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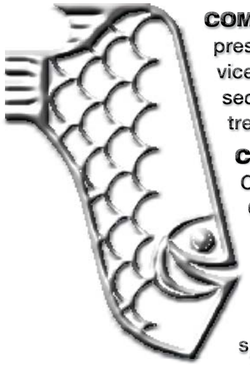
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IMAGE: Alf Stalsberg

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INSIDE BACK:
Mesonauta insignis – **Fiona Reed**.

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CONTENTS

Calendar 2

eCichlids 3

Newsletter Columnists Wanted – admin 3

Why Hobbyists Should Write For Their Club – Wayne S Leibel 4-5

Fish collections in the Upper Orinoco and Casiquiare, Venezuela: with observations on biogeography and ecology – Stuart Willis 6-20

The Last Word – Daryl Hutchins 20



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The Victorian Cichlid Society was formed by cichlidophiles in March 1972, thus becoming the first specialist aquarist group in Victoria. Its main aims are:

1. To promote the keeping of cichlids;
2. To gain and disseminate knowledge of cichlids, their habits and attributes through the use of slides, films, books, lectures, practical demonstrations, local and overseas magazines, articles by members and discussions with fellow members or experts in the field;
3. To assist, in any way possible, the establishment and/or maintenance of approved public aquaria;
4. To be involved in the education of the general public with regard to the benefits of fishkeeping (particularly cichlids), and the potentially harmful effects of animal mismanagement;
5. To promote fellowship between members;
6. To further the conservation of species and their natural habitats;
7. To further the identification, distribution, breeding, maintenance and enjoyment of species in the Family Cichlidae.

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VCS 2015 CALENDAR

n/a	*e*News	*i*Cichlid	*e*News	*i*Cichlid	*e*News	*i*Cichlid	*e*News	*i*Cichlid	*e*News	*i*Cichlid	*e*News
JAN ✓	FEB ✓	MAR ✓	APR Auction ✓	MAY ✓	JUN ✓	JUL ✓	AUG	SEP	OCT Auction	NOV	DEC AGM
n/a	<<	Meetings/Auction		>>		No Meetings		<<	Meetings/Auction		>>



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In 2016, the newsletter will be requiring a new Manager ... so try your hand now.

Why Hobbyists Should Write For Their Club

By Wayne S Leibel

We stand on the shoulders of others who come before us. This is no less true of the aquarium hobby than it is for most other aspects of life. We learn by hearing of or reading about other peoples' experiences. In the case of the beginning aquarium hobbyist, this is usually through books or slick magazines. But once having joined an aquarium society where hobbyists of all experiences and abilities meet and exchange ideas (and fish!), our learning increases exponentially. This can happen via speakers invited to share their knowledge specifically because of their expertise in particular areas of the hobby, or better, through informal chat with other members of the club over coffee or the auction table, or, yes, through club publications.

Although my major lifelong hobby interest has been cichlids, I find nuggets of useful information in virtually every talk I have attended, be it about guppies, bettas, or even marine fishes, or in conversation with other members about some weird fish they've spawned, or fielding a question or problem they might bring me (and more often than not I don't have a clue, but learn something from discussing!), or reading an article in the club journal, be it a short BAP report about some fish I have never kept, or a longer feature article. There is always something to be learned, and it is what keeps us vital in the hobby.

A club's publication is its lifeline to the membership and its lifeblood for information exchange. In my talks to various and sundry groups I always try to give hobbyists a pep talk on how what we do as hobbyists is important. I think, as a group, tropical fish hobbyists have a collective inferiority complex: we think that our experiences in captive rearing and spawning of fishes is unimportant, simply a 'hobby' (with all the lack of seriousness that implies) particularly, relative to science. But nothing could be further from the truth! We have much to contribute. Even to that serious activity we call 'science'. Let me tell you why.

These days, the number of professional ichthyologists and other scientists actively engaged in research on fish has dwindled in favor of more molecularly oriented research. That's where the action and money is these days! Fact is, too, most professional ichthyologists are great with the dead and pickled fish they study and name, and not so good with the living critters! (Though there are some exceptions, thankfully.) Also, with so few ichthyologists and so many fish, a lot of interesting observations just never get made: so many fish, so little time, so few professionals to do it! Here's where we hobbyists come in.

Our stock and trade as aquarium hobbyists is creating conditions that encourage our fish to spawn in captivity where we can watch what they do at close range and learn from them. We do this for a variety of reasons: to accumulate breeder award points, to have young fish to sell at auction or to stores to help defray the cost of our hobby, or simply for the challenge and bragging rights of being the first to spawn some difficult or little-known, seldom-kept or new fish. But along with these activities comes the opportunity also to observe - really observe - what our fishes do, record what they do by taking notes on the conditions we spawned them under and the behaviors we witnessed, and to share that information with other aquarists either through brief BAP reports or better, through articles published in the club bulletin (or even a national slick hobby magazine!). The information is important not just to other hobbyists who would like to learn how to spawn a particular fish, but also to science! Really!

Here's one (of several) examples of how hobbyists have contributed to ichthyology in a direct and important way. In the mid-1980s, some of us playing with South American earth-eating cichlids of the genus *Geophagus* (Eartheaters) noticed that one of the 'species' appearing in the hobby and sold as 'surinamensis' differed from batch to batch. Although all 'forms' had blue and red longitudinal striping along their sides, and the same basic body shape, and all sifted the sand for food, they differed in the coloration of their tail fins - some had flag stripes (alternating blue and red), some had spotted tails, and some of the spot-tails had black throats and others did not. We also knew they came from different river systems in South America, since, among others, Ben Rosler (Metropolitan Pet), a knowledgeable local wholesaler, kept track of where they were collected and exported from: Colombia, Venezuela, Peru, Guyana, Brazil, etc.) At the time ichthyologists (J.P. Gosse, 1974) who had studied the dead, pickled bodies of these 'surinamensis' Eartheaters concluded that it was one very widely distributed species.

A (then) newcomer to South American cichlid ichthyology, Sven Kullander, thought otherwise and suggested that these were discrete, different species, not just various flavors of *Geophagus surinamensis*, in need of different species names. He thought the colorational differences and other differences (body-shape, scale numbers, etc) were different enough to justify splitting them as different species. It was hobbyists who bred these fish that provided the final clue and proof: some of the population forms were 'immediate' mouthbrooders, which like African Rift Lake cichlids, laid their eggs and picked them up in their mouths immediately to incubate them to hatching. Other forms were 'delayed' mouthbrooders, which pasted their eggs down on a rock, guarded them for a few days, then took them in their mouths for final incubation. Some were simply non-mouthbrooding 'substrate brooders' who did the typical cichlid thing and pasted and guarded their eggs!

Clearly, there was more than one species involved! And it was hobbyists who provided the crucial information. How did Kullander learn about this? There was no way of observing these behaviors in the wild, and no ichthyologist sufficiently skilled in getting live fish to breed in the aquarium, leastwise not Dr Kullander. He didn't breed these himself, rather hobbyists did and wrote about their experiences in hobby magazines that Kullander had the good sense to be reading, and he went 'aha!'. In fact, Kullander and other ichthyologists have increasingly looked to the aquarium hobby community to provide observations of fish behavior they would never see in the wild.

Have you heard about mouthbrooding severums? Or contact-feeding pike cichlids? Or killifish who inject their eggs into cracks in rocks in fast moving streams? Or splashing tetras that jump out of the water to spawn on overhanging plants? Or bubble-nest brooding catfish? Or etc, etc, etc. The list goes on and on, and science would be ignorant of all if it were not for tropical fish hobbyists and the articles they have written about observations they have made in their home aquaria! We should give ourselves a huge pat on our collective back!

OK, well maybe your experiences breeding this or that may not prove important or crucial to science (though you never know!), but I am certain someone, somewhere would love to learn about them even if it is just to repeat them and rack up BAP points. Our hobby is, among other things, about generating and sharing information. I can think of no better vehicle for doing this than a fish club, and no better way for sharing the information within and between fish clubs then through club publications, particularly in this age of the internet and websites where club journals and your writings are posted on the web for all to access and learn from.

So, please, really observe your fish, take good notes and SHARE them with the rest of the tropical fish community by WRITING FOR YOUR CLUB PUBLICATION. Please write! ■





Cerro Duida near La Esmeralda on the upper Orinoco.

Fish collections in the Upper Orinoco and Casiquiare, Venezuela

with observations on biogeography and ecology



By **Stuart Willis**

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Part I: the Upper Orinoco and Mavaca

The upper Orinoco and Casiquiare rivers, in the far southern end of Venezuela, are some of the most remote places for ichthyological collection in South America. However, the region is immensely interesting ecologically and biogeographically, as it exhibits an amazing diversity of ecological habitats and constituent fishes, and it is where the fish faunas of the Orinoco and Amazonas basins conjoin. In search of samples of the species of *Cichla* (peacock bass) that occur in Venezuela, I organised an expedition to visit this remote region of Venezuela in January of 2005. The following is an account of the journey including biogeographic and ecological observations of the fish species we observed (with bias towards cichlids). I am in great debt to Carmen Montaña, formerly a student at the Universidad Nacional de Los Llanos in Guanare, for her immense support and assistance in all my field collections of fishes in Venezuela. I am also indebted to Kirk Winemiller of Texas A&M University for his contribution to funding of the trip.

First I need to provide some background on the trip. Besides adding to the scientific collections from the region, I was determined to collect samples of a species of *Cichla* that is uncommon in the Orinoco, *Cichla monoculus*, and additional samples of *Cichla intermedia*, the only endemic Venezuelan *Cichla*. All five currently-valid species of *Cichla* are distributed in Venezuela, four of those in the Orinoco (Winemiller 2001). *Cichla temensis* and *C. orinocensis* are relatively widespread in the Orinoco itself, and *C. intermedia* occurs in several disjunct pockets of appropriate habitat in the Orinoco basin. *Cichla monoculus*, which is widespread in the Amazonas of Brazil and Peru, only occurs sparsely in Venezuela in the upper Orinoco and Casiquiare. Finally, in Venezuela *Cichla ocellaris* only occurs in the Cuyuni River, on the eastern border with Guyana, a tributary of the Essequibo River not connected to the Orinoco. My Masters thesis project at the University of Manitoba in Winnipeg, Canada, under the supervision of Nate Lovejoy (now at University of Toronto-Scarborough) was



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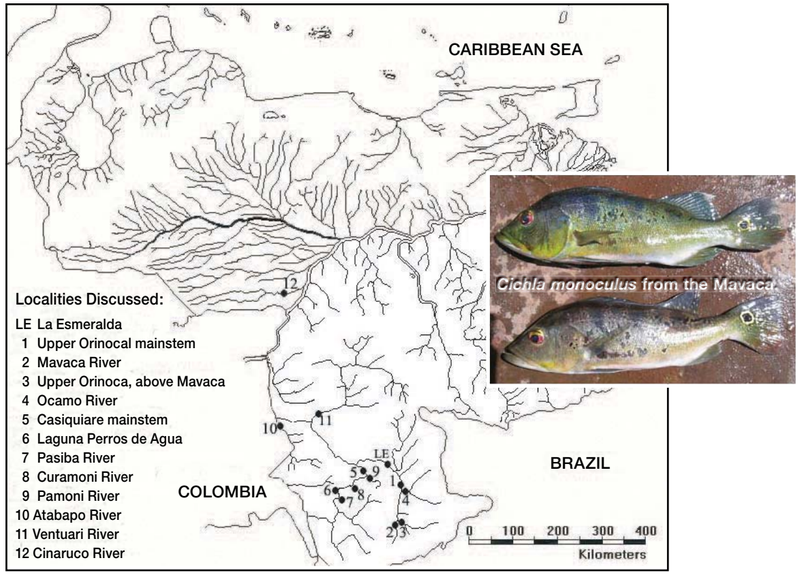
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Mavaca floodplain: habitat for *Cichla monoculus*.



investigating *Cichla* phylogenetics (evolutionary relationships) and phylogeography (lineage patterns with respect to geography) to provide insight into the biogeography and speciation of Neotropical fishes. As *Cichla* only contains five species (a number which may soon rise to more than 10), we felt this genus was a tractable place to continue the investigation of these phenomena. Relatively few other molecular biogeographic studies have been performed on Neotropical fishes, but their results had proven quite insightful, and so we hypothesised a cichlid group might prove a timely and informative addition. In order to more fully understand the phylogeographic pattern of *Cichla*, and particularly *C. monoculus* and *C. intermedia*, it was necessary to have samples of fishes from additional localities in the Orinoco. I was fortunate to have been able earlier to purchase samples of *C. monoculus* in the markets in Puerto Ayacucho (northern Amazonas state of Venezuela, just south of the Orinoco-Meta confluence); a surprise, because *C. monoculus* was not known to occur so far down-river. But localities you haven't been to yourself are inherently unreliable, and I needed more samples from known localities. As for *C. intermedia*, I had obtained samples from three good localities in the Orinoco, but I needed more samples from the upper Orinoco, where *C. intermedia* is apparently more common, probably due to greater availability of preferred habitat.

The Casquiare is a fascinating place biogeographically because it is a river which captures a portion of the water from the Orinoco headwaters, turns south-west and flows in the Negro basin, the largest tributary of the Amazonas River. Thus, the Casiquiare may provide a link between the ichthyofaunas of the Amazonas and Orinoco, but we don't know the age or significance of this connection. How might the Casiquiare have come to be? Many tributaries of the Orinoco flow off of, and the main channel of the Orinoco flows around the northern edge of, the Guyana Shield, a major Precambriam rock formation which lies below much of Venezuela, Guyana, Surinam, French Guiana, Colombia, and northern Brazil, and is homologous with the Brazilian Shield farther south. As the Andes Mountains have grown through time, however, they have pushed once more-western drainages farther east, and this is probably the case with the Negro headwaters (Lundberg et al, 1998). Through time, drainage capture resulting from this process has likely caused rivers which once may have flowed into the Orinoco to now flow into the Negro and Amazonas (eg, Siapa River), and possible vice versa (eg, Atabapo River), and the result has been a connection between the drainages. I knew before beginning the trip that fishes with both Orinocoan and Amazonian affinities inhabit the Casiquiare region. I suspected that the distribution patterns of different species would be based on historical drainage patterns. For instance, *Uaru fernandezyepezi* is endemic to the Atabapo River, a river that presently flows into the Orinoco, whereas all other *Uaru* (ie, *U. amphiacanthoides*) are confined to the Amazonas drainage (maybe the Atapabo flowed directly to the Amazonas at some point). On the other hand, *Cichla intermedia*, which appears for all other purposes to be an Orinoco endemic, is confined in the Negro drainage to the Casiquiare and is not more widespread in the Amazonas (maybe the Casiquiare flowed into the Orinoco long ago). However, others (ie, Winemiller et al, 2003) have suggested that distributions of fishes in the Casiquiare are largely determined by habitat characteristics and resource preferences, and that species are distributed along a gradient of conditions which change between the Orinoco and Negro-



↑ Dave, John, and Hernán (N-F) take it easy on the trip upriver.



One night's gill-netting and trot-lining. →







↑ Geophagus dicrozoster, mouthbrooding: notice the eggs with tiny embryos.

←← Our camp on the Mavaca River.

← *Satanoperca* sp 'Negro-Alto Orinoco'.

influenced areas. So observing these patterns firsthand was another objective, at least for me.

The trip was for logistical purposes divided into two portions, an excursion to the Mavaca and Ocamo rivers in the far upper Orinoco, and a stroll to the Casiquiare and its tributaries the Pasiba, Pamoni, and Curamoni rivers. This has been divided into three sections: our collections on the Mavaca and upper Orinoco, the Ocamo and Casiquiare mainstem, and our collections in the Pasiba, Curamoni, and Pamoni. To place the trip in context, most of our group spoke enough Spanish or Portuguese to make it around in Venezuela, as the trip would have been tough or impossible otherwise. We also had the benefit of academic connections in Venezuela to obtain fish collection permits, which are necessary for this work. Our group consisted of Kirk Winemiller, Hernán López-Fernández, David Hoeinghaus, Carmen Montaña, John Putegnaut, and me. From the Venezuelan capital of Caracas we flew on Rutas Aereas de Venezuela (a.k.a. Venezolana) airlines to Puerto Ayacucho (PA), the capital and largest city of the southern Amazonas state. In Puerto Ayacucho we collected permits to purchase gasoline from the Guardia Nacional (GN) and recognition letters from the Ministerio de Ambiente (thanks again to Carmen, who did most of the leg work), and any supplies we could not count on to purchase in the town in the upper Orinoco (eg, plastic ware, hammocks and mosquiteros, blankets, tarps, formaldehyde, alcohol). We had scheduled to fly all together on the "regular" flight from PA to La Esmeralda (LE), an eight-seat, two-prop plane for our six-person crew (plus pilot). One thing you don't consider much in flying jet airlines all the time is the weight issue. With our luggage we were just too heavy. Fortunately, the company (Wayumi) had a four-person single-prop plane which could bring up the rest of our supplies the following day, so we packed up what we could and flew out to LE.

La Esmeralda is an outpost town in the upper Orinoco, and its "airport" consists of a tarmac strip maintained by the GN that doubles as a road between different parts of town for the two non-military cars. The village makes its living by catering to the GN outpost and selling gasoline and supplies to the people from more remote villages. The majority of people in the vicinity of LE are Amerindians, from tribes such as Guahiba and Yanomomö, and they live in traditional villages along the tributaries of the Orinoco. After checking in with the GN in LE, we met up with the man who had been helping us to arrange the logistics for the trip for us by storing the gasoline, stockpiling important supplies, and arranging the boats. Levis Olive and his brother own and run the largest and most popular store in LE, are Wayumi's local agents, and are pretty much the go-to guys for anything on the Orinoco side of the Casiquiare (as opposed to the San Carlos do Rio Negro on the Negro River side of the Casiquiare). Levis introduced us to Francisco Yavinapi, a local man of Amerindian descent who owns and rents bongos and motors, and we arranged with him to rent a large metal bongo (~40ft or 13m), a metal skiff, and two 25hp motors. We also took with us a motorista (boat driver) and guía (guide). In retrospect, we should have hired a cook as well. Food staples consisted of rice, pasta, and crackers, but we also caught and ate many of our calories in the form of fish.

From LE we went upriver and camped the first night near the mouth of the Ocamo river. As was typical for the rest of the trip, we found a rocky outcrop along the river and cleared some brush to hang our hammocks and mosquiteros between trees with tarps slung over and tied with twine. It sounds very rustic but hammocks are quite comfortable and I quickly became used to the "natural" conditions afforded by the camps. We spent only one night there, and as it was late when we arrived, we only made some cast-net throws, but were able to collect *Geophagus dicrozoster*, a pink *Crenicichla* cf. *lugubris**, *Prochilodus* cf. *rubrotaeniatus*, *Leporinus fasciatus*, and several species of Loricariid catfishes (I think *Pekoltia* sp., *Lasiancistrus* sp. and *Dekeyseria* sp.). Just a few minutes of fishing in the mouth of the Ocamo the following morning, where some submerged rocks produce torrid currents, produced another *Crenicichla* cf. *lugubris*.

As we were in a hurry to get upriver, the next morning we headed straight up towards the Mavaca River after picking up another guide, a member of the local Yanomamö village (the current president of Venezuela relegated control of access to most of the Amazonas state to the local Amerindian groups, which is great, although one must get a permit from the agency for native affairs in Caracas, a process which often drags on for months or years. An unofficial bypass is to hire local Amerindians as guides, a decision which appeases the local groups and helps us by providing local knowledge of the landscape). The main channel of the upper Orinoco, our highway as it were, is in general a clearwater river (low sediment, soft water, slightly acidic to neutral pH, nutrient poor), as are most tributaries of the upper Orinoco. It only takes on a distinctly whitewater character (heavy sediment, neutral pH, nutrient rich) after its confluence with the Guaviare, Meta, and Apure rivers, the main middle and lower Orinoco tributaries flowing from the Andes in the west. So in the upper Orinoco, the Mavaca, which has a high sediment load as well, is an abnormality. After arriving there, we cleared the understory from a relatively flat area at the mouth on an oxbow lagoon, and slung our hammocks again between trees for the duration of our three-night stay. We began cast-netting immediately and set gill-nets and trot-lines each night to sample while we slept. We discovered that in comparison to local clearwater rivers the Mavaca had an above average biomass of fishes, probably from the increased nutrient load. There we collected fishes which were more typical of whitewater rivers, such as the piranha *Pygocentrus* cf. *caribe*, freshwater drums *Plagioscion* and *Pachypops*, and *Crenicichla* cf. *saxatilis*, as well as more ecological generalists such as *Geophagus abalios*, the fanged *Hydrolycus cf. armatus*, wolf characin *Hoplias malabricus*, *Serrasalmus manueli* piranha, freshwater herring *Pellona*, pike characin *Acestrorhynchus microlepis*, and a freshwater stingray *Potamotrygon* cf. *schroederi*, among others.

***** A note on the pink *Crenicichla*: there appears to be at least one undescribed *Crenicichla* of the lugubris group in Venezuela, which we often catch farther downriver in the Cinaruco river and other llanos (plains) tributaries of the Orinoco, and which has been provisionally referred to among ichthyologists familiar with Orinoco fishes as *Crenicichla* sp. "Orinoco-lugubris." In the upper Orinoco, we have collected *Crenicichla* which would also be referred to the lugubris group, but which was pink to flaming-red in color. However, as I have collected both forms together on the Atabapo and Ventuari, and I think they grade into one another, it is difficult to distinguish these as separate species, ecotypes of a complex species, or habitat-mediated or sexually-dimorphic forms of one species. Hernán has suggested to me that he believes that they are different species. For those additionally interested in *Crenicichla*, I have collected either or both of these forms along with *C. lenticulata* in the Atabapo, Ventuari, and Casiquiare, and with *C.* sp. "Orinoco-wallaci" in the Cinaruco, Ventuari, Atabapo, and Casiquiare.



Moderately-pink *Crenicichla* sp. "Orinoco-lugubris".



Dave cast-nets while waiting for lunch.



***Acestrorhynchus* cf. *microlepis*.**

The next day we set out in search of *Cichla* and split our group into two portions. The sediment-laiden main channel is not appropriate for *Cichla*, as visual predators prefer transparent habitats, so we directed our collecting to several floodplain lagoons recommended by the guides (several local Yanomamö from a village on the Mavaca had joined us too). During the wet season these lagoons flood and are connected to the main channel, but during the dry season (when we were there), they are above the level of the main river by about five metres. Floodplain lakes are usually formed as oxbow lakes which slowly fill as sediment settles into them. The floodplain lake my sub-group visited was quite shallow and surrounded by dead and rotting trees. It was a precarious matter to balance on some of the trees jutting out into the lake, cast and retrieve, and especially land fish, and it took hours for us to hold in-hand our first *Cichla* of the trip. But it was worth it, as this *Cichla* turned out to be *C. monoculus*, the very species I was most worried about collecting! So, once we determined *C. monoculus* were there, we hacked a path through the forest with machetes and dragged our skiff into the small lake. Round and round we went, casting over and over again, and finally caught … SIX! It sounds like very few, but when you target particular species, you take what you can get. With hook-and-line we also caught several *Hoplias malabaricus*, and we observed but did not catch smaller cichlids like *Heros* and *Mesonauta* cf. *insignis* living among the sunken trees. As mid-day approached, we caught up with the other group and had a cook-out with the *Cichla* and *Hoplias* that we had collected. They hadn't had any luck with *Cichla* in the other lagoons they tried, but they had caught *Geophagus* sp., *Aequidens* sp., *Heros* cf. *severus*, and an undescribed member of the *Satanoperca jurupari* group that we call *S.* sp. "Negro-Alto Orinoco." After lunch the whole group went back to the first and an adjacent lagoon and collected seven more *Cichla*.

Part II: the upper Orinoco, Ocamo and Casiquiare Main Channel

Our second day camping in the Mavaca River we left camp in place, on the Mavaca River, boated back down the river to the Orinoco, and turned and went upriver. We were curious to see what fishes we could catch there, but were unimpressed with the habitats (mostly sandbanks with little structure) until we stopped to fish with hook-and-line at a large rock outcropping around which the water flowed fairly quickly, good habitat for *Cichla intermedia*. It took some time for us to begin catching anything, but finally after an hour or so we caught a *Pellona* freshwater herring and several *Serrasalmus rhombeus* black piranhas. I knew that *C. intermedia* should have been there, but was frustrated that either our jigs weren't getting into the rocks where they were, or that they had just been fished out. Finally, as we were just deciding to give up, Carmen caught a single, *beautiful*, *C. intermedia*. One sample is better than none, and I counted myself lucky. The generally nutrient-poor habitats of the upper Orinoco probably harbor relatively low densities of these fishes, but fish population levels may also have been depressed in this region in recent years due to shifts in resource-use by the local population (see below).

During the nights on the Mavaca, John, Carmen, our guide Johnny, and I boated away from camp to find a deep spot in the river in which to fish for the large catfishes which occur in the Amazonas and Orinoco rivers, such as *Brachyplatystoma*, *Pseudoplatystoma* (tiger shovelnose), and *Hemiliopturus* (redtail cat). These were fishes Carmen was particularly interested in having samples of, and we fished for them using chunks of characin fishes (*Mylossoma*, *Myleus*) on large hooks with heavy weights to sink them in the current. However, we were frustrated not to have any luck catching catfish or even stingrays, usually alternatives with night fishing. At night the zancudo (traditional mosquitoes) come out, and it's necessary to take pains to keep them off of you by wearing long sleves, pants, and insect repellent. This part of Venezuela is known for malaria, and although we were all taking medicinal prophylactics, prevention is always the best measure. During the day the zancudo weren't so bad, but then we had to contend with the mosquitos (ie, black flies, it's Spanish for 'little flies'), which don't carry malaria, but are more stealthy and usually exist in huge numbers. In several places these insects where quite oppressive, and one of the tributaries of the Casiquiare (the Siapa) is rated as the among the world's contenders for highest density of biting insects. In retrospect we didn't bring anywhere near enough repellent for this trip.



Rocks and swift water on the Ocamo, good habitat for *Cichla intermedia*.

After our third night on the Mavaca we went back downriver and up the Ocamo, a clear-water tributary. We had collected so many fish by gill-netting on the Mavaca that we could not possibly keep and eat all of them ourselves, and so we were confronted with what to do with them. Someone had the bright suggestion to visit the Yanomamö village we had passed on the way up the Mavaca, and give the remaining fresh fish to them. Kirk had brought a Polaroid camera that he knew was popular from previous experience, and offered to take and donate pictures of the villagers, while the rest of us took shots of the event with our digital cameras. Several of us also traded extra fishing hooks for woven baskets, and John took the opportunity to try the local variety of tobacco, which the Yanomamö roll into a cylinder and hold against their gums (an experience he wouldn't recommend, in retrospect). I have been told the Yanomamö are typically upland hunters, seldom making their villages along the rivers. But several generations of changing culture and overhunting as a result of outside influence has decreased the local abundance of game and increased their reliance on starchy crops like yuca (cassava, or manioc: a plant root not unlike a potato, which is usually made into manioco in Venezuela or farinha in Brazil). A reliance on starchy foods can result in the



Cichla intermedia from the Orinoco above Mavaca.



Carmen catches the only Cichla from the Orinoco above Mavaca.

swollen bellies seen in many Yanomamö children as a result of protein starvation (children must eat more food to get the requisite amount of protein, but consume more than sufficient calories; this phenomenon is also contributed to by parasites). Even though fish are available to be caught for protein in most places, most Yanomamö allegedly don't have the desire or supplies to be fisherman. These people were quite grateful for our gift of fish meat.

The Ocamo flows off the Guyana shield, and unlike the Mavaca, has high transparency, low nutrients, and neutral to slightly acidic pH (ie, clearwater). The fish fauna here was distinctly different (see below) and lower in biomass than the Mavaca, but seemingly less impacted than some parts of the river with more people (ie, near La Esmeralda). We had to scout for several hours to find an appropriate spot to make camp along the Ocamo, as the banks of the river were quite steep. The first spot we tried, on the peninsula where Caño Sangre (a blackwater creek with tannin-stained, low-sediment, low-pH water) joins the Ocamo, was quite small and would have required us literally to monkey up trees and vines 5-7 meters each time we returned to camp to cook or sleep. We finally made our camp in a similar location to the Mavaca, clearing the understory among trees in the floodplain of a small stream (Caño Amapué). Unfortunately, we also chose a spot right on top of an ant colony, a mistake we suffered through over the next couple of days!

The clearwater Ocamo has numerous rocky outcroppings with relatively high flow velocity, and the three conditions are the preferred habitat of *C. intermedia* (Jepsen et al, 1997), which were relatively easy to collect with hook-and-line during the day and by spearing them at night as they slept among the rocks, for a final total of 15 fish. After achieving the *Cichla* objectives for the upper Orinoco which I expected to be the most difficult, we set out in search of the more common *Cichla* species, *C. temensis* and *C. orinocensis*. We again split into two groups, with one group going in the skiff back to Caño Sangre, and the other group going upstream to look for other fishes. The first group didn't succeed in finding either "common" *Cichla* species, which we know do occur on these rivers because Carmen had earlier collected *C. temensis* on the Iguapo (a nearby,



Ichthyologists in La Esmeralda (l-r): John, Kirk, Hernán, Carmen, Dave, the author.



***Cichla intermedia, Brycon* sp., and *Serrasalmus rhombeus*.**



Trading with the Yanomamö on the Mavaca.

similar river). They did manage to capture a large *Brycon* (that was delicious), and several *Serrasalmus rhombeus* black piranha, which seem to prefer black and clearwaters, and several more *C. intermedia*. The other group, of which I was a member, went up and collected by seine along some shallow sand beaches and neighboring leaf-litter. We collected a number of interesting things, including *Apistogramma* sp., *Bujurquina* n. sp., *Aequidens* cf. *diadema*, an interesting green *Characidium* darter characin, *Farlowella* twig catfish, and several other species of Loricariids, and numerous other small characins I didn't even try to identify to species in the field, among them *Hemiodus*, *Hyphessobrycon*, *Moenkhausia*, and likely several species of *Hemigrammus*.

The following day we packed everything up and headed back to La Esmeralda so Kirk, Hernán, and John could depart on another tiny plane to visit to the Cinaruco in the llanos, and David, Carmen, and I re-supplied we so could head on to the Casiquiare. In a slightly smaller bongo (~30ft or 10m), with a skiff and two 25hp motors, Carmen Montaña, David Hoeinghaus, and I set off from La Esmeralda downstream to where the Casiquiare veers south-west to the Negro, and the Orinoco continues north-west. I expected the drainage division to be something spectacular, a giant waterfall with rainbow, maybe with fireworks and dancing native girls celebrating the biogeographic significance of the connection, or at least a sign with two arrows pointing "Negro this way, Orinoco this way." But the reality was much less spectacular, and all the more intriguing. The spot is marked on the northern side by a Guardia Nacional (GN) station and a mission called Tama Tama, where we had to check on our way to the Casiquiare. The connection itself is no more conspicuous than many small rivers that connect to the Orinoco in this region: maybe 50m (150ft) wide and not more than 4- 5m (12-15ft) deep in the dry season (small by Neotropical standards). This makes it all the more interesting to think that the ancestors of many of the species



Laguna Perros de Agua *Acestrorhynchus* cf. *heterolepis*.



Laguna Perros de Agua (blackwater) *Cichla orinocensis*.



Crenicichla lenticulata from the Casiquiare main channel.

held in common between the Amazonas and Orinoco probably had to pass through this tiny river.

We had caught the *Cichla* that are generally uncommon in the Orinoco, *C. monoculus* and *C. intermedia*, during the previous week on our jaunt to the Orinoco headwaters, but still had no samples of *C. temensis* or *C. orinocensis*, the most common Orinoco species. I was anxious to get samples of the latter from anywhere on our trip, upper Orinoco or Casiquiare. But now that we were going to the Casiquiare, my need for *C. monoculus* and *C. intermedia* again took precedence due to some theoretical considerations of my project. A null hypothesis of Neotropical fish phylogeography, in specific reference to the Casiquiare as a connection between the Amazonas and Orinoco river drainages, would be that any disjunction in gene flow among populations would align with the drainage division, so that fishes in rivers that flowed to the Orinoco basin would be a population, and fishes in rivers that flowed to the Negro (an Amazonas tributary) basin would be a population. However, should that null hypothesis be rejected, the first logical alternative hypothesis would be to expect that fish species with distributions in both drainages would show no divergence in genetic diversity among populations in each drainage, that is, that fishes use the



***Farlowella* sp. from leaf-litter near a sandbank in the Ocamo.**



A herd of hairy spiders emerged beneath Dave's hammock.

Casiquiare as a conduit for gene flow between populations in each drainage. Additional alternative hypotheses would be more complex patterns, such as recent or historical range expansion from one basin to another, or stochastic lineage sorting among populations in each drainage due to overall low gene flow. However, to test this, ideally I needed samples from the immediate vicinity on each side of the drainage divide, where the Casiquiare flows away from the upper Orinoco. So, we were again looking for all four of the five valid species found in Venezuela (excluding *C. ocellaris*).

Our first night in the Casiquiare was spent on a sand-bar not far from the head of the river. We cut some logs and buried them upright in the sand, and we hung our hammocks among them. After discovering a jaguar track on the sand bank (cool!), we hung trot-lines in hopes of big catfish (*Brachyplatystoma*, *Pseudoplatystoma*, or *Hemiliopturus*), and after several hours of darkness poled the skiff over to some rock outcroppings that looked promising for dip-netting fishes. The Casiquiare at its source is a clear-water, but takes on a much more blackwater character as it travels along and connects with many blackwater tributaries. Kirk Winemiller and Hernán López-Fernández had conducted a study in which they concluded fishes in the Casiquiare were distributed along ecological gradients, the most distinct of which was water type and associated parameters (Winemiller et al. 2003). I, on the other hand, believed that fish distributions must be mostly directed by historical hydrographic nets, as in which rivers might have historically flowed to the Negro or Orinoco. In the rocks in the Casiquiare channel we caught cichlids typical of clearwater rivers, such as *Geophagus dicrozoster*, *Satanoperca* sp. "Negro-Alto Orinoco," *Heros* cf. *severus*, *Mesonauta* cf. *insignis*, *Hoplarchus psittacus*, *Crenicichla lenticulata*, and one *Cichla intermedia* (yeah!). We also caught other interesting fishes like *Erythrinus erythrinus* and *Prochilodus rubrotaeniatus*. These fish were easy to scoop up as they slept by spotting them first with a flashlight, and in many cases it was easier to just grab them by hand rather than wake them while maneuvering the dip-net. The *Heros* were particular interesting too, as several minutes after placing them in a bucket, one of them spit out a herd of baby cichlids. I had read reports of mouthbrooding *Heros*, one of only a few mouthbrooding heroine cichlids I'm aware of, but it was cool to see it first-hand. We were also able to dip-net a small stingray our guide called the "tigre" (jaguar) variety (probably *Potamotrygon orbignyi*).

The next morning David made the disturbing realisation that a nest of baby tarantulas had emerged directly beneath his hammock (as he put his bare feet to the ground). Undaunted, he took to photographing them. We checked the trot-lines and discovered we had caught a *Pinirampus pirinampu* catfish, not one of the species we were hoping for but a good catch nonetheless. In the afternoon we stopped at a rock outcropping (Piedras Perro de Agua) to camp and fish the nearby lagoon (Laguna Perro de Agua). The lagoon is a small oxbow still connected to the Casiquiare, but fed by several creeks of distinct blackwater character. The transition was dramatic. After a few minutes of no luck in the lagoon, which was distinctly dark and tea-colored and filled with aquatic macrophytes (probably *Cabomba* sp.), we suddenly began to catch *Cichla orinocensis* so fast that I had trouble sampling and releasing them fast enough! The lagoon was absolutely filled with *C. orinocensis*, and it seems that they were nesting and were excluding almost everything else (*Cichla* are very territorial nesters, and the only other things we saw or caught were several large *Acestrorhynchus* cf. *heterolepis* and a *Hoplias*). By this time, my biogeographic theory for fish distributions was beginning to unravel, as clearly this little oxbow had no clear biogeographic history independent of the Casiquiare itself, yet had a distinctly different fish assemblage. After such success we decided to spend the night at Piedras Perro de Agua and feast on fish, and trot-lining in the main channel during the night produced five large *Potamotrygon orbignyi* (four females, one male), and one *P. motoro*. A gross phenomenon that I was reminded of is that pregnant female stingrays usually abort their growing young when landed. David was fascinated enough to film the whole thing for posterity.

Part III: Casiquiare tributary rivers Pasiba, Curamoni, and Pamoni

The day after Perros de Agua on the Casiquiare main channel saw our arrival at our farthest destination, the distinctly blackwater Pasiba River, a tributary of the Casiquiare. A few hundred yards away from its mouth the Pasiba, along with its major tributary the Pasibita, opens up into beautiful, shallow lakes which are filled with aquatic grasses. This river, along with the Pasimoni farther south-west, is known to anglers who fish the Casiquiare for its populations of large *Cichla temensis*, which by some accounts is the largest of all cichlids. Our first afternoon was spent navigating the grass beds of the Pasibita in the skiff, catching numerous *C. orinocensis*, but only two *C. temensis*. We made our camp along the shore of the channel between the Pasibita lake and the Casiquiare, and we hung our hammocks among the short shrubs that grow along the river. When darkness fell Carmen and I set about seining and dip-netting fishes sleeping near the shoreline. The distinction in the fish fauna from clearwater and whitewater collections was dramatic. Not 200 yards from the clearwater Casiquiare and we were catching cichlids and other fishes we had not seen in a week and a half of previous collections. *Satanoperca daemon*, *Dicrossus* cf. *filamentosus*, *Crenicichla* sp. "Orinoco-*wallaci*," and *Biotodoma wavrini* were the new cichlid components (in addition to *Mesonauta*, *Apistograma*, and *Bujurquina*), and other new fishes were *Chalceus macrolepidotus* (pink-tail chalceus), *Hemigrammus rhodostomus* (rummy-nose tetra), *Belonion* cf. *dibranchion* (a small, paedomorphic needlefish), *Fluviphylax* cf. *obscurum* (lampeye), *Brachyhypopomus* sp. (a knife fish), and *Leporinus* sp. "doble-raya" (a complex with *L. fasciatus*). This was the last straw for my historical biogeographic theory of fish distributions, at least in the near reaches of the mainstem Casiquiare, and really cemented in my mind that fishes in this region really do key very distinctly to water quality differences as Winemiller et al. (2003) had suggested (a.k.a. ecological biogeography).



Dave with one of many *Cichla orinocensis* on the Pasibita River.

Since we hadn't been able to collect *Cichla temensis* by day, we guessed that we could be more selective at night by spotlight. So after it had been dark for several hours, Carmen and I woke our guide Johnny and took the skiff out into the lake to try to dip-net or spear *Cichla*. It turned out to be a wasted effort. Even just poling ourselves along in the lake, the *Cichla* were just too skittish to let us get close enough to even see what species they were, let alone scoop them up. And as if that weren't defeating enough, the rain clouds we had thought

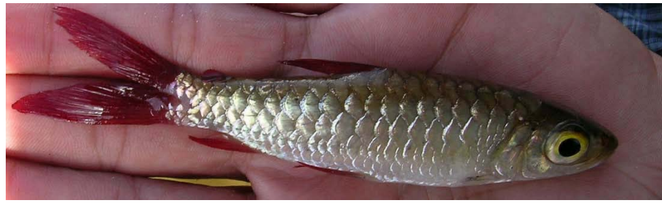
***Crenicichla* sp. "Orinoco-wallaci".**



***Leporinus* sp. "doble-raya".**



Pink-tail *Chalceus macrolepidotus*.



would stay in the distance suddenly decided to thunderstorm with us stuck in a metal boat in the middle of a lake. Lightning aside, the rain at first was freezing, and it came down so hard we lost our bearings! So, to find camp again, we started picking a direction and going until the motor clogged with weeds, cleaning it, and picking a new direction. Finally, the rain let up and we were able to find our way along the shore with the light. It was a pretty sad ordeal! Upon returning to camp, we made the unfortunate observation that Carmen had forgotten to put her tarp on her hammock, and it was soaked. So, since I was so grateful for her help in arranging the trip, she took my hammock and I slept in the boat with towels draped across me for the bugs. I don't recommend wooden planks for a bed, if you can help it.

I awoke the next morning in a daze. Looking out of the boat at my surroundings, I didn't recognise where I was. I appeared to still be in the Pasiba, but the hammocks and camp were nowhere in sight. Luckily, our guide and motorista, who had hung their hammocks inside the boat (under the roof … smart), were with it enough to realise that we had just floated downstream a few metres and were just out of sight of camp. Whew, better than thinking David and Carmen had been kidnapped or swept away by the storm! After setting our things to dry, we headed back out into the Pasiba lake, rather than the Pasibita where we had been. David and our guide went in the skiff while Carmen, the motorista, and I took the big boat in a separate direction. We learned fairly quickly that *C. orinocensis* and *C. temensis* prefer different parts of the lake. It took us a while to figure out, but in the meantime I got to observe some interesting dynamics in the local ecosystem. When the water is low and the *Cichla* are concentrated, they seem to be very often pursued by the freshwater dolphins (*Inia geoffrensis*), who probably aren't fast enough to catch them when they have someplace to go. The *Cichla* don't give up without a fight, though. Several times, when a dolphin would run up on a group of *Cichla*, I saw the *Cichla* go as far as they could, encounter a mat of weeds, and then clear the water trying to escape being eaten. It turns out that *C. orinocensis* here prefer the shallower habitats among grass beds, habitat which may make them particularly susceptible to these attacks from opportunistic dolphins. *Cichla temensis*, on the other hand, were much more common where the lake was relatively deep (>~6ft or 2m) and where there was a steep edge to the bank that gave them some cover. Even on these deeper habitats, we found that they would often repeatedly attack top-water lures dragged dramatically across the surface. This way we were able to get our required sample of both species. David was able to catch two 2kg and one 3.4kg *C. temensis* in a morning, and Carmen and I had both caught 2kg fishes: not world records, but good catches for our trip. David had also managed to locate a pocket where *C. monoculus* were intermixed with *C. orinocensis* in the lake with no discernable segregation of habitat (which *C. orinocensis*, *C. temensis*, and *C. intermedia* do show in other rivers; Jepsen et al, 1997), and while I took samples from the fish he had caught, he and Carmen returned to the spot to get more *C. monoculus*. It is also interesting to notice that we didn't capture or see any *C. intermedia* in the Pasiba. From my observations, it appears to me that they don't seem to like the very distinct blackwater habitats (though moderate blackwater they seem to tolerate).

Having caught what *Cichla* we could on the Pasiba, we headed back upriver to visit additional tributaries we had passed along the way. We stopped several times to fish in the rocks in the clearwater main channel of the Casiquiare, and in this way were able to catch a number of *C. intermedia*. *Cichla intermedia* have the potential to be big fish, but the majority of fish we caught in the Casiquiare were relatively small. Carmen and I have caught 2-2.5kg *C. intermedia* in several places, but these were in ecosystems that may have been more productive than the Casiquiare clearwaters, or the small size of Casiquiare *C. intermedia* may have been a result of the habitats we were fishing in there. Most of the spots where we caught *C. intermedia* were riffle/rapid type of habitats not more than 1m deep, in and around boulders and piles of smaller stones. Larger *C. intermedia* may be few and prefer deeper spots. In these habitats we also often caught *Crenicichla* "Orinoco-*lugubris*" and *Serrasalmus rhombeus*. Additionally, on our way back up the river, we also caught the other three species of *Cichla* in the main channel, though in many fewer numbers than the *C. intermedia*. We caught two very young *C. orinocensis* in a shallow spot along the shore of the main channel, one *C. monoculus* was caught in the mouth of the Pamoni, and one 3.4kg *C. temensis* David caught in a deep hole along the bend of an island in the main channel. This is significant, because even though the main channel appears to be sub-optimal habitat for these three species, they still apparently travel along it, likely connecting each of the larger populations in the tributaries by gene flow. In addition, one of the rocky outcroppings we stopped at was particularly interesting to me, as it was surrounded by cichlids using it for cover. Among these were three *Pterophyllum altum* (altum angels), which were the first that I had seen in the wild (they're not terribly common), along with *Mesonauta*, *Heros*, and *Hoplarchus*. Try as we might, we couldn't snag them from their rocky refugia, although it would probably have been easy had we been there at night.

Our next stop was another blackwater tributary of the Casiquiare, the Curamoni River. Much smaller than the Pasiba, the Curamoni exhibits many of the same types of habitats but on a smaller scale, and we expected to get the same *Cichla* fauna. However, fishing for several hours produced only a very few *C. orinocensis*, and we soon discovered why. We pulled up to shore alongside a large bongo with people who had traveled from the upper Orinoco (Tama Tama) to exploit the denser resources on the Casiquiare tributaries. Their bongo contained three giant bins (1.5m diameter, 1m deep) that they were filling with meat which had been stripped from fish and rubbed with salt for preservation. The bins were 75% full, and they told us they would stay until the bins were full. Among the fishes they had harvested were the three species of *Cichla* we had expected to see (*C. temensis*, *C. orinocensis*, and *C. monoculus*), along with large *Acestrorhynchus* cf. *heterolepis* (pike characin) and *Pseudoplatystoma fasciatum* (tiger shovelnose). It seems strange to me that they would choose a smaller ecosystem to exploit, considering the Pasiba might have sustained this type of harvesting, where the Curamoni probably could not. However, the Curamoni is closer to the Orinoco than is the Pasiba, and gasoline is a scarce commodity in this region (gasoline is rationed by the military along the border with Colombia and Brazil, in an effort to keep it out of the hands of guerillas, gunrunners, and illegal goldminers). In the long run the Curamoni will likely be populated by fishes from other tributaries, but at what cost to local genetic diversity? My guess is they're going to continue to pound the river each season, rather than let it recover.

On the way to our next stop, the Pamoni, our guides pointed out some petroglyphs made by ancient Amerindians of the Casiquiare. Depicted on large rocks in the main channel were monkeys, fishes, and indiscernible symbols. Upon arriving at the Pamoni, which is a clearwater river, we found hook-and-line fishing there less than productive. Although we repeatedly hooked *C. intermedia*, they were too small to hook well and bring to the boat. Instead, we spent some time cast-netting and seining to sample smaller fishes. In this way we caught *Apistograma*, *Biotodoma wavrini*, *Dicrossus* cf. *filamentosus*, *Geophagus dicrozoster*, *Satanoperca* sp. "Negro-Alto Orinoco," and *Rineloricaria*. And with that, our active collecting was over.

Upon arriving back in La Esmeralda we had to arrange a charter flight to get out of Dodge. The night before we flew out we were confronted with a weight problem Along the trip we had taken tremendous numbers of

***Satanoperca daemon*.**



Petroglyphs (monkeys?) from the Casiquiare.



Fishes harvested from the Curamoni river.









Top:
Dave with reproductive (L) and non-reproductive (R) *Cichla temensis* on the Pasiba.

Middle:
Casiquiare-Negro left, Orinoco right … then straight on till morning!

Bottom:
The author with a small Casiquiare *Cichla intermedia*.

specimens, and now had two large containers full of fish in formol to return to Puerto Ayacucho so they could be taken to the museum in Guanare. When all was said and done, we just sneaked by under the limit. The trip back through the Ayacucho airport was relatively smooth, with the Guardia reviewing our baggage as we returned. In all, the trip was quite productive, having collected samples of all the species we were interested in, from numerous localities, and from a number of species we might be interested in investigating in the future. I also had the opportunity to explore my historically-contingent theory of fish distributions against an ecologically-based one (Winemiller et al, 2003), and concluded in agreement with that study that local patterns are significantly influenced by the interaction of local habitat characteristics and the resource preferences of different species, although I am still confident that the construction of region-scale fish assemblages are influenced at least as much (or more) by history, as ecology.

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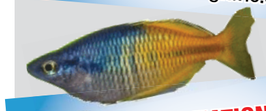
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AUSTRALIAN & NEW GUINEA FISHES ASSOCATION

Meets bi-monthly at the Field Naturalist Club, 1 Gardenia Street, Blackburn.
Contact: angfavic.org



NATIONAL AUSTRALIAN KILLIFISH ASSOCIATION

Meets Bi-monthly in members' homes.
Call:
Emma Jenkin 9442 3408.



EASTERN DISTRICTS AQUARIUM SOCIETY

Meets on the 4th Friday of the month at Nunawading Civic Centre, Whitehorse Road, Nunawading.
PO Box 3005, Nunawading 3131



AQUARIUM SOCIETY OF VICTORIA

Meets on the last Thursday of the month at 29 Grant Street, Clifton Hill.
Call:
Daryl Maddock: 9874 1850.

the last word

By Daryl Hutchins

David Green and myself recently represented the VCS at a 60th Birthday bash for the Eastern Districts Aquarium Society.

A most enjoyable evening it was too. We were seated with friendly people, the food was very good, the speaker was most interesting and the live entertainment outstanding.

The Master of Ceremonies did make an error of fact in response to a member's query about the club's magazine, saying that the club's journal was the first [didn't catch the locality] to go electronic. I didn't feel it appropriate to interrupt the festivities on such an unimportant point, but as I don't have a lot to say this month, I feel compelled to correct his statement here for the benefit of anyone attending as, unchallenged, such statements tend to become "fact".

If we're talking Melbourne/Victoria/Australia, *Fishtales* was NOT the first electronic magazine. Technically, *TCM* was available "electronically" since 1994, but it has been available as a pdf since March 1997. Predating the electric *Fishtales* by nearly two decades.

First-place in dropping the paper version, however, is hereby conceded to EDAS/ASoV.



IMAGE: Fiona Reed



VCS Certificate of Incorporation #A0012794D