limited in this river, although *Ancistrus* species are as successful here as they are elsewhere. Many of the species are

undescribed, except for the true *A. dolichopterus* – the white-seam bristlenose. The Negro is archetypal blackwater system – tannin stained and warm. In addition to *Ancistrus*, Walter presented a diverse range of Pimelodidae, Heptapteridae, Callichthyidae, Doradidae, Auchenipteridae and Cetopsidae. Other loricariids included *Dekeyseria*, *Squaliforma*, *Pterygoplichthys* as well as numerous loricariines. A very unusual catfish present in the Negro is the 'worm-like' catfish found amongst the damp leaf litter of the forest floor (*Phreatobius*). Walter shared some images of this and another no doubt new similar species which was almost amphibian in form.

Discussion Panel

After the talks were concluded, the speakers assembled as a panel to discuss how the hobby and science can work together. This subject is at the heart of my interest in catfish keeping. I started keeping fish which led to an academic interest and postgraduate study. I would have loved to have had the opportunity to continue in research but took a different career path. My hobby now gives me back the opportunity to interact with the scientific community, better understand the biology and distribution of catfish and hopefully provide some insights into their behaviour.

L-number days 2015 speakers & organizers. Photo: A. Tanke

The panel confirmed the mutual help that hobbyists and scientists can provide each other and further strengthened those ties. The same is true for both food and ornamental fish aquaculture. The talks on Sunday focused on pleco breeding at small and commercial scales.

Loricariidae Reproduction

Hans Mengshoel presented a report on his success with one of the wavy line *Hypancistrus* – L173. The species appears similar to *H. zebra*, although its bands are not uniform. A number of morphological characteristics differentiate it further from the zebra pleco, although it has a similarly low fecundity. With the profusion of wavy line types in the hobby, Hans explained that he will try to maintain the Norwegian line of this species as carefully as possible; it would be too easy for contamination to occur from other similar species which are more closely related to the L066 types. Hans has bred and raised a good number of L173, which show a fair degree of variation in the offspring with some approaching patterns more typical of *H. zebra*. The species is sympatric with *H. zebra* and equally threatened by Belo Monte. Thankfully, there are numerous good breeders who are maintaining the species to secure its immediate future in captivity.

The second BSSW breeding report came from a young German aquarist who has also taken himself away from his fish tanks to the wilds of South America. Markus Kaluza has bred the red-finned *Pseudacanthicus* (L24), recently described as *P. pitanga*. Although hatching many hundreds of fry, the youngsters share a trait with other *Pseudacanthicus* and become aggressive towards their siblings. As a consequence, Markus managed to raise just a fraction of each brood – around 20 individuals – still an excellent achievement! Markus followed up his account with a report from an area he visited where the river had been impounded by a dam. The resulting lake housed a large population of *Megalancistrus parana* which, although they had survived, were in an emaciated state due to their preferred food source (sponges) being in short supply. This example serves as a warning for the fate of species affected by other dam projects across the continent.

Rajanta Sinardja Rahardja has been a regular speaker at L-Welse and returned with updates on breeding success at the Bellenz fish farm in Indonesia. Some of the stats thrown at us were phenomenal and the comparisons with commercial food-fish farming were obvious. The

advantages of aquaculture in the tropics are obvious with 'free heating', plus reduced labour costs compared to Europe at least. Rajanta still presented significant electricity and food bills, along with a substantial workforce to maintain a business which now produced over 500 market-size zebra plecos every month, plus many other *Hypancistrus*, *Panaqolus*, *Pseudacanthicus* and *Scobinancistrus*.

L-number days in full swing. Photo: A. Tanke

In addition to the standard types, the farm has isolated unusual variants of the wavy-line *Hypancistrus* to fix a fine-lined and leucistic varieties of *H. zebra*. It seems the future of some of these endangered species is secured in the hands of professional fish farms and the hobbyists can work with them to maintain genetic diversity in their own stocks. Rajanta promised to return in 2017 to help inform other breeding programmes.

The following day, I was fortunate enough to be invited to a BBQ held by Andreas at his home. I joined several other conventioneers and toured his incredible fish room. After four days away, I spent the next 24 hours in the airport waiting for a flight back to foggy England. Thankfully I had resisted the temptation to take any fish home with me, which would otherwise have been rather uncomfortable in my suitcase! The event gave me a fresh view of aquatic events and organisations, and provided me with some ideas for improvements for the CSG moving forward as an influential international group.

Typhoons, spiny monsters and scarlet cactus: a preliminary review of *Pseudacanthicus* catfishes (Siluriformes: Loricariidae).

By Michael Hardman

Fig. 1. *Pseudacanthicus leopardus* (Fowler 1914), male. Photo: M. Hardman

In some way or another, all catfishes are interesting. But some will cause even the most stubborn of cichlidophiles to stop at a tank and gawp. Catfishes of the genus *Pseudacanthicus* fall into this category, and are otherwise known to catfish fans in the UK as spiny monsters or in Germany as kaktuswelse (cactus plecos). With common names like these, you get the idea that these cats have an appearance to match their attitude.

Cactus plecos have been in the hobby since the early 1980s, when the original spiny monster (*P. spinosus*) was frequently shipped to Europe by Brazilian aquarium fish dealers in Belém. Since then, a steady stream of new and spectacular cactus plecos have been showcased by Japanese and European importers, many of which remain undescribed.

In order to deal with the increasing diversity of loricariids imported since the late 1980s, German aquarists including Walter Lechner, Bernd Kilien, Erwin Schraml, Ingo Seidel, Rainer Stawikowski, Sandor Tüllman, André Werner, and Frank Warzel assigned so-called "L-numbers" to plecos that could not be reliably identified as described species. Photographs of the fish along with an approximate locality were published in the German magazines *Die Aquarien- und Terrarienzeitschrift* (*DATZ*) (L-numbers) and *Aqualognews* (LDA numbers) to help exporters, importers and hobbyists navigate the new suckermouths that were being collected and shipped out of South America. The L-number system is now universally embraced by aquarists across the world and ichthyologists are now including L/LDA-number designations (hereafter "L-numbers") in new species descriptions.

Although L-numbers give us a rapid way to give a fish a standard label, they have their drawbacks in that because no type specimens are designated, the same species has been given multiple L-numbers and multiple species have

been given the same L-number. Furthermore, because no diagnosis is provided, the concept of the species or variant to which the L-number is applied can change over time. This can be a consequence of early fish imports biasing our understanding of a particular L-number or because of their inconsistent use by exporters, importers, retailers and aquarists. If we don't have a clear understanding of the species to which the L-number is assigned, things can get very muddled very quickly, and there have been plenty of fierce arguments among pleco fans concerning the L-number of a given fish.

It's all relative

Pseudacanthicus is a member of the *Acanthicus* group which also includes *Acanthicus, Leporacanthicus,* and *Megalancistrus* (Armbruster, 2004; Chamon, 2012, 2015; Lujan et al., 2015). Within this group, *Pseudacanthicus* is resolved as sister to a clade composed of *Acanthicus* and *Megalancistrus* by molecular (Lujan et al., 2015) and morphological (Armbruster, 2004) data (Fig. 2), or as the sister group to *Leporacanthicus* according to the morphological analysis of Chamon (2012). The *Acanthicus*-group is well diagnosed by several morphological characters, the most notable of which are the rows of odontodes that erupt from the keeled body plates and which give these catfishes their common name of cactus plecos (Fig. 3 A).

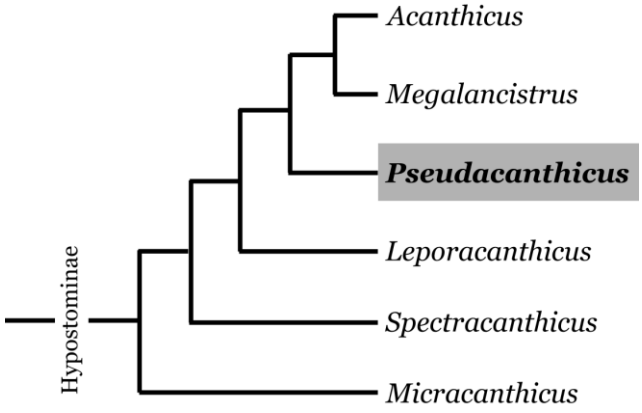


Fig. 2. Intergeneric phylogeny of the *Acanthicus* group and relatives as inferred by Lujan *et al.* (2015).

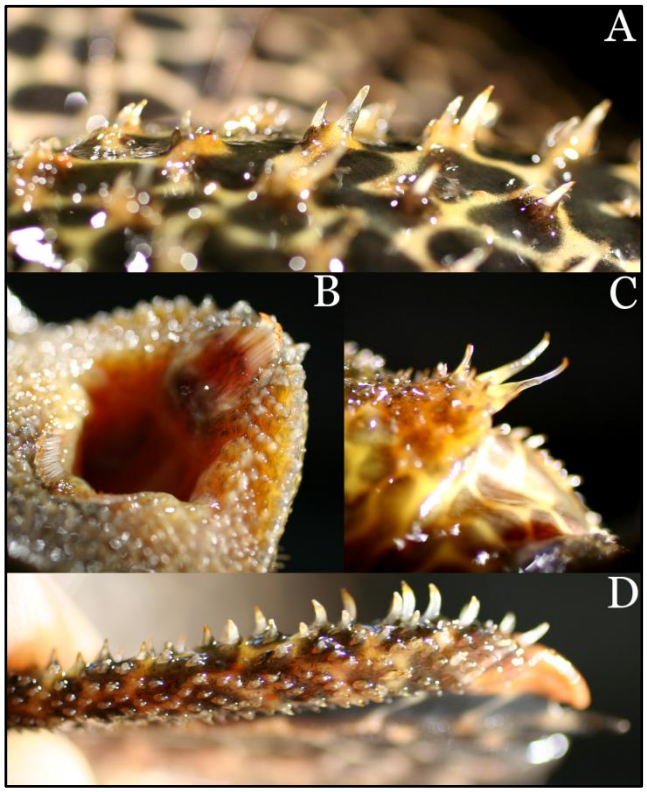


Fig. 3 (A–D). *Pseudacanthicus leopardus* oral and skin teeth (odontodes). A. Odontodes borne by the body plates just below the dorsal fin. B. Mouth, premaxillary teeth to the right. C. Everted interopercular odontodes. D. Odontodes borne by the left pectoral-fin spine. Photos: M. Hardman.

A generic diagnosis

Within the *Acanthicus* group, *Pseudacanthicus* is characterized (or *diagnosed*) by the presence of two small plates just behind a pair of bones (*pterotic-supracleithrum*) at the back of the skull (vs. one median plate or none at all in the other genera). *Pseudacanthicus* can be differentiated from *Acanthicus* in terms of the presence of an adipose fin (absent in *Acanthicus*), small to moderate pterotic-supracleithrum (vs. large in *Acanthicus*), short but powerful jaws, 8–9 branched dorsal-fin rays (vs. 10–11 in *Megalancistrus*) and up to 12 premaxillary (upper jaw) teeth (vs. up to 4 in *Leporacanthicus*) (Chamon, 2015).

In the late 1990s, I studied museum specimens of *Pseudacanthicus* and reviewed the described species as they are represented in the collections of the Natural History Museum in London (Hardman, 1997). At present, there are six described species of *Pseudacanthicus*, and 26 L- and four LDA-numbers assigned to fish identifiable as members of the genus (Table 1).

Table 1. Current taxonomy of *Pseudacanthicus* including L- and LDA numbers (juv = assignment based on a juvenile). L- and LDA-numbers are assigned to a described species or maintained separately where they pertain to an undescribed species. The interpretation of L- and LDA-numbers in terms of described or undescribed species is based on information and photographs supplied in the original designation.

Species	Authority	Type locality
L/LDA-number	Designator	Reported locality
P. serratus	(Valenciennes in Cuvier & Valenciennes 1840)	Region around Paramaribo, Surinam
P. fordii	(Günther 1868)	"probably Suriname"
L320	A. Werner, DATZ 2002(8): 26–27	río Jari: Pará/Amapá, Brazil
P. histrix	(Valenciennes in Cuvier & Valenciennes 1840)	No locality (= Brazil)
L064	R. Stawikowski, DATZ 1990(4): 239–241	río Tocantins: Pará, Brazil
L065 juv*	R. Numrich, DATZ 1990(7): 392	Unknown; suspected Tocantins, Peru or Manaus
L186	R. Stawikowski, DATZ 1994(10): 619–620	Cametá, río Tocantins: Pará, Brazil
P. sp[1]. cf. *histrix*		
L275	A. Werner, DATZ 2000(1): 48–49	río Tapajos: Pará, Brazil
P. sp[2]. cf. *histrix*		
L406	A. Werner, DATZ 2006(11): XX	Boa Vista, río Branco: Roraima, Brazil
P. spinosus	(Castelnau 1855)	Amazon River, Brazil
L096	R. Stawikowski, DATZ 1992(6): 348–349	Environs of Belém: Pará, Brazil
L160	R. Stawikowski, DATZ 1994(3): 145–146	río Tocantins: Pará, Brazil
L343	I. Seidel, DATZ 2003(10): 34	río Jari: Pará/Amapá, Brazil
L375	A. Werner, DATZ 2005(2): 32–33	río Anapu (Tocantins dr.): Pará, Brazil
LDA085	E. Schraml, Aqualognews 2006(71):23	Unknown; imported from Belém, Pará, Brazil
P. sp. cf. *spinosus*		
L283	F. Warzel, DATZ 2000(8): 58–59	río Tapajos: Pará, Brazil
P. leopardus	(Fowler, 1914)	Rupununi River, Guyana
L114 juv	R. Stawikowski, DATZ 1992(10): 618–619	río Negro: Amazonas, Brazil
L427	I. Seidel, DATZ 2009(11): 10–12	río Jatapu: Amazonas, Brazil
LDA007	–	–
LDA073	–	–
P. pitanga	Chamon 2015	Serra dos Carajas, río Tocantins: Para, Brazil
L024	B. Kilian, DATZ 1989(5): 306–309	río Tocantins: Pará, Brazil
L025b	W. Löll, Aqualognews 109: 28–32	río Itacaiúnas (Tocantins dr.): Pará, Brazil
P. sp. "scarlet"		
L025	B. Kilian, DATZ 1989(5): 306–309	río Xingu: Pará, Brazil
P. sp. "castanho"		
L063	R. Stawikowski, DATZ 1990(4): 239–242	río Tocantins: Pará, Brazil
L179	R. Stawikowski, DATZ 1994(9): 551–552	unknown, possibly río Tocantins: Pará, Brazil
P. sp. "blizzard"		
L452	S. Tüllman, DATZ 2010(10): 35	Requena, Rio Tapiche (Ucayali dr.): Loreto, Peru
P. sp. "Marabá"		
L079	R. Stawikowski, DATZ 1991(3): 144–145	Marabá, río Tocantins: Pará, Brazil
L420 juv	W. Lechner, DATZ 2008(12): 35	Marabá, río Tocantins: Pará, Brazil
P. sp. "Alenquer"		
L065 juv.*	R. Numrich, DATZ 1990(7): 392	Unknown; suspected Tocantins, Peru or Manaus
L097	R. Stawikowski, DATZ 1992(6): 348–349	Santarém at mouth of río Tapajos: Pará, Brazil
L282	F. Warzel, DATZ 2000(8): 58–59	Found in a tank of *L. galaxias* imported from Venezuela
P. sp. "black"		
L185	R. Stawikowski, DATZ 1994(10): 619–620	río Xingu: Pará, Brazil
P. sp. "titanic"		
L273 juv	F. Warzel, DATZ 1998(12): 754	río Tapajos: Pará, Brazil
P. sp. "Gurupi"		
L380	A. Werner, DATZ 2005(4): 35–37	río Gurupi: Pará, Brazil
P. sp. "typhoon"		
LDA105	E. Schraml, Aqualognews 2008(79):22	río Jamanxim (Tocantins dr.): Pará, Brazil

* The original designation of L065 included two images of juvenile *Pseudacanthicus* of uncertain origin and may not be conspecific. The lower image likely corresponds to *P.* sp. "Alenquer" (L97/282) while the upper may be a juvenile *P. histrix* (see Fig. 9).

Figure 4 shows the river basins where *Pseudacanthicus* species are known to occur. The natural distributions of cactus plecos are split between the right-bank Amazon tributaries of the crystalline Brazilian Shield (i.e., Tapajos, Xingu and Tocantins) and left-bank tributaries (i.e., Branco-Negro, Jatapu and Jari) and Atlantic streams (i.e., Rupununi and streams of Surinam and French Guiana) of the Guiana Shield. We might also consider the reported home of *P.* sp. "Gurupi" (L380) – the Gurupi – to be part of the Tocantins-Xingu-Tapajos system, although it empties directly into the Atlantic. Although not shown in Fig. 4, *P. histrix* and *P. spinosus* might also occur in the Amazon mainstem, but this needs to be confirmed.

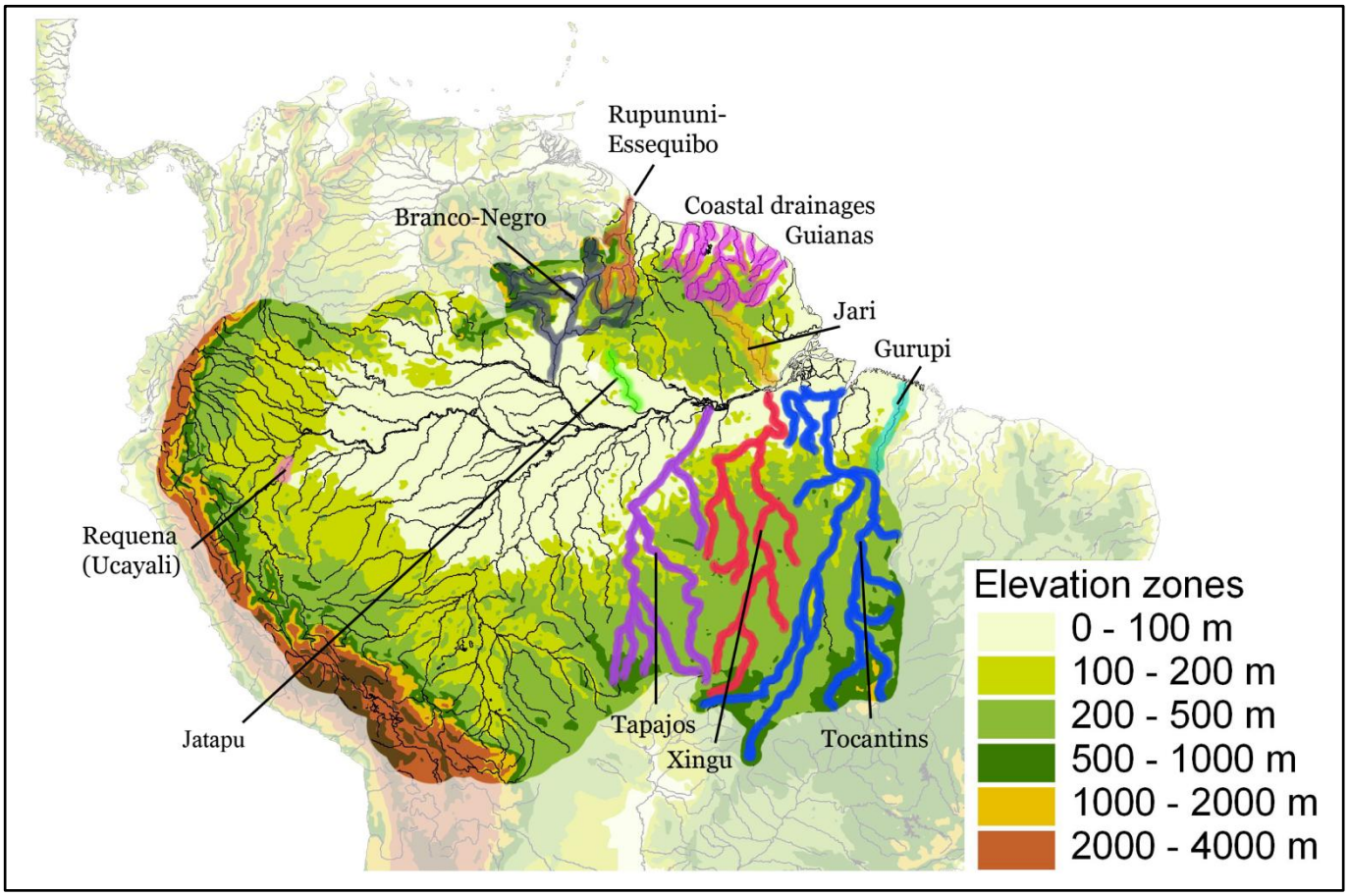


Fig. 4. Known distribution of *Pseudacanthicus* within the Amazon basin (unshaded) and coastal drainages of the Guianas and rio Gurupi. See Table 1 for reported distributions of each species and variant.

Species of *Pseudacanthicus* appear to be variable across their range. This is not too surprising, as their cousins the vampire plecos (*Leporacanthicus*) and *Spectracanthicus* species are also known to be *polychromatic* (Camargo et al., 2013; Hardman and Forssander, 2015). Many of these variants have been coded in the L-number system (Table 1, Figs. 5–7), and the job of the systematic ichthyologist is to make sense of that variation and establish where *intra*specific- (i.e., *within* species) becomes *inter*specific- (i.e., *between* species) variation; in other words what the species are and how to recognize them.

In many cases, genetic data can help to show that variants are local parts of a large and freely-mixing population or distinct genetic lineages that have long-since ceased swapping their DNA. Due to their cost and difficulty, population genetic studies have only been completed for a few commercially-important species although several Xingu plecos are now being studied in this way (e.g., *Baryancistrus xanthellus*; Leandro Sousa, pers.comm.). In the absence of objective molecular studies, systematic ichthyologists often base their decisions about species limits on morphology and colouration.

Aquarists can sometimes object to the description of a new species and its limits, feeling that the diversity they see is being over-simplified and that some of the variants are so distinct they should be recognized as different species. Taken in isolation, variants can seem extreme when compared to another individual and this often happens when single fish are photographed and published in print or digital media. However, if a variant is compared against *lots* of individuals from many locations, its distinction might become blurred as we begin to appreciate how variable the species can be and how that variation is structured with respect to geography

In writing this article, I have tried to make sense of the six described species and the 29–30. L-numbers that have so far been assigned to *Pseudacanthicus*. I have arranged the L -umbers in groups that are similar and which -

Fig. 5. Images from the original DATZ articles in which L number codes were first assigned to a *Pseudacanthicus* variant. Each code is followed by the reported origin of the variant and the species to which it is assigned in Table 1. All images reproduced with permission (see Acknowledgments).

Fig. 6. Images from the original DATZ articles in which L number codes were first assigned to a *Pseudacanthicus* variant. Each code is followed by the reported origin of the variant and the species to which it is assigned in Table 1 when permitted. All images reproduced with permission (see Acknowledgments).

might be considered as broad concepts for the extant species (Table 1). I have also suggested likely instances where two or more L-numbers represent the adult and juvenile forms of a given species. It is important to realize that I have based my understanding of the various L-

Fig. 7. Images from the original DATZ/Aqualognews articles in which L/LDA number codes were first assigned to a *Pseudacanthicus* variant. Each code is followed by the reported origin of the variant and the species to which it is assigned in Table 1 when permitted. All images reproduced with permission (see Acknowledgments).

numbers on the original image supplied when the code number was first designated.

Some readers may find my decisions and concepts inaccurate or in conflict with their own. In these instances, I encourage the reader to consider the original image and how their understanding of that L-number relates to it. I suspect that, in several instances, large imports of fish labeled incorrectly as a given L-number may have replaced or obscured the variant on which the number was originally based. With this in mind, I have obtained permission to reproduce and publish the original images for all 25 L-numbers and two of four LDA-numbers here (Figs. 5–7).

Figure 4 provides a coarse illustration of the known distribution of *Pseudacanthicus* species and L-numbers. It is certainly incomplete and of rather low resolution. However, I believe it helps to understand diversity and is a good place to start trying to rationalize the variation into species.

In many cases, fish species have restricted and similar distributions that are explained in terms of their evolution in response to major events in the landscape that might alter the way a river flows (e.g., the rise of the Andean mountain range) and thereby split one population into two, which are then free to evolve independently either side of the new barrier. Such processes create repeating patterns of relationship and distribution, and are one of the strongest forms of evidence in support of evolution. These patterns also give us an expectation as to how diversity might be structured in groups that have not been intensively studied by systematists, such as

Pseudacanthicus. With this in mind, I generated Table 1 on the basis of tying L/LDA-numbers to described species in terms of their distribution and similar morphology, and using the images of imported fish to help inform my understanding of those species, which is admittedly limited and based on museum specimens, some of which are over 150 years old!

What follows is an account of how I have come to understand the six described species and how the L-numbers relate to them. The accounts are based on the original descriptions (translated in most cases by me aided by online translators) and illustrations (Fig. 8), museum specimens and photographs of live individuals. It is hoped this will help the reader to understand the history of the species names available for *Pseudacathicus*, and the basis on which I have assigned L- numbers to them or considered them undescribed.

Pseudacanthicus serratus (Valenciennes 1840)

Although the type species of the genus, *P. serratus* is perhaps the most-poorly understood species of *Pseudacanthicus*. Valenciennes (1840) described *Rinelepis serratus* on the basis of a single specimen reportedly from the Paramaribo region in Surinam. The holotype exists in the Leiden museum (RMNH 3125), and the same fish was illustrated and used by Pieter Bleeker to describe the genus in 1862 (Fig. 8, middle right). Below is a translation of the original description of *Hypostomus serratus* by Valenciennes (1840: 503–505);

"*This species was collected in Surinam by M. Diepering of the Royal Museum of Leiden and is eminently distinguished by four or five spines that arm each ridge of the armored body plates, which increase in size from first to last; forming four rows of jagged or serrated ridges on each side of the body.*

This is similar to Hypostomus commersoni. The head is very rough; the interparietal is prominent and obtuse without a crest; snout with a convex and rounded profile. Strong teeth in two rectangular bands and terminated by two unequal peaks. The interopercular is armed with hooked thorns that are longer than those nearby and which the animal can protrude and spread. The membrane covering the posterior opening of the nostril is remarkably large. The first pectoral ray is round, obtuse, with strong serrae and reaches the base of the ventral fin. The ridge [dorsal fin?] *is longer than tall. The outermost caudal-fin rays extend a quarter of the [total?] length. The fish is a dark chocolate brown, with small round white spots on the belly. We also saw a few on the base of the dorsal and on the rays of the paired fins, and even some on those of the tail. The spines of the armored plates are also white. D 1/8, A 1/5, C 16, P 1/6, V 1/5.*

The individual provided to us by M. Temminck is eight inches long."

Important things to note in the description include the large nostril flap and the colouration: dark brown with small white spots on body, belly and fins. Although *P. serratus* was a name often applied to new species of *Pseudacanthicus* imported into Europe in the 1990s, this species is very rarely seen in the hobby, if at all. Given that very few live fish are exported from Surinam or French Guiana, it is very unlikely that *P. serratus* will be available in your local fish store. However, L320 is a cactus pleco collected in the rio Jari, an Amazon tributary but one which flows south from Surinam and it seems reasonable to suggest that L320 might represent *P. serratus*. Several other species have large ranges in neighbouring drainages (e.g., *P. leopardus, P. spinosus, Leporacanthicus galaxias*, etc.) and *P. serratus* might be typical of its cousins in this respect. Furthermore, a second species reportedly from Surinam (*P. fordii* [Günther 1868]) might also correspond to *P. serratus* and be a junior synonym of this species (see below).

Pseudacanthicus histrix (Valenciennes 1840)

Pseudacanthicus histrix was originally described in *Rinelepis*, and its taxonomic history is a challenging one to work out. No type specimens are known to exist and the taxonomist responsible for describing the species (Professor Domingos Vandelli of the University of Coimbra in Lisbon) unfortunately died before it could be completed. Illustrations of the specimens had been made along with a short description and both were sent to the natural history museum in Paris, where Achille Valenciennes used Vandelli's account to describe *Rinelepis histrix* in one of the most important books in ichthyology; the epic *Histoire Naturelle des Poissons*. In the description, Valenciennes quoted from Vandelli's manuscript (p.486–487):

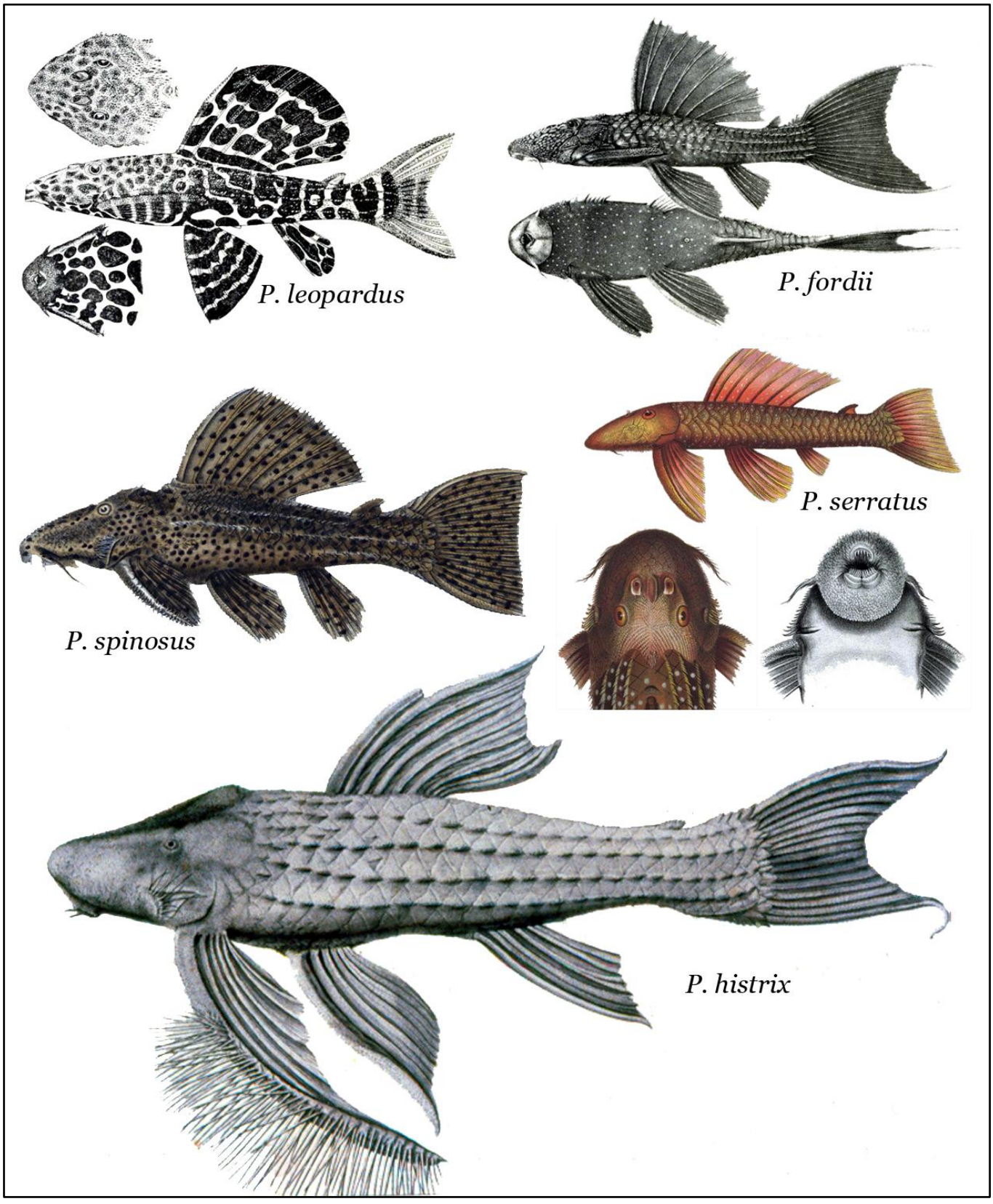


Fig 8. Illustrations from the original descriptions of *Stoneiella leopardus* Fowler 1914, *Chaetostomus fordii* Günther 1868, *Hypostomus spinosus* de Castelnau 1855, *Hypostomus serratus* Valenciennes 1840 and the redescription of *Chaetostomus histrix* Capelo 1870.

"The length of the head is three and three quarters in the total length, and is one quarter shorter than wide. The snout is very obtuse and round at the tip; the eye is a fifteenth of the length of the head, and the distance of one eye from the other is six diameters. The spines borne by the first pectoral ray are half its length in the middle and becoming shorter towards the base and tip of the ray. The ventrals seem to be one quarter less than the pectorals; the dorsal occupies one sixth of the length, and is slightly taller than long. The caudal has its corners projecting slightly. Its length is five

and a half times in the fish. All the body appears rough; and there are some crests borne by the three rows of intermediate scales."

Valenciennes adds that the two illustrated fish were 8–9 inches (20–23 cm) long. The most salient features of his description is the relatively small eye (1/15th of head length) and that the dorsal fin is taller than long – most *Pseudacanthicus* have a low slung dorsal fin, i.e., longer than tall.

As an ever-increasing stream of preserved fishes arrived in Europe via the efforts of 19th century explorers, soldiers, entrepreneurs and missionaries, it became necessary to redescribe many species and designate type specimens for those names that didn't have them. This is what happened to *P. histrix* 30 years after its description, when Felix Antonio de Brito Capelo designated a neotype and redescribed the species as *Chaetostomus histrix* (Fig. 8, lower). The neotype was a dried specimen reportedly 76 cm long and – judging by an impressive set of pectoral-spine odontodes – an adult male. Capelo (1870: 65) drew attention to the pectoral fin and described how some of the odontodes were a third as long as the entire fin spine. The illustration (Fig. 8, lower) suggests the specimen did not have any striking coloration, being a uniform dark grey, and the characteristics of a small eye and a tall dorsal fin can clearly be seen. Nothing in Capelo's re-description suggests he was looking at a different species to that described by Valenciennes.

Unfortunately, in 1978 a great fire destroyed 90% of the Zoology, Anthropology and Geology collections at the Lisbon museum, including the very old and important specimens from Brazil and Africa collected in the 18th and 19th centuries (Brandao, 1997). Sadly, it seems very likely that the neotype of *P. histrix* was destroyed in the fire.

Grey cactus plecos with tall dorsal fins, small eyes and long filaments on the caudal fin (mentioned in the original 1840 description) have been seen in the pet trade. These have been reportedly collected in the Tocantins (L64, L186), Branco (L406) and Tapajos (L275). Given the reported size of Capelo's neotype (76 cm), *P. histrix* is a large species likely able to overcome barriers that restrict smaller species. As such, we might expect *P. histrix* to have a large distribution and be found in the lower courses of many Amazon tributaries.

The tall dorsal fin of L64 and L186, coupled with the dark grey colouration and small eye correspond well to *P. histrix*. Both of these are reportedly from the Tocantins, and the specimens on which the original description was made may well have come from this drainage. This also makes sense given it is the first of the main tributaries met while ascending the Amazon, and 19th-century Portuguese naturalists would likely have stopped at the river port of Belém (founded 1616) and eagerly made collections after crossing the Atlantic.

L406 (Branco) and L275 (Tapajos) were reportedly collected a considerable distance from the Tocantins, and images of the specimens on which the L-numbers were designated (Figs. 5 and 6) are somewhat different from the Tocantins fish (L64 and 186), especially L275 (Fig. 6) which does not appear to have the flame-shaped dorsal fin. This may be due to regional variation in what is likely a species with a large distribution, or they may be distinct lineages. Unfortunately, both are poorly known but future

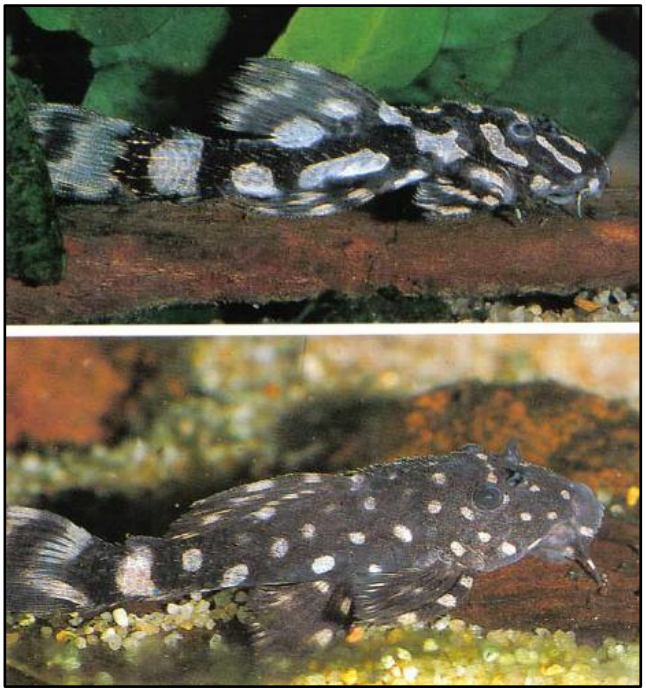


Fig. 9. Original image used to illustrate the designation of L65. It is suggested these juvenile fish are not conspecific; the upper fish may represent *P. histrix*, while the lower is likely *P.* sp. "Alenquer" (L97). Photo: ©R. Numrich (reproduced with permission).

imports and collections of fish from these areas should be compared against *P. histrix*.

Lastly, while I'm far from certain, one of the two images presented in the designation of L065 (Fig. 9, upper) has a small eye and tall dorsal fin, and which might represent the juvenile of *P. histrix*.

Pseudacanthicus spinosus (Castelnau 1855)

The original cactus pleco for many aquarists, otherwise known as spiny monsters, *P. spinosus* was imported into Europe in large numbers during the 1990s. Nowadays, *P. spinosus* seems less common, perhaps as a consequence of more colourful species coming onto the market from the Tocantins and Xingu. The spiny monster was described as *Hypostomus spinosus* by François Louis Nompar de Caumont La Force, comte de Castelnau (or more simply as Castelnau) in 1855. The holotype exists in the Musee d'Histoire Naturelle in Paris (MNHN A-9577), and the original description included a coloured illustration (Fig. 8, middle left). A translation of the original description follows:

"*Total length 35 cm; maximum width 8 cm; maximum height 4 cm; length of the first dorsa, 8 cm; maximum body width 7 cm. Body fairly elongate, dark brown, covered with white spines. Head slightly rounded, obtuse anteriorly, rough and covered with small spines, those of the opercular shorter compared to those of the previous species* [=Hypostomus pictus]. *Each body plate is rough and armed with two long straight spines, the rear is more elongated, which form on each side of the fish a series of four ridges not extending onto the belly. The body and fins are covered with many black spots.*

The first dorsal fin is very large, has 8 branched rays and a spine that is large, arched and rough; the second dorsal has a short radius, is arched and covered with strong spines; 16 caudal-fin rays are covered with small spines, both spines are heavy, arched, and significantly exceed the rays in length; anal large, five rays and a rough spine; pectoral large, five branched rays, each with a few thorns, and a rough and strong spine covered with large curved spines especially towards the tip. The river Amazon."

Cactus plecos with black spots or blotches on a brown base (Figs. 5–7) are well represented among L-numbers. L96, L160, L283, L343, L375, L380 and LDA85 all conform to this basic pattern, although the size, density and connectivity of the black spots and reticulation vary considerably.

Similar to *P. histrix*, it seems likely that the type material of *P. spinosus* was obtained from the Amazon delta region, perhaps in the vicinity of Belém. L96 is a juvenile *P. spinosus* reportedly from the Belém region, and other L-numbers corresponding to *P. spinosus* were allegedly collected in the Tocantins (L160) Anapu (Tocantins drainage: L375) and "imported from Belém" (LDA85). The colour patterns of LDA85, L343 (collected in the Jari, a left bank tributary of the Amazon, see Fig. 4) and L380 (collected in the Gurupi, see Fig. 4) generally conform to that of *P. spinosus*, but their spots unite to form wavy lines and a maze-like pattern on the body and head in L380.

L283 (reportedly from the Tapajos) also has a *spinosus*-like colour pattern although the morphology of this variant and its apparent distance from the Tocantins suggest it may be a distinct lineage. One might also suspect that L380 represents a new species as the Gurupi drains directly into the Atlantic Ocean. As such, I have developed a concept of *P. spinosus* that is centred on the Tocantins and Amazon delta region (i.e., the Marajó archipelago), but expect the species to have a large distribution containing several regional variants, reflecting the pattern we see in *P. leopardus, P. pitanga, P.* sp. "scarlet", etc. (see below), although there may be cryptic species that share this common colour pattern (e.g., L283, 380).

Pseudacanthicus fordii (Günther 1868)

Albrect Günther (1830–1914) described *Chaetostomus fordii* in 1868 from a series of specimens bought by the British Museum from the specimen dealer Robert Damon (1814–1889) in 1866 (Boeseman, 1970). Günther mentioned that the type specimens could be traced to Theodor Gerard van Lidth de Jeude (1788–1863), rector of Utrecht University. The syntype specimens do not have a specific locality associated with them, but Günther states (1868: 232) that the species is "*probably from Surinam*". Given their association with the

Netherlands and that Surinam was a Dutch colony at the time, this seems plausible.

Günther (1868) provides a short description and a black-and-white illustration (Fig. 8, upper right) which can be compared with *P. serratus*, the other species of the genus described from Surinam and which shares a similar colour pattern of a dark body and fins covered with small white spots. Unfortunately, the accounts of *P. fordii* and *P. serratus* do not lend themselves to a direct and detailed comparison. However, several observations are important to note regarding the possible synonymy of *P. fordii* and *P. serratus*.

Firstly, the unique holotype of *P. serratus* is reported by Valenciennes to be eight "pouces" (ca. 215 mm). Boeseman (1972) reported the type to be 155 mm SL (208 mm TL), Chamon (2015) measured it to be 148.7 mm SL. The syntype specimens of *P. fordii* range from 119 to 148 mm SL (Hardman, 1997), so we are dealing with similar-sized fish.

Of the characters mentioned, the only notable discrepancy between the written accounts concerns the number of odontodes on the keeled ridge of each body plate; "*..three to four..*" in *P. fordii* (Günther, 1868: 231) and "*..four or five..*" in *P. serratus* (Valenciennes, 1840: 504). However, specimens identified as *P. serratus* obtained around the same time and deposited in the Natural History Museum (BMNH 1864.6.2:6–77 and BMNH 1870.3.10:3) range in size from 195 to 298 mm SL, and have 2–4 odontodes on each plate (Hardman, 1997) (Fig. 2A). Furthermore, photographs of the holotype of *P. serratus* show that most plates have fewer than four odontodes, suggesting the discrepancy is due to a mistake in the original description rather than a measurable difference between these two species.

As such, it seems unlikely that two similarly-patterned species with similar morphologies occur sympatrically in Surinam, and *P. fordii* is probably a junior synonym of *P. serratus*. With respect to cactus plecos seen in aquarium imports, L320 from the rio Jari conforms to the colour pattern of *P. serratus* and might well correspond to that species.

Pseudacanthicus leopardus (Fowler 1914)

In 1912, the Academy of Natural Sciences in Philadelphia bought a collection of fishes from the Rupununi River made by Mr. J. Ogilvie the year before. The ichthyologist there at the time was Henry Weed Fowler (1878–1965), and he described *Stoneiella leopardus* as a new genus and new species from specimens of the species we know today as *Pseudacanthicus leopardus* (Figs. 1, 2, 8 upper left). It is not clear if Fowler was familiar with the genus *Pseudacanthicus* described by the Dutch ichthyologist Pieter Bleeker (1862) and further articulated by Charles Tate Regan (1904). *Stoneiella* was recognized as a synonym of *Pseudacanthicus* by Isbrücker (1980), and subsequent ichthyologists have agreed with this correction.

The holotype of *P. leopardus* (71.6 mm SL) was collected in the Rupununi River in southern Guyana, one of the main tributaries of the Essequibo. During the rainy season, the Rupununi is temporarily connected to the Takutu River which flows into the río Branco (Negro drainage) across the border in Brazil. *Pseudacanthicus leopardus* is well represented in museum collections and in aquarium imports, and appears to be a smaller species with a large range that includes several drainage basins. L-numbers pertaining to *P. leopardus* include L114 (Negro), LDA007 (Demini-Negro) and LDA073/L600 (Negro). L427 from the Jatapu (a left-bank tributary of the Amazon rising in the mountains bordering Guyana, see Fig. 4) appears similar to *P. leopardus*, and may represent a melanistic variant or a distinct lineage long-since separated from its relatives in the Rupununi and Negro. A phylogeographic study of *P. leopardus* might help to understand the dispersal and diversification of fastwater fishes in the Amazon basin and its adjacent drainages.

Pseudacanthicus pitanga Chamon 2015

Earlier this year, Brazilian ichthyologist Carine Chamon described *P. pitanga* from the Tocantins basin, a species aquarists have known as *Pseudacanthicus* sp. L24 for over 25 years. Chamon diagnosed *P. pitanga* in terms of its colouration, the separation of the sphenotic and

the 6th infraorbital, lateral surface of the metapterygoid channel triangular (vs. rounded) and posterior contact between cleithrum and coracoid ventrally expanded (vs. straight).

The holotype is 220.7 mm SL and was collected by Michael Goulding in the rio Itacaiunas, a tributary of the Tocantins whose headwaters come close to those draining westwards into the río Xingu. Chamon (2015) states that the species probably occurs throughout the middle and lower Tocantins. Variation within *P. pitanga*, as seen in aquarium imports, concerns the expression of the orange-red in the fins and dark pigment on the body. Specimens vary from having relatively little (e.g., the original image of L24, see Fig. 5) to L25b (not shown) from the Itacaiunas which clearly shows the zig-zag dark lines running along the body. In his designation of L25b, Löll (2013) suggested the population in the Itacaiunas represents a link between red-finned *Pseudacanthicus* in the Tocantins (i.e., *P. pitanga*) with those in the Xingu (i.e., *P.* sp. L25 "scarlet"), and that these are merely colour variants of a single widespread species that occurs in both drainages.

Undescribed species of *Pseudacanthicus*

The review of species identities and L-numbers described here reveals several L-numbers that are difficult to place under broad concepts of the described species. These are *P.* sp. "scarlet" (L25, Xingu), *P.* sp. "castanho" (L63/179, Tocantins), *P.* sp. "Maraba" (L79/420, Tocantins), *P.* sp. "Alenquer" (L65/97/282, Santarem-Alenquer), *P.* sp. "black" (L185, Xingu), *P.* sp. "titanic" (L273, Tapajos), *P.* sp. "blizzard" (L452, Tapiche-Ucayali) and *P.* sp. "typhoon" (LDA105, Jamanxim-Tocantins). Furthermore, I note the apparent distinction of L275 (*P.* sp. cf. *histrix*, Tapajos), L283 (*P.* sp. cf. *spinosus*, Tapajos), and L380 (*P.* sp. "Gurupi", Gurupi) and stress the possibility these forms represent distinct lineages worthy of full species recognition. At present, I do not subscribe to the concept of a polychromatic *P. pitanga* spread across the Tocantins and Xingu, as suggested by Löll (2013).

The Tocantins appears to harbour at least three undescribed species of *Pseudacanthicus*: 1. the third member of the "silver-eyed" subgroup L79, including L420 as the juvenile of this species; 2. L63/179 is a greyish-brown and dark-eyed species with yellowish pigment on the leading edges of the fins; 3. The colour pattern of LDA105 "typhoon" is clearly distinct.

The middle and upper Xingu is home to the well-known *P.* sp. "scarlet" L25, and *P.* sp. "black" L185 is found naturally in the lower Xingu below Volta Grande. Reports in 2014 suggested that individuals of L185 with broken fins had been released at the Altamira dock and could now be found above Volta Grande where they were previously absent; a situation mirrored by several *Hypancistrus* variants that have been translocated across cataracts and other presumed upstream barriers to the Xingu at Altamira (Leandro Sousa, pers. comm.). Although native to the basin, such translocations can be considered invasive and the outcome of their introduction to the local pleco community remains uncertain, particularly as this area will soon be flooded by the reservoir supplying the hydroelectric turbines at Belo Monte.

The Tapajos system appears to harbour at least two and possibly four undescribed species: 1. *P.* sp. "Alenquer" (L97/282) is reportedly collected on both sides of the Amazon (Santarem and Alenquer) around its confluence with the Tapajos (Janne Ekström, pers. comm.); 2. *P.* sp. "titanic (L273) is a brightly-coloured and distinct dark-eyed species; and, as mentioned above, L275 and L283 should be studied carefully to evaluate their distinction in relation to *P. histrix* and *P. spinosus*, respectively.

The enigmatic *P.* sp. "blizzard" (L452) is reportedly from the upper Ucayali near to Requena in Peru. The variant appears to be distinct although it shares a black base with brilliant white spots with *P.* sp. "Alenquer" (L65/97/282). Its Peruvian origin should be confirmed as it represents a remarkable outlier for a genus that is mainly found on the Guiana Shield and clearwater streams of Pará (Fig. 4). The reported locality of L452 is thousands of river kilometers from its nearest relatives (i.e., L427 in the Jatapu and L65/97/282 around

Santarem). L452 should be compared against *P.* sp. "Alenquer" (L97/282), a species with a similar pattern and which might be more widespread than currently appreciated, or the product of a translocation of the population upstream to Requena through international trade or movement of ornamental fish in the Amazon basin (J. Ekström, pers. comm.).

Finally, thanks to Brian Chung, I recently learned of new *Pseudacanthicus* variants appearing in Hong Kong fish stores labelled as L24×63 hybrids! This fish (fig. 10) has the silver eye of *P. pitanga*, L25 and L79/420, but the brown base colour and yellowish tips to the dorsal and caudal fins of *P.* sp. "castanho" (L63/179). Brian also explained that other putative hybrids have been seen in the Asian market, but their origin is a fiercely-guarded secret.

Fig. 10. Putative *Pseudacanthicus* hybrid L24 × 63 photographed in Hong Kong. Photo: B. Chung (reproduced with permission).

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2nd J. Hetherington, CSG. *Aspidoras taurus* 81.5 pts

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2nd D. & L. Speed, CSG. *B. splendens* 68 pts

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3rd D. & L. Speed, CSG. *C. napoensis* 83.5 pts

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Class 15: *L&LDA-numbers over 130mm* (2)
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2nd J. Kavanagh, Preston AS Not identified 72 pts

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Class 17: *MOCHOKIDAE over 130mm*(0)
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2nd B. O'Neill, CSG. *Microglanis iheringi* 79 pts
3rd D. & L. Speed, CSG. *Brachyrhamdia meesi* 76.5 pts

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Class 24: *PAIRS – CORYDORADINAE* (3)
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1st M. Walters, CSG. *C. longipinnis* 84 pts
2nd M. Walters, CSG. *S. lacerdai* 80 pts
3rd J. Kavanagh, Preston AS *C. condiscipulus* 78 pts

Class 25: *PAIRS – LORICARIIDAE inc L&LDA-numbers* (1)
Sponsor: B.I.D.K.A.
1st M. Walters, CSG. *Peckoltia braueri* L121 83 pts

Class 27: *PAIRS – AOV AFRICAN* (1)
1st B. O'Neill, CSG. *Microsynodontis polli* 87 pts

Class 29: *BREEDERS–CORYDORADINAE* (2)
Sponsor: I. Fuller – Corydorasworld.com
1st M. Walters, CSG. *S. lacerdai* 77 pts
2nd M. Walters, CSG. *S. lacerdai* 68 pts

Class 30: *BREEDERS–LORICARIIDAE Inc L&LDA* (4)
Sponsor: B.I.D.K.A.
1st D. Blundell, CSG. L260 84 pts
2nd D. Blundell, CSG. L201 80 pts
3rd D. Blundell, CSG. L340 78 pts

Class 31: *BREEDERS – AOV SOUTH AMERICAN* (0)
Sponsored by D. Blundell

Class 34: *FAMILY CLASS – Pair & Breeders Team* (1)
1st M. Walters, CSG. *S. lacerdai* 148 pts

Class 35: *BREEDERS – MASTER CLASS* (2)
1st D. Blundell, CSG. 242 pts
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Best in Show – Sam Trophy
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M. Walters CSG *Corydoras gryphus* Class 3

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D. & L. Speed CSG *Pseudacanthicus spinosus* Class 13

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D. & L. Speed CSG *Mystus bimaculatus* Class 18

Best AOV Catfish [20-23] – A.O.V. Catfish Cup
M. Kirkham CSG *Pseudomystus siamensis* Class 23

Best Pair [24-28] – Clint Cup
B. O'Neill CSG *Microsynodontis polli* Class 27

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D. Blundell CSG L260 Class 30

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