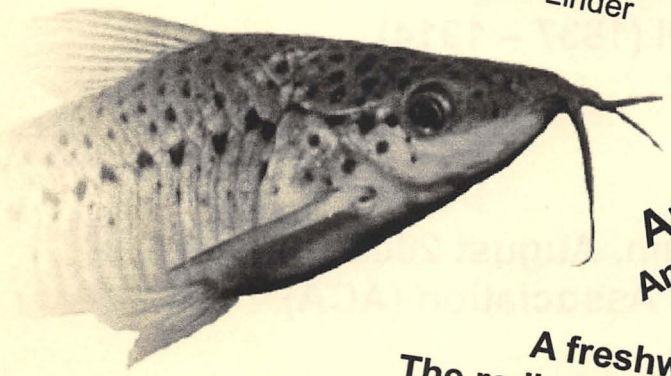
CAT CHAT

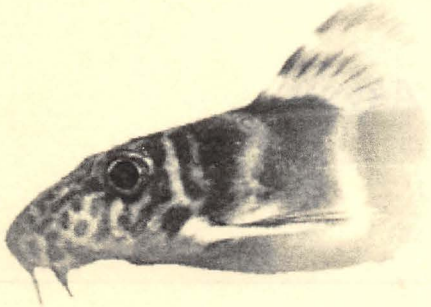
The Journal of the Catfish Study Group (UK)

Parasitic Catfishes in the Aquarium
R. Shane Linder

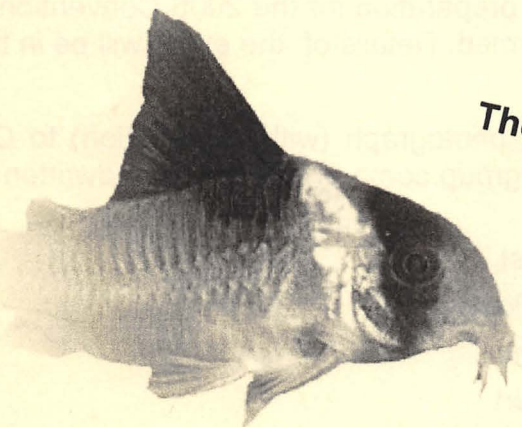


Amazon Rivers Program
Amazon Conservation Association
Text by Dr. Michael Goulding

A freshwater *coelacanth* story:
The rediscovery of the giant pancake-headed catfish *Pardiglanis tarabinii*
Dr Luc de Vos



Yet another bumblebee:
miniature catfishes of the genus *Akysis*
Heok Hee Ng



Theodore Nicholas Gill (1837 – 1914)
An insight by A W Taylor

Volume 6 Issue Number 2
June 2005

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From the Editor

Without letting the catfish out of the bag, the preparation for the 2006 Convention is well under way. The speakers have all confirmed. Details of the event will be in the next Cat Chat, hopefully with prices etc.

Anyone who wishes to submit an article or photograph (with explanation) to Cat Chat should e-mail it to <editor@catfishstudygroup.com> or by post (handwritten or on a disk) to

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CAT CHAT

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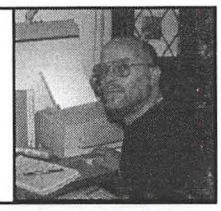
From the Chair



Hello everyone, welcome to 'Cat Chat'.

The April meeting was cancelled because of several factors, one of which being the British Cichlid Association convention being held on the same day.

Everything was back to normal for our May meeting, where Danny Blundell put on a presentation for the days discussion on the African Catfishes Mochokidae.

The subject 'Miniature Catfish' for the June meeting will cover quite a wide spectrum of fishes, and should be very interesting, there are so many diverse fishes that fit into this category that we may even require a second meeting to cover them.

Preparations are well under way for the first ever weekend Catfish Convention to be held in the UK. The venue is, The Britannia Hotel, Standish, Nr Wigan. The dates for you all to remember is **18th-19th February 2006** with a pre-Convention dinner and Catfish Forum being held on the evening of Friday 17th, the Forum panel will be announced a little nearer the time. Four speakers have been booked and confirmed, they are Dr Stanley Weitzman, Curator of Fishes, Smithsonian Museum, Washington, USA; Lee Finley, USA; Hans-Georg Evers, Germany; Ingo Seidel,Germany. The program will be in the September Cat Chat.

Until next time happy (Catfish) keeping. Ian.

British Cichlid Association Convention

Ian Fuller

Co-Operation, collaboration or just plain mutual support, this to me, seems the way to go when specialist groups hold their annual events. As you will already be aware, the BCA supported us at our Convention in February. In return I, along with our Secretary, Adrian Taylor, were up bright and early, and heading for Henley in Arden.

We arrived in plenty of time but due to a slight technical hitch, as is customary at these events, the key holder was conspicuous by his absence. With a little ingenuity, access was gained.

Eventually, with everyone seated, Chairman Pete Liptrot gave an introduction and the day's events got under way.

Once I settled into my seat I realised why we changed the venue of our CSG Conventions, to a nice warm hotel conference room. The early months of the year can be cold and this day was certainly on the nippy side. When the first of the two auction sessions started I wondered how the fish would fare. Being a Catfish person I would not have been too worried, as many Catfish prefer cooler temperatures but I was not so sure how cichlids would handle the temperature when the lots were laid out on tables prior being auctioned.

Not being familiar with Cichlids, I couldn't say if the buyers or the seller were getting good deals but the bidding was brisk and everyone seemed happy.

The first talk of the day was by Ian Watson, a Fisheries Biologist and former Chairman of the BCA, who has a special interest in Tropical Environments, particularly the collection of ornamental fish. Ian's talk was about the development of Project Iwokrama in Guyana, which promises to return some of the old classic species that many of us were weaned on and also bring some exciting new ones into the hobby, at the same time providing a sustainable source of income for local people. For a while I felt quite at home, as most of the species shown during the talk were Catfish. Like most good talks they finish all too quickly and it was time to head for the refreshment table and grab a nice cup of hot coffee.

After a break, where I found myself chatting with several old friends, some of whom I had not seen in years, the program re-started with the second auction and was soon followed the second speaker for the day Jos Snoeks from the Africa Museum, Tervuren, Belgium. At first, if I am totally honest, I thought I would be bored but that was certainly not the case. I listened with interest and learned many things about the diverse habitats and specialist species of the rift lakes. As a result, I may even take my Catfish blinkers off and venture into the realms of Cichlids and try my hand at keeping a few of the not so specialist rift Cichlids.

All in all I had a very enjoyable day and I will certainly be attending next years event, hopefully it will be a little warmer.

Parasitic Catfishes in the Aquarium

R. Shane Linder
shane@planetcatfish.com

The call came early on a Saturday morning.

"Hey Shane, this is Rhonda at the pet store. We received some strange catfishes in our shipment today. Actually, we are not even sure if they are catfish. Can you come take a look at them?"

Telling me there is a new unidentified catfish around is probably the fastest way to get me moving on a Saturday morning. I grabbed a couple of books and headed down to the pet store.

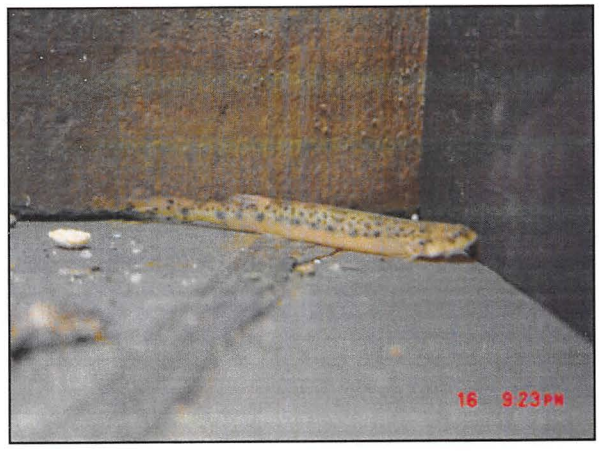
Once I saw the fish I knew the trip had been worth my time. Nearly lost in a fifteen gallon tank, sat half a dozen tiny catfish. They were each just over an inch long and less than the diameter of a pencil.

"Are you sure they are catfish? They look more like loaches."

"Yes, they are catfish. Remember that all loaches have scales and all catfishes do not. These fish are scaleless."

I was looking at the first member of the catfish family Trichomycteridae (pronounced trick-oh-mick-TARE-id-dee) that I had ever seen. I explained that these catfish were members of the same South American family as the infamous candiru. The candiru are a group of parasitic trichomycterids that enter the gill cavities of other fish. Once inside the gill cavity, the candiru expand sharp spines (known as odontodes) on their gill covers, anchor themselves in the host's gills, and feast upon the soft gill tissue or suck blood from their unlucky host.

I wondered if the trichomycterids in the store were parasites or not. Only a few members of the family are actually parasites. The majority of species live secretive lives hidden among the leaf litter or burrowed into the sand or mud substrate. Most trichomycterids also feed on what we would consider a normal diet of insects, small worms and the like. Of course, the next question was if I wanted these fish. I thought about it a minute but was not too sure. Then I heard the magic words, "You can have them for free." The pet store was obviously not as impressed with these interesting little catfish as I was. Along with the trichomycterids, I brought home a large feeder goldfish. I had no idea if these fish were a parasitic species, but I wanted to place them with potential prey and see if they reacted.



For my newest charges I prepared a ten gallon tank with a sponge filter. I was, it turned out necessarily, afraid that the catfish might be attracted to the current near the intake of any other type of filter and lodge themselves in the uptake. The sponge filter's return was kept above the water line so that the fish could not enter it. The tank was set up with a substrate of fine sand. The trichomycterids immediately buried themselves in the sand alligator fashion with only their eyes showing. The temperature was kept at 75F and the water soft (2 GH) and slightly acidic (pH 6.8).

After hours of observation, I was quite sure that the

fish burrow as a defensive measure, to hide from predators, and not as an offensive measure, to ambush prey. After a few weeks the fish must have realized there were no predators and stopped burying themselves. Many catfishes lose their natural instincts in aquariums. *Corydoras*, for example, will stop schooling, a natural defensive measure, in the aquarium. However, when *Corydoras* perceive danger, such as during a water change, they revert back to their natural instincts. During a water change, *Corydoras* will form a tight school, but within a few hours they will once again be spread out all over the aquarium. These trichomycterids behaved in a similar manner and after a few days only burrowed into the sand when they were frightened.

A few large rocks and a piece of driftwood covered with Java moss completed the artificial habitat. After the trichomycterids stopped burying themselves, they would spend their days perched upon the rocks or driftwood. They remained inactive for long periods of time but would occasionally dart to the surface. Because the fish are so small, and there is no coloration on the underside, it is possible to see through their skin and into their stomachs. I often noted air bubbles visible in their gut and believe that this species is capable of breathing atmospheric air in a manner similar to that practiced by *Corydoras*.

The next morning I took a close look at my new set up and was very surprised to see that the goldfish was now completely white. Closer inspection revealed that, with the exception of a few scales on the caudal peduncle, the goldfish was completely scaleless. The catfish sat listless on the bottom, their translucent bellies were glowing bright gold as a result of their recent meal. The reflective gold scales were clearly visible inside the trichomycterids. Well, I thought, there is your answer. These are definitely parasites. A few members of the family are known to be scale-eaters or mucus-eaters. The mucus-eaters feed on the body slime of other fishes similar to how baby *Discus* feed from their parents. The scale and mucus-eaters have not received the infamy of their blood-sucking relatives.

I soon learned that in complete contrast to their normal lethargic behavior was their activity at feeding time. Every two to three days I added a two inch feeder goldfish. I never used larger feeder fish for fear that the catfish might become the feeders. Shortly after a goldfish was added, the catfish became very active. The catfish swam around until they found their prey, aligned themselves parallel to the goldfish, and then quickly grabbed a mouth full of scales. The catfish always gorged themselves until their bellies glowed orange from the goldfish scales inside. By the next

morning, the goldfish would be almost completely without scales and usually still alive. The trichomycterids showed a preference for the scales around the gill and eye and any remaining scales on the goldfish the following morning were inevitably on the caudal peduncle. As an experiment, I placed some neon tetras and some white cloud minnows in the tank. The trichomycterids never bothered these small fish. Perhaps there is a minimum prey size that these trichomycterids find suitable.

Although their manner of feeding may sound horrible it is actually more humane and resource conserving than just eating other fishes. In the wild, a trichomycterid might eat a few scales from its prey and then the irritated prey swims away. In a short time the prey regenerates the lost scales, and the trichomycterid can

feed from the same fish again. This feeding habit only becomes a problem in the closed aquarium where the prey is unable to escape. An interesting experiment (that I have yet to try) would be to buy a dozen or more feeder goldfish and rotate them through the trichomycterid tank for an hour or so once every two weeks. This would give the goldfish time to regenerate their lost scales and ideally the goldfish would provide an inexhaustible food source.

My observations have also led me to believe that chemical compounds, such as ammonia and/or urea, attract at least this trichomycterid to their prey. Despite various currents from the filter, which was eventually lowered, and the siphon (when refilling the tank) the fish never seemed attracted to either source. When prey was added, the trichomycterids remained still for a few moments and then simultaneously rose to seek out their meal. It appeared to me that this small amount of time was needed for the catfish to "smell" that a meal was near. Perhaps it is necessary for the various chemicals to reach a certain concentration before the prey can be detected. Once these chemicals reach this concentration all of the trichomycterids in the area are able to sense that prey is near. As I noted before, the catfish were kept with neon tetras and white cloud minnows for a time and never attacked either species. I have no explanation for how the trichomycterids are able to determine which fish were potential prey and which were not. Winemiller and Yan (1989:511) theorized that the mucus-eating trichomycterid species, *Ochmacanthus alternus*, fed only on larger hosts. My observations support this, but I am unable to explain how the catfish differentiate. Perhaps they prey on larger fishes because large fish are an easier target or maybe the reason is that more mucus or scales can be obtained from a single attack on a larger fish. Since scale and mucus-eating catfishes depend on a renewable resource, it would be to the predator's advantage that the prey does not die from an attack. Evolution may have conditioned these catfish not to attack any fish so small that the victim could not recuperate from an attack.

Unfortunately, I was never able to identify these fish to species or even genus. The family Trichomycteridae contains more than 175 species and most are difficult, if not impossible, to identify with the naked eye. I have since seen a half dozen or so species of trichomycterids imported and have collected another half dozen species in South America myself. All others imported for the aquarium trade that I have seen have turned out to be non-parasitic catfish that were happy on a diet of frozen and live foods and could be kept with appropriate tankmates such as tetras, dwarf cichlids, and other small catfishes. Whether parasitic or non-parasitic, we know little about this fascinating catfish family. Trichomycterids are becoming increasingly available in the aquarium trade, and hopefully as they do so, we will learn more about the habits, behavior, and reproduction these bizarre little catfish.

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A freshwater *coelacanth* story:
The rediscovery of the giant pancake-headed catfish *Pardiglanis tarabinii*

Dr Luc de Vos, (Ichthos Member) Ichthyology Dept., National Museums of Kenya, Nairobi

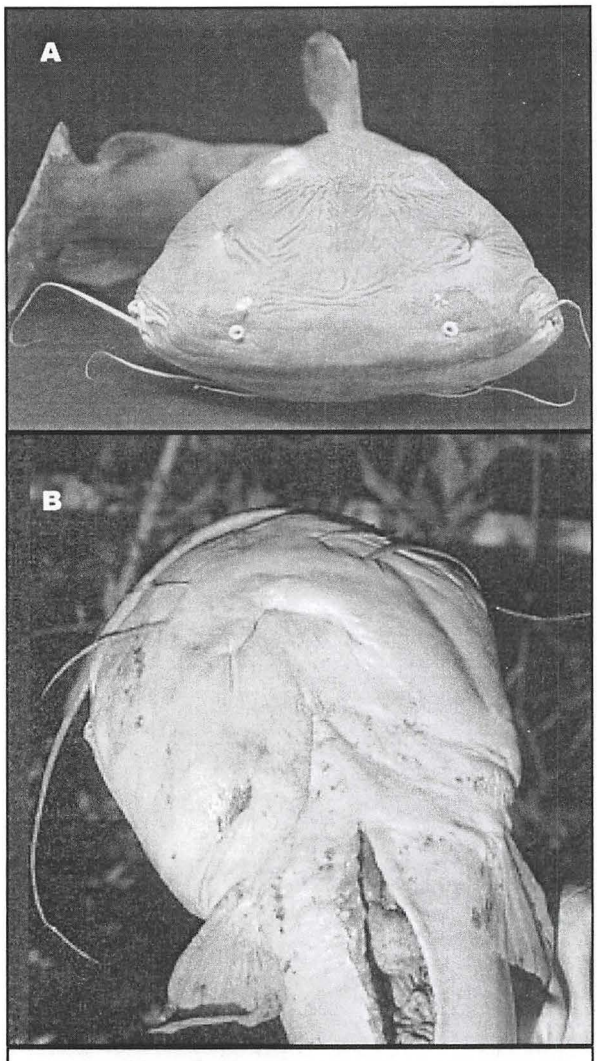
Few people know about the large catfish *Pardiglanis tarabinii*, which can best be called the "giant pancakeheaded catfish", referring to its extremely large rounded head. This curious monstrous freshwater fish was only discovered some 30 years ago when the Italian Professor Tarabini Castellani brought a unique specimen of 64 centimetre length to the Florence University Zoological Museum, Italy. During a scientific expedition in Somalia in 1969, the specimen was obtained from a local fisherman who had caught the fish in the Juba River near Gelib Town. According to the locals the fish lives in the mud on the bottom of the river. The strange new specimen was subsequently described as a species in a new genus by a team of three zoologists headed by the famous ichthyologist Prof. Max Poll from the Africa Museum in Tervuren, Belgium. The fish's mouth looks grotesquely wide; so wide that only a head of such prodigious bulk could possibly accommodate it. Flat and pancakeshaped, this massive head accounts for nearly 40 % of the fish's body length and is more than twice the width of even the broadest portion of its abdomen. Only the characteristic whisker-like barbels around its mouth, four pairs of these in all, are relatively slight. The authors also mentioned its close relationships with the common wide-headed catfish *Clarotes*.

For nearly 30 years since its description nothing was heard about the pancake headed catfish. But following a fish survey of the Lower Tana River carried out in March 2000 by the National Museums of Kenya, as part of the Tana River Primate National Reserve GEF Project, Baomo fishermen told the NMK team that their inventory of fishes for the area was incomplete. "There's one fish you don't have," these fishermen insisted, "and that fish is the large catfish we call *mpumi hwahwa* in the Pokomo language. It's not a common fish, but it is sometimes caught. It has a massive head and it looks very ugly, so nobody here eats it. Whenever one is caught, it is simply thrown away". The NMK team nevertheless, succeeded in extracting a promise that, when next one of these mysterious fish was pulled out of the river, it would be kept for them, intact and in a drum of formalin. They did not wait long. In April 2000, one of the fishermen, Michael Israel Omara, did manage to land one of these giant fish. This male specimen, nearly 90 centimetres long and weighing in at more than 7.5 kilograms was caught in the shallows during the extended recent drought when water levels in the river were exceptionally low. The monster was hooked on the river's sandy bed using fish as bait. This suggests that the species may, in part at least, be a carnivorous scavenger. The stomach of the landed fish was empty. A few months later, again upon reward, a second specimen caught by Michael Omara near Baomo was sent to the Nairobi Museum. This 82 centimetre long fish apparently is a female.

The habits of *Pardiglanis* are still something of a mystery. That it frequents the same waters as, and apparently lives in close association with the common wide-headed catfish, *Clarotes*, is obvious. Local fishermen have confirmed this view, adding that both species appear to live side by side in the thick mud on the riverbed. The puzzling aspect is that none of the fishermen has ever, yet, knowingly seen any of the fry, or juveniles, of the giant pancake-headed catfish. This is surprising in that these fishermen are all very familiar with *Clarotes* young, which apparently they see regularly. This could mean one of several possibilities:

- Adult Pardiglanis have migratory habits and juvenile fish do not share the adult habitat.
- Juveniles are very cryptic, being virtually unnoticed by fishermen.
- Fry and juveniles could so closely resemble those of Clarotes as to be virtually indistinguishable.
- This giant fish could simply be a monstrous phenotype, or perhaps even a special morph, in the life cycle of Clarotes, with which it is known to cohabit.

The latter theory seems improbable, however, given the extremely solid and well-developed cranial bone structure evident in the three Museum specimens. But nothing can be ruled out as impossible until we have had the chance to study this fish properly. Rare instances of head widening have been reported in some other claroteid catfish species of the genus Chrysichthys, among older adults of both sexes. But this phenomenon, where it has occurred (and it has never been observed in Clarotes), has not been anywhere near the scale that could explain the huge discrepancy in head size between Clarotes and Pardiglanis.



(slide A: view of head, slide B: underside of head)

The fossil skeleton of Pardiglanis
(Nairobi Museum, Palaeontology Division collections)

We are very eager, now, to get our hands on a live specimen, as this would enable us to The specimen of Pardiglanis collected in April 2000 from the Lower Tana River, NMK Ichthyology Dept. collections show the fish in the aquarium section of the Nairobi Snake Park, and maybe, to learn more of its habits.

Although currently restricted to the Juba and Tana River systems in Somalia and Kenya, it appears Pardiglanis once had a larger distribution. A complete 96 cm fossil claroteid specimen from East Turkana, age about 3,4 million years, indeed seems to correspond in detail with Pardiglanis. It suggests that the fish has been around for a very long time, and that, like that other, rather better known marine 'living fossil', the coelacanth, it has changed little over the intervening millennia. Like the coelacanth, the pancake-headed catfish has also been re-discovered only recently.

For more information, contact:

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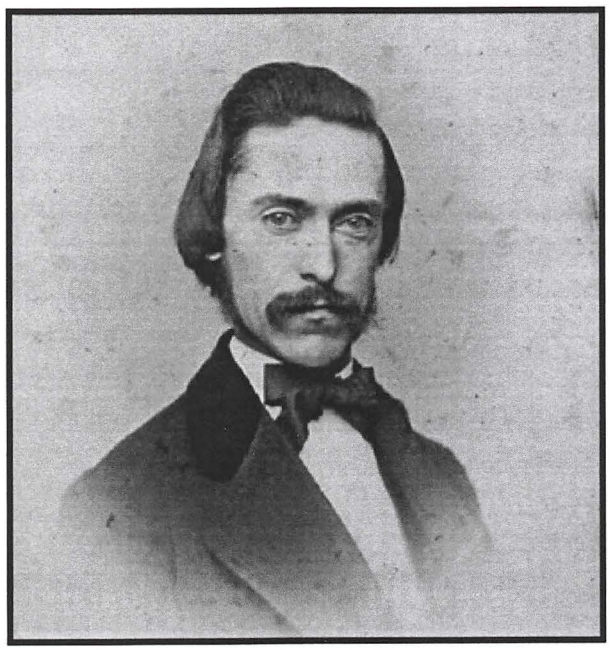
Theodore Nicholas Gill (1837 – 1914)

An insight by A W Taylor

Theodore Nicholas Gill was born in New York USA, on the 21st March 1837 and was During his childhood his parents decided that Theodore would enter the clergy and had him educated partly in private schools and partly by private tutor. However religious studies held no attraction to Gill and he decided to study law instead; gaining employment with his uncle's law firm. It was during this time that Gill started regularly to go the fish markets of New York, and it was here that his attention was drawn to the array of different species of fish that was being offered fore sale, Gill found that he was more and more being attracted to these animals and it was at this time that Gill turned to the scientific study of animals.



In 1855 Gill applied for and received a scholarship at the Wagner Free Institute of Science, in Philadelphia. In the following year Gill met with William Stimpson who had just returned from an expedition, exploring the North Pacific. Gill must have impressed Stimpson, because it was Stimpson that brought Gill to the attention of Spencer Baird of the Smithsonian Institute. Although Gill and Baird didn't meet in person at this time, they regularly exchanged correspondence and with help from Baird had his first report 'the fishes of New York' published in the annual report of the Smithsonian Institute of 1856.

Gill didn't meet Baird in person until December 1857, when Gill was visiting Washington preparing for an expedition he was making to the West Indies. In 1858 Gill collected fish specimens from all over the West Indies including some from Trinidad, and upon returning home deposits his collection in the Smithsonian. In 1859 his grandfather dies and Gill travels to Newfoundland to help settle the estate, and while he was there he took the opportunity to collect some more specimens, the unusual fact is that in all his time studying fishes these were the only two extensive field trips that Gill ever did.

Between 1860 and 1861 he became and worked as the adjunct professor of physics and natural history at what is now the George Washington University. In 1862 Baird appointed Gill to the team that was responsible for correlating the results of the survey that determined the Boundary between the USA and Canada and shortly after was put in charge of the Smithsonian's extensive Library, and here Gills long term relationship with the Smithsonian Institute begins, Gill temperament was more suited to research than lecturing (most reports hint that Gill was an uninspiring lecturer). During his career Gill's research was prolific he produced over five hundred papers, The majority of these papers dealt with his favorite topic, Fishes (388); however Gill also had papers on birds, molluscs and mammals published. (published either under T N Gill or just T Gill). His 1872 work on the classification of fishes formed the basis of the Smithsonian's arrangement of their fish collection, which was followed by many Ichthyologists for many years after. Gill although studying other vertebrates as mentioned he was happiest studying fishes, and some of his findings are valid today.

In 1870 the University of Princeton trustee's turned down their president's recommendation that Gill be given the job as the resident full time biologist, because the trustee's felt that Gill's Darwinian beliefs had no place at their University; and appointed the reverend George Macloskie from Ireland instead.

Gill gave many lectures in his illustrious career. In one of his lectures in 1908 to the international fishery congress he remarks about a species of catfish that inhabits Europe. Quote "Too much care can not be given to the detailed observation of the economy of any fish, for differences between related species may exist which might be least foreseen. For instance, two silurids occur in Europe which are so near each other that they have been long nominally confounded; they are the common wels of central and eastern Europe and the glanis of Greece. Nothwithstanding their great morphological similarity, they differ remarkably in their habits, for the wels takes no care of its eggs, while the male of the glanis exercises paternal supervision for a prolonged period".

Gill went on to comment that parental care in fishes does not necessarily depend on type as within Callichthydae the genus Corydoras shows no parental care, where as in the Callichthyinae(Hoplo's) there is parental care.

Although he had never found the time to get married, mainly because he spent most of his time deep in study, he was an active participant in the scientific and social groups of Washington including the American Association for the Advancement of Science, of which he was elected President in 1897. Gill was also popular with his colleagues including the Ichthyologist David Starr Jordan, who gave Gill the label "the master of taxonomy".

However weakened badly by a stroke Gill spent his last years quietly in Washington and died on the 25th September 1914.

A W T

Meet Heok Hee Ng

My love affair with catfishes began in 1993, when I accidentally stumbled onto them for an undergraduate research project (because they were one of the few groups of fishes that I was vaguely familiar with then). After obtaining both Bachelor and Master of Science degrees from the National University of Singapore, I have been in Ann Arbor since fall 2000, pursuing my Ph.D. at the University of Michigan on the phylogenetic relationships of the sisorid and erethistid catfishes.

My main interest lies in the field of Asian catfish systematics, with particular emphasis on the sisoroid catfishes (containing the families Akysidae, Amblycipitidae, Erethistidae and Sisoridae). Over the years, I have also maintained a varying number of tanks of catfishes (somewhat unusually, it was the work that came before the hobby). I have always had a soft spot for Old World catfishes (both African and Asian), although most of my current tank denizens are New World. I confess to not being overtly fond of plated catfishes, particularly loricariids or callichthyids (I currently have none in my tanks, save for a few hypoptopomatines).

I also enjoy writing about catfishes, and do that whenever I can find the time.

Amazon Rivers Program

August 2002 Update

Amazon Conservation Association (ACA)

Text by Dr. Michael Goulding

August Excursion

The main purpose of the excursion was to carry out further ichthyological and limnological surveys of the río Madre de Dios and río Los Amigos. Our team consisted of approximately 22 people, including Michael Goulding, Carlos Cañas, Ronaldo Barthem, Bruce Forsberg, 7 professional fishermen from Puerto Maldonaldo, 2 promotores (Vicente and Pedro Maceda (ACCA)), Clemente (ACA), Juvenal (Maki) + 2 fishermen from Boca Amigo, and 5 assistants from Boca Amigo. We employed professional fishermen from Puerto Maldonado to work with seines and experimental trawls. Boca Amigo fishermen were employed to fish in floodplain lakes and in the river channels with trotlines. Additional assistants were recruited from Boca Amigo to insure that as many people as possible were employed from the local village.

UPDATE SUMMARY OF ACTIVITIES RELATED TO PROGRAM GOALS

Aquatic Biodiversity Survey

To date we have captured somewhere between 220-250 fish species in the río Madre de Dios and río Los Amigos within about 15km of the Centro Río Amigos. Representatives of all species have been photographed alive in aquaria to show what they look like in the wild. We now have a good idea of the composition of the fish fauna in this region, including migratory species. It is not unreasonable to hypothesize that there might be 350 species within 15 km of the Centro Río Amigos, but further large-scale collecting at this time will be of less importance than preparing a colorful guide of what is already known. To collect the remaining 100 species will probably cost 2-3 times more in effort and financial resources as the 200-250 species we already have.

Also, we have prepared a preliminary catalogue of laminated fishes that is being used to train fishermen and promotores to identify species. We are also using the plastic field manual to show local people what we are doing and to make them aware of the fish diversity in the río Madre de Dios and río Los Amigos.

Quantitative Habitat/Fish Community Survey

During three excursions we have carried out intensive quantitative surveys of the following habitats and their fish diversity: floodplain lakes (cochas); rainforest streams (quebradas); aguajales (Mauirita palm swamp); levee lakes (tahuampas); beaches; river channels, including shores, bottom habitats and surfaces); and rainforest pools. This is the first quantitative study of fish communities of any river in Peru and will provide a critical mass of information for statistical analyses of habitat diversity, role of various habitats to commercial fish production, predator and prey relationships, fish size distributions and many other variables.

We have developed a new methodology for studying fish communities which involves photographing all specimens with barcodes so that relevant information about date, habitat, etc. can be retrieved with a computer. Barcodes also serve as scales so that fish can be measured with a computer as well. To date we have photographed approximately 27,000 fish specimens. Approximately half of these specimens have been delivered to the Museo de Historia Natural in Lima. Within the next 3 months these specimens (photographs) will be measured, identified and incorporated to a database for statistical analyses.

Study of Migratory Catfish

Since March 2002 we have been working closely with Puerto Maldonaldo fishermen to measure all dorado and mota flemosa catfish delivered to market. We have also collected the gonads to determine spawning periods. An assistant, Landers, has been hired to collect data and gonads in the Puerto Maldonado market. Fishermen are paid per fish to deliver catches and help with measurements. After examination catches are returned to fishermen. This approach has proven very successful and to date we have examined approximately 900 specimens. Although we need to collect data for at least a two year period to determine exact spawning patterns, our initial impression is that the large catfishes might be partial spawners, that is, they spawn two or more times during one year. This discovery has led us to alter our hypothesis. We now believe that the large catfish use the río Madre de Dios within about 50-400 km of the Andes as a "staging ground", that is, they wait in deep river channel waters until conditions are appropriate for spawning in the Andean foothills, at which time they swim rapidly upstream for a few days to reach spawning habitats. After partial spawning they retreat back downstream to wait the next appropriate period, which might be related to peak rainfall levels in the foothills. Andean foothill rivers rise and fall very rapidly and the ecology of the large catfish is probably tuned to this phenomenon. Unfortunately there are no river level data upriver of Centro Río Amigos.

From a conservation point of view the headwater "staging ground" for migratory catfish needs to be considered along with Andean foothill spawning habitats. In the near future we plan to use sonar to map the presence of deep river channel pools, and fish, where large catfish remain while waiting to spawn.

Limnological Survey of Madre de Dios Region

Bruce Forsberg carried out a limological survey (ph, conductivity, sediments, current speed, oxygen and hydrographical measurements) of the río Madre de Dios region in February, 2002 during the high water period. Sample sites of the original survey were re-sampled during the low water period in August 2002. Sample sites included río Manu, río Alto Madre de Dios, río Madre de Dios at various points between Puerto Maldonaldo and Boca Manu, río Blanco, río Azul, río Colorado, río Los Amigos, río Amiguillos, río Inambari, río Las Piedras, río Pariamanu, río Tambopata and Lago Valencia. Intense limnological surveys were also carried out in many aquatic habitats near the Centro Río Amigos and lower río Los Amigos. These surveys included rainforest streams, aguajales, floodplain lakes (cochas), and river channels at various depths.

Based on the large amount of data collected, Bruce Forsberg is now in the process of developing realistic limnological hypotheses for the río Madre de Dios region, including the río Los Amigos basin, and these will be linked to fish ecology.

Fish Catalogue for Museo de Historia Natural

Hernan Ortega and Carlos Cañas have been busy developing a digitized catalogue of all fishes in the Museo known from the río Madre de Dios Basin, including Manu and Tambopata, and collected in expeditions more than 20 years ago. This catalogue is extremely important because it will allow us to compare museum specimens with live fishes, and also to have a realistic idea of the distribution of fishes in the río Madre de Dios of Peru. Specimens from our project are all being included in the digital catalogue.

Training

Our long-term goal is to have full-time assistants that are collecting data on nearly a daily basis at Centro Río Amigos and in the Los Amigos basin. This, of course, requires training and the full-time use of the people that have been trained.

Our training has been focused on: 1) experimental fishing techniques by fishermen; 2) identification of fishes by promotores and fishermen; 3) photographic techniques; 4) collection of fish market data in Puerto Maldonado; and 5) hydrographical surveys by promotores.

We have invested considerable time in the training of two promotores, Vicente and Pedro Maceda, though other promotores have received training in fish research as well.

Forsberg also trained Pedro Maceda to map and record rainforest stream habitats using GPS and a limnological habitat classification scheme. This is very important because many rainforest streams in the Los Amigos are not visible using satellite imagery, thus satellite imagery alone cannot be used to estimate biological diversity of rainforest streams in this region.

Products

We now have two books planned:

The Meandering Madre: Ecology and Conservation of an Amazon Headwater.

This is a popular book, in Spanish and English, that will deal with the geography, ecology, conservation and aquatic vertebrate diversity of the río Madre de Dios headwater region. Most of the maps are already done and nearly all of the photography has been completed. In the next few months we will be getting additional data from published and unpublished sources in Peru and US libraries. The first manuscript should be done by January 2003.

Ecology of Río Madre de Dios Fish Communities

This will be a two purpose didactic and scientific book aimed at students and researchers interested in Amazonian aquatic studies or the río Madre de Dios region of Perú. In great statistical detail the nature of río Madre de Dios fish communities and habitats will be analyzed. The various types of collecting methods and statistical analyses used will be discussed in detail so that beginning students, especially in Andean countries and Brazil, can use this as both a reference source to the region and as a text book to learn how to carry out field work and statistical analyses dealing with aquatic habitats.

Scientific journal papers:

Within the next couple of months we will outline the scientific papers planned. Because so little is known about the region we have given priority to the book-length general works.

Smithsonian Atlas of the Amazon

The title has been finalized and will be "Smithsonian Atlas of the Amazon". Copyediting and layout are now being done. Book will be in Spring 2003 catalogue but we should have copies a few months before.

Catfish Discovery

Text and photo by Dr. Michael Goulding, ACA scientist

Brazilian biologist Dr. Ronaldo Barthem of the Goeldi Museum in Belém and I were in Peru investigating catfish that migrate between the Amazon River mouth and the Andes 3,500-4,000 km upstream. We carried color pictures of all the large catfish species that we knew and would first ask locals if they recognized these fish. During our travels throughout the Amazon Basin in Brazil, Bolivia and Peru we have been surprised on numerous occasions when local fishermen would report the presence of a species whose distribution there was unknown to scientists. After showing our pictures in villages along the Rio Alto Madre de Dios, a Peruvian headwater of the Rio Madeira, we were surprised to have fishermen and young boys that fished tell us that we were missing a large species. We at first had our doubts but offered a small reward if someone would show up with the missing species so that we could photograph it. The next morning a young boy named Carlos brought us a large catfish species that we had never seen and, as far as we know, is not in Brazil. We knew about the original description and citations in Peruvian literature but had doubts about what it was. Sure enough, one more large migratory catfish species has been added to our list. The lesson to field biologists is that local people often know more than scientists about what fish species, especially large forms, are in the areas where they live. Even young boys often know more.

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Yet another bumblebee: miniature catfishes of the genus *Akysis*

Heok Hee Ng

The moniker "bumblebee" is very often applied to catfishes with a pattern of alternating brown and yellow bands encircling the body. Thus have the South American *Microglanis*, the African *Microsynodontis*, and the Asian *Pseudomystus* been given this name (these catfishes have nothing in common except for their color pattern, which are vaguely similar). This article will provide a brief overview of yet another group of catfishes for which the name "bumblebee catfishes" seems apt: the miniature Asian catfishes of the genus *Akysis* Bleeker, 1858.

Akysis_leucorgynchus

Many species of *Akysis* possess the color pattern for which their chosen name is apt, but there are also many other species that have a more irregular, blotchy color pattern. Externally, *Akysis* species look like any other regular (albeit somewhat small) catfish, save for the rough, tuberculate skin. The genus is distributed throughout Southeast Asia, being particularly diverse on the Indochina's peninsula (i.e. mainland Asia between India and China). In the mid-1990s, there were only 11 species of *Akysis* known to science, since then, the number has more than doubled to 29 species (this includes 5 more species whose descriptions are currently in press).

Akysis species can be divided into two species groups (following Ng & Kottelat, 1998): the *pseudobagarius* species group (14 species), and the *variegatus* species group (15 species). The two species groups can be distinguished as follows: members of the *pseudobagarius* group have a relatively elongate body, a more inferior mouth (i.e. located on the underside instead of at the anterior end of the head; Fig. 1), relatively large anterior and posterior nostrils that are separated only by the base of the nasal barbel (Fig. 1), and a strongly forked caudal fin; members of the *variegatus* group have a shorter and deeper body, a more terminal mouth (i.e. located at the anterior end of the head instead of the underside; Fig. 1), relatively small anterior and posterior nostrils that are separated by a space between the anterior nostrils and the base of the nasal barbel (Fig. 1), and an emarginate or truncate caudal fin. A list of *Akysis* species with their known distributions is given below:

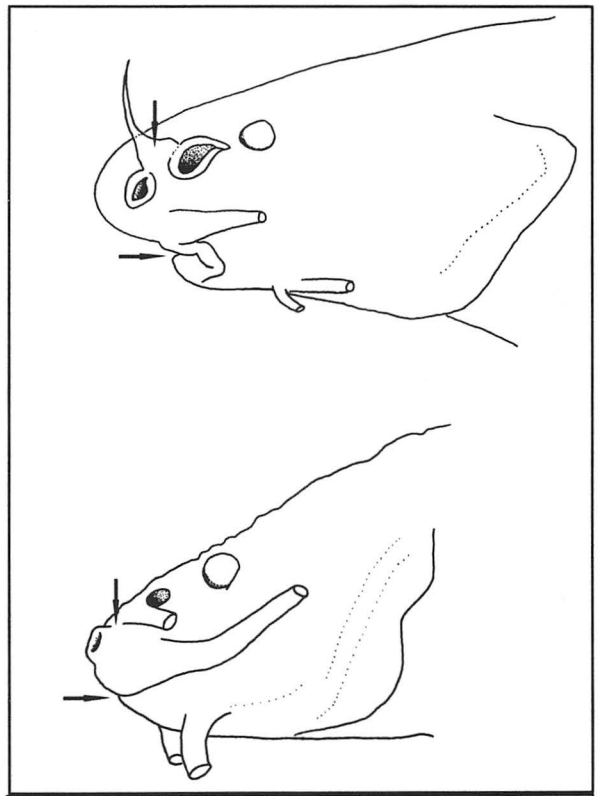

Fig. 1. Heads in members of the *pseudobagarius* species group (top) and the *variegatus* species group (bottom), Arrows indicate differences in mouth position and spacing of anterior and posterior nostrils (see text). Figure modified from Ng & Kottelat (1998).

Members of the *pseudobagarius* species group:

A. alfredi Ng & Kottelat, 1998: Pahang River drainage in Peninsular Malaysia

A. baramensis (Fowler, 1905): Baram River drainage in Borneo

A. sp. A: Mekong River drainage in Cambodia

A. fuscus Ng & Kottelat ,1996: Kapuas River drainage in Borneo

A. sp. B: Chao Phraya River drainage in Thailand

A. inermis Ng & Kottelat, 2000: Mekong River drainage in Laos and Cambodia

A. leucorhynchus Fowler, 1934: Chao Phraya and Tapi River drainages in Thailand

A. macronemus Bleeker, 1860: Musi and Batang Hari River drainages in Sumatra

A. meridionalis Ng & Siebert, 2004: Barito River drainage in Borneo

A. sp. C: Mekong River drainage in Laos

A. pseudobagarius Roberts, 1989: Kapuas River drainage in Borneo

A. similis Ng & Kottelat,1998: Mekong River drainage in Vietnam

A. sinensis He in He & Chen, 1981: Mekong River drainage in China

A. subtilis Ng & Kottelat, 1998: Mekong River drainage in Thailand

Members of the *variegatus* species group:

A. brachybarbatus Chen in He & Chen, 1981: Mekong River drainage in China

A. clavulus Ng & Freyhof, 2003: Cai and Duc My rivers, draining to the central coast of Vietnam

A. sp. D: southwest Cambodia

A. ephippifer Ng & Kottelat, 1998: Mekong River drainage in Laos and Cambodia

A. sp. E: Mekong River drainage in Cambodia

A. hendricksoni Alfred, 1966: northern Peninsular Malaysia and southern Thailand south of the Isthmus of Kra

A. heterurus Ng, 1996: Batang Hari River drainage in Sumatra

A. maculipinnis Fowler, 1934: southwest Cambodia and southeast Thailand

A. microps Ng & Tan, 1999: Endau River drainage in Peninsular Malaysia

A. pictus Günther, 1883: Salween River drainage in Myanmar

A. prashadi Hora, 1936 : Irrawaddy River drainage in Myanmar

A. recavus Ng & Kottelat, 1998: Chao Phraya River drainage in Thailand

A. variegatus (Bleeker, 1846): Java

A. varius Ng & Kottelat, 1998: Mekong River drainage in Laos and Thailand

A. vespa Ng & Kottelat, 2004: Ataran River drainage in southern Myanmar

Akysis can be found in a wide variety of habitats, ranging from hillstreams to large rivers, and even estuaries. The one thing in common in areas where they have been collected is the presence of the fine substrate, be it the form of sand or mud. The habitats they have been collected in also have a considerable current, which means that they are fishes that require adequate oxygenation. They can be found hiding around tree stumps and fallen logs where leaves and twigs accumulate, amongst leaf litter, in patches of submerged vegetation such as *Cryptocoryne*, or in riffle areas under stones and coarse gravel (Ng & Tan, 1999; Ng & Freyhof, 2002). In the aquarium, they show a tendency to burrow into the substrate and remain there for most of the day, something that they most likely do in the wild. When they swim, they do so close to the substrate in short quick bursts from one place to another.

These diminutive (largest recorded size ca. 5 cm SL) catfish are predatory in nature and many specimens of *Akysis hendricksoni* regurgitated small atyid shrimps of the genus *Caridina* after capture (Ng, 1996). In the aquarium, they will readily take bloodworms and other small live or frozen food.

In some of the species, sexual dimorphism is present (Ng & Kottelat, 1996; Ng & Tan, 1999): males have shorter pelvic fins located further away from the anal fin. The pelvic fins of the males are also more closely-set and curved to form a bowl. The use of the pelvic fins in the male remains unknown. They may be used for handling eggs or for directing the sperm towards the eggs (Ng & Kottelat, 1996). The eggs produced by *Akysis* species are relatively large for such small fish, with reported sizes ranging from 0.8 mm in *A. fuscus* (see Ng & Kottelat, 1996) to 1.5 mm in *A. vespa* (see Ng & Kottelat, 2004).

Akysis species are not often exported for the aquarium trade. In my personal experience, one is only likely to encounter *A. heterurus*, *A. leucorhynchus*, *A. pictus* or *A. prashadi*. With adequate decor and water conditions, they are not difficult to maintain in the aquarium, and can even be induced to breed (as has been done for *A. vespa*).

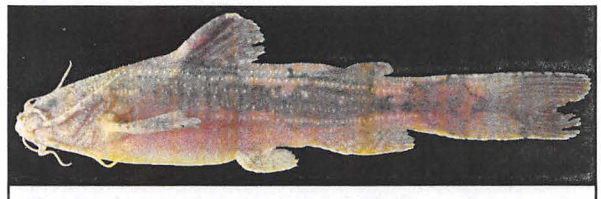

Fig. 2. *Akysis clavulus* has a blotchier color pattern

Fig. 3. The color pattern of *A. inermis* is still blotchy, but begins to resemble the familiar bumblebee pattern.

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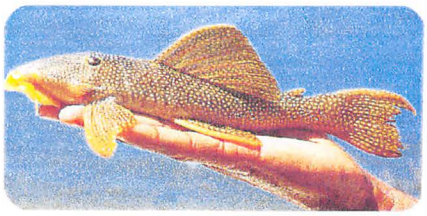

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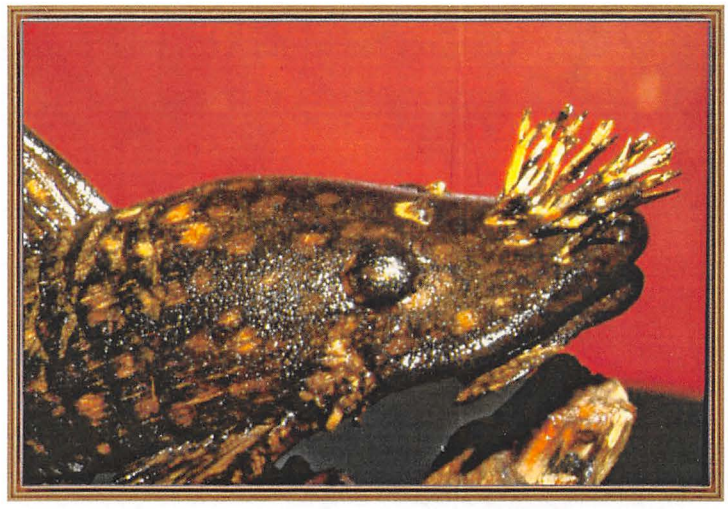

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