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After a four-hour hike into the Peruvian jungle, the editor rests with a group of friendly native children. (See pages 88-89 for new Peruvian fishes.)

Dear Reader,

I am writing these lines in the seclusion of a small Danish island. The wind is whistling around the house and the rain is dripping from the thatched roof as I put together plans for the forthcoming issues of AMAZONAS. This is just a break from home—a time to relax and collect my thoughts—and has nothing to do with collecting fishes. A vacation like this is a good time to separate the important from the unimportant, to examine yourself and what you are doing.

The main feature in this issue has been so long in the planning that the contributors will undoubtedly be glad to finally see the fruits of their labors in print—and in English. Well-planned aquarium features don't just grow on trees. They can require long and careful preparation, and above all a team of authors who really know their stuff.

In this issue, a number of articles on the dainty little Licorice Gouramis of the genus *Parosphromenus* have been gathered together under the auspices of acknowledged expert Dr. Peter Finke, scientific manager of the Parosphromenus Project. Like so many of the fish groups that we have previously presented here, these dwarfs are only familiar to a relatively small circle of labyrinthfish enthusiasts. But no magic wand is required to achieve success with these fishes, and because

the habitats of many of these attractive little gouramis are seriously endangered in their native lands, it is high time they received a bit of publicity. The authors who wrote these fine articles have all been intensely involved in the study of "Paros" species for decades.

"An editor's lot is not a happy one," as the saying goes, and unfortunately there is sometimes an element of truth in that. A balanced issue should always include articles on species that have not yet played a role—or have played only a minor one—in the aquarium hobby.

But to achieve that you have to keep your ear to the ground. Oliver Lucanus brings us an exciting group of newly available and very appealing *Crenicichla* spp. pike cichlids from the Río Uruguay, Río Parana, and Río Iguassu drainage in Argentina, while Maike Wilstermann-Hildebrand looks at a relatively new invertebrate import, the so-called Fruit Snail, *Neritina juttingae*, from Borneo.

It's time for this editor and his dogs to take a walk and stretch their legs. While we battle through the Danish rains, you can sit in comfort and read this new issue of AMAZONAS.

Happy reading!

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Why are Licorice Gouramis the way they are?

by *Martin Hallmann* • What distinguishes highly specialized soft- and blackwater fishes from “normal” species, those adapted to more typical water parameters? The majority of fishes live in nutrient-rich water with a neutral pH and moderate hardness. But *Parosphromenus* species are quite different. The water they live in is very akin to distilled water, but is also extremely acid and brown in color. What effects does this have on their ecology?

ABOVE: N. NEUGEBAUER; RIGHT: M. HALLMANN

Typical Licorice Gourami biotope, in Cherating, western Malaysia. Within a short distance, this spring-fed pool at the edge of a wood becomes a large, sometimes fast-flowing stream. Some of the loveliest blackwater aquarium fishes live here: rasboras, chocolate gouramis, fightingfishes, *Pangio* loaches, and others. Licorice Gouramis inhabit heavily vegetated areas with little current in 20–40 inches (50–100 cm) of water. Unlike most labyrinthfishes, they do not use an accessory breathing system, so they need clean water that isn't too warm.



During courtship, Licorice Gourami males exhibit bold markings and colors; this is a *Parosphromenus nanyi* (Nagy's Licorice Gourami) male from the Cherating biotope. The head-down courtship position is typical of *P. nanyi*. Both sexes exhibit “sexy eyes,” no doubt highly visible even in the gloom of a blackwater stream.

To understand the husbandry demands of the rare and beautiful Licorice Gouramis, we must start with their native blackwater habitats in southeast Asia.

“Normal” water is a suitable medium for most tropical freshwater fishes. It permits the development of food chains consisting of bacteria, uni- and multicellular organisms, plankton, crustaceans, and insects, with fishes and piscivorous fishes at the top of the chain. The similarity of the surrounding chemical milieu and that of the body cells facilitates the metabolism of the resident life forms.

By contrast, the *Parosphromenus* species are specially adapted to extremely nutrient-poor, almost sterile blackwater streams—a biotope that is hostile to life as far as the majority of “normal fishes” are concerned. Because it isn't at all easy for the normal fish organism to cope with pH values of 3 to 4 and practically distilled water, our *Parosphromenus* have had to develop a strategy to do so: they glean their trace-element requirements from the small amount of minerals in the water and eat a specialized diet that consists almost exclusively of the juvenile stages of the ubiquitous shrimps, which process the substrate of leaf litter, making difficult-to-obtain nutrients available to higher links in the food chain.

Blackwater streams

The dwarf fishes that we know as Licorice Gouramis are thus specialized predominantly on very acid waters with a low “germ” count, for example, blackwater streams. They are children of the tropics, inhabiting regions with very constant temperatures and rainfall throughout the year. They occur on the Malayan Peninsula, in Sumatra and



This *P. quindecim* male exhibits extreme contrast in its markings and coloration. In this species the male courts the female in a horizontal body position, often twisting around the longitudinal axis of the body and pushing beneath the female.

Borneo, and on the islands of the Riau Archipelago. Their distribution region includes remnants of once-extensive natural forests, swamps, and elevated moorlands, which are subject to the fairly constant rainfall prevalent in the tropics throughout the year and which store the water and then slowly give it up again, buffered to a low pH.

However, in the tropics there are also intervening dry periods that can have a dramatic effect on aquatic life forms. Although it sometimes doesn't rain for many weeks in western Malaysia, cool, clean blackwater continues to flow out of the slightly elevated woodlands. Around Kuantan, for example, the ground is frequently covered in a layer of peat, even near the coast. The blackwater wells up from numerous gullies and pools among the trees, initially creating small streams.

It is astonishing how rapidly these streams increase in size compared to lowland rivers. The input of water from the adjacent soil must be very large. Within a short distance these rivulets expand to broad streams, often becoming large rivers within a few miles. Sea tides also play a role in the ecology of these lowland coastal waters of the tropics.

The deep, soft, moist forest floor, enriched with huge amounts of organic residues, acts like a sponge, initially compensating for gaps in the rainfall. Even in the dry season, water of largely optimal quality, chemistry, and temperature continues to flow. The water issuing from the forest floor under the force of gravity is conditioned by the shade and the cooling effect of evapora-

tion. During its passage through the ground, the rainwater absorbed by the forest floor (or peat bog) is enriched with the tannic, humic, and fulvic acids contained in the masses of dead plant material in the soil. The result is very soft, acid, and dark-stained water with antiseptic properties. As we will see, this staining plays an important role.

These cool waters, which have extremely low electrical conductivity, no measurable hardness, a pH of 3 to 5.5, and a temperature between 77 and 84°F (25–29°C), represent an ecological niche for our Licorice Gouramis. These fishes will die at a temperature a little above 86°F (30°C). With air temperatures typically around 104°F (40°C), it would spell doom for the inhabitants of a stream if the influx of cool water were to cease.

Parosphromenus species can also live in waters with less extreme parameters (as evidenced by their adaptability in the aquarium and the fact that they are sometimes caught in acid clearwaters), but are undoubtedly adversely affected by competitors there. There are both directly limiting factors and those that have an insidious effect.

The important influence of the upland moors, swamps, and layers of peat is demonstrated by the fact that where these natural reservoirs and water-conditioning layers are removed or drained by ditches, the blackwater is replaced by warm, stagnant, nutrient-rich water. Widespread destruction of forests and agricultural land use, mainly for oil-palm plantations, is systematically, rapidly, and permanently destroying these blackwater biotopes. Unfortunately, the blackwater fishes cannot adjust.

Water color and courtship coloration

What effect does this specialization on the biotope described have on the appearance and behavior of Licorice Gouramis? It is now known that the 20 or more species of the genus are amazingly homogenous in their behavior and requirements. They also have limited evolutive capability; these fishes are highly specialized, and tolerate only slight alterations to their basic environmental conditions, which have remained constant for centuries.

The blackwater stream ecological niche, with its extreme water parameters (where only a highly specialized fish community can develop, as certain disruptive influences are excluded) and very low light levels, is relevant to the development of extreme color patterns and the effective courtship movements of Licorice Gouramis. They are known as extremely colorful, butterfly-like fishes with contrast-rich patterns. Photographs typically show males exhibiting a mood-related color pattern and displaying their finnage. The brief moment during which the fins are fully spread apparently produces a spectacle that is attractive to the female.

The contrast-rich color patterns and gleaming bands,



Male *Parosphromenus alfredi*.

spots, or edgings are accentuated when the fish twists in the light entering the dark water from above. The fish assumes an oblique position along the longitudinal axis so that the vertically incident light rays are reflected by the iridescent surfaces of the fins. Such extremely contrasting display coloration is unnecessary in clearwater biotopes, and could even be dangerous. But when the fish adopts a normal, horizontal body position in the dimly lit conditions in the tangle at the bottom of a blackwater stream, there is no light reflection and the outline of the fish is virtually invisible to either friend or foe. Only for the brief moment when he spreads his fins in the oblique position does the male abandon his camouflage against predators.

Species-specific display coloration

Licorice Gouramis are superficially very similar, and most don't differ in size and form but only in their coloration and fin patterns (although there are a number of exceptions). Because these differences are critical when it comes to recognition of the correct reproductive partner, we regard them as criteria for the differentiation of species.

The small size of these fishes, and the fact that mood-



Far left: We found *Betta tussayae* (Tussy's Fightingfish) in the same blackwater stream, but always in shallow pools with water flowing through, at the shady edge of the wood.

Left: Numerous predators constitute a threat to the Licorice Gouramis, which are not particularly well armed or flight-efficient and for this reason rely on cover, shadow, and very limited movement for protection. We caught well-fed nandidids and this large *Belontia hasselti* (Malay Combtail) in the Licorice Gourami biotopes.

related coloration is displayed only when the fish is thriving, make it considerably more difficult to distinguish the species. However, their color patterns—which relate to the display coloration of the males—can be used to distinguish clearly recognizable types. The species-typical body pattern should always be considered together with the coloration and patterning of the fins. This gives us five basic types.

In the commonest type, the banding and margins of the fins follow the body outline. Because of the strongly contrasting colors and metallic effects of the markings, the body outline appears larger and more impressive when the fins are spread. This display coloration is exhibited by the majority of Licorice Gouramis. All members of the *Parosphromenus harveyi* (Harvey's Licorice Gourami) group, as well as *P. allani* (Allan's Licorice Gourami) and *P. quindecim*, plus the lanceolate-finned *P. filamentosus* (Spiketail Licorice Gourami) and *P. deissneri* ("the" Licorice Gourami), exhibit this type of patterning in the fins. It is combined with striking white and blue to black and turquoise ventral fins and longitudinal striping of the body, similar to that seen in pencilfishes (*Nannostomus*). *P. nagyi* (Nagy's Licorice Gourami) is an exception. The uniform red-brown fin color and striking white fin margins in *P. anjunganensis* (Anjungan Licorice Gourami) probably represent a reduced variant of the submarginal band.

There are also other types of pattern, such as the "starry sky" in the fins of *P. linkei*. This is also seen, in reduced form, in *P. pahuensis*, in combination with lateral spots (ocelli) like those seen in *Betta coccinea*.

The two members of the *Parosphromenus parvulus*

group exhibit a simple, light-dark contrast on the body (no striping, just divided in two), with broad and extremely reflective white margins in the unpaired fins with contrasting black and red. These are the only two species in which the ventral fins are unimportant in communicating with conspecifics. The ventral fins of almost all other Licorice Gouramis are intensely colored and are displayed by spreading them apart from one another, but those of *P. ornaticauda* (Redtail Licorice Gourami) and *P. parvulus* are small and transparent.

Then there are the more plainly colored Licorice Gouramis, such as *Parosphromenus paludicola* (Swamp Licorice Gourami). The males of this species, and to a lesser extent the females as well, exhibit flank spots and pastel turquoise and red-violet reflective markings in the fins.

Finally, in *Parosphromenus sumatranus* (Sumatra or Fire-Red Licorice Gourami), practically the only marking apart from the irregular, low-contrast patterning in the unpaired fins is a striking ocellus on the dorsal fin. The essentially transparent ventral fins exhibit a dark-line marking that ends in the filament.

Head-standing and "sexy eyes"

And now we find ourselves in the middle of those confusing color features that are only intermittently displayed. These are inseparably interwoven with specific modes of behavior and situations.

We have already outlined the dramatic courtship display of the male, who seeks to present himself to the female literally in the best light. This courtship includes not only fin-spreading and maximum expression of col-

oration, but also making sudden passes above and below the female. The details of this behavior vary in accordance with the groups mentioned above, and may be useful in undertaking the systematic separation of species.

We recognize head-up courtiers (*Parosphromenus sumatranus*, *P. parvulus*, and *P. ornaticauda*) and head-down courtiers or horizontal courtiers (the majority of the others). The head-up display is seen in males of the *P. parvulus* group and both sexes of *P. sumatranus*. All members of the *P. harveyi* group display head-down, and *P. quindecim*, *P. linkei*, *P. paludicola*, and *P. filamentosus* in a normal, horizontal swimming position.

Mood-related color patterns are a lot less striking in females, but close observation shows that they exhibit interesting differences. In almost all species, female coloration during courtship is characterized by the striping becoming paler and by the appearance of a black vertical bar through the eye (so-called "sexy eyes"). This marking is also seen in males in the corresponding mood. However, in the "odd men out," *Parosphromenus parvulus* and *P. ornaticauda*, neither sex ever exhibits sexy eyes, and the females display a contrast-rich, light-dark body coloration during spawning. Even the red flame of the caudal fin is then visible in *P. ornaticauda* females, making them look very similar to the males.

In addition to the species-specific markings and coloration, there are other ways of determining the species.

All species with a lanceolate caudal fin often exhibit a typical backward and forward jerking with fins spread, but to the best of my knowledge, all other forms remain at rest in the water. A further striking species-typical and

apparently unique behavior is the courtship dance of *P. ornaticauda*. (The sibling species *P. parvulus* exhibits this in a very dilute form.) During courtship the male flits around the female in an erratic circular or zigzag pattern. An example of as-yet-unexplained behavior is the up-and-down rocking of the body, with the back straightened and the eye representing the pivot, seen in all courting Licorice Gouramis of the *Parosphromenus harveyi* group.

Habitat specialists

Obviously the courtship, the enticing of the female to a pit dug in the substrate, the ritualized spawning, and the almost overbearing brood care by the male for 10 days are all part of the successful "Licorice Gouramis in the blackwater stream" model. And the paucity of movement on the part of the few, but relatively large, fry (there are hardly any microorganisms suitable for first foods for small fry in the sterile environment) ensures that enough young fishes grow to maturity.

The seeking out of suitable habitats and the subsequent sedentary nature of these fishes are striking. Licorice Gouramis are never found *en masse* in their native waters, but they may occur in large numbers together with shrimps in suitable places, such as beneath overhanging turf or among the masses of small roots in holes in the bank beneath trees. Some have documented the colonization of current-poor bank areas on the insides of bends in streams. In practice, the fact that Licorice Gouramis settle only in certain spots in the stream means that different collectors working in the same body of water may have

Unlike almost all other Licorice Gouramis except *P. parvulus* (Cherry-Spotted Licorice Gourami), *P. ornaticauda* doesn't use reflected sunlight but light shining through from above. By approaching the female from above and simultaneously angling his body, he causes the very broad white fin edgings to gleam brilliantly.



Parosphromenus sp. "Langgam" is a very lovely species, not yet scientifically described.

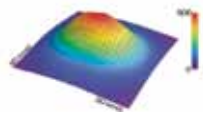
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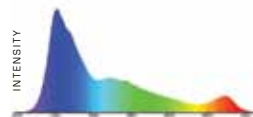
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widely different results. In the course of time one develops an eye for it, and sometimes luck plays a part.

Somehow these very dainty little fishes are able to hold their own among other, much more robust-looking species. By analyzing the environment in great detail during a number of trips to the tropics, I have established that they are neither able to defend themselves nor adept at flight. Their strategy is to “creep” along close to the food-rich substrate with minimal movement, no noticeable aggression or strong territoriality, little in the way of striking coloration except during courtship, and reliable and highly effective brood care.

Licorice Gouramis have also abandoned the use of the labyrinth (an accessory respiratory organ that labyrinthfishes use to take in atmospheric oxygen). They are independent of the water’s surface, but require cool, oxygen-rich (flowing and clean) water. Overall, the strategy is advantageous in this environment, but only in this environment!

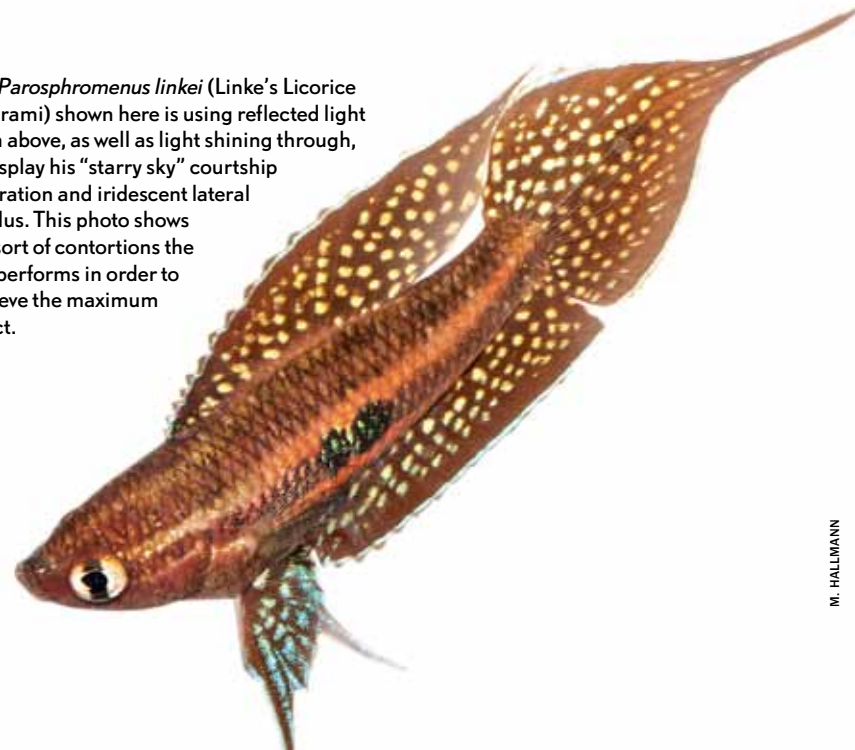
Not very adaptable

I find the rigidity of the ritualized behavioral patterns noteworthy. They appear to have evolved over a very long period of time and are not easy to change. Licorice Gouramis are highly specialized, and therefore not very adaptable. Unfortunately, this means they are demanding both in the aquarium and in the wild.

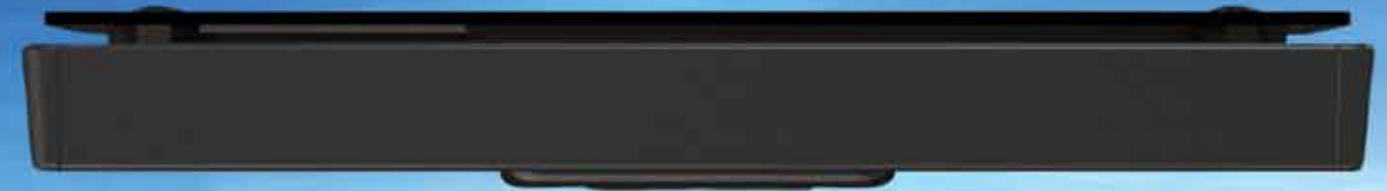
The severe and fundamental encroachment of humans on a highly specialized ecological niche can be repaired only with difficulty. Such encroachment is destructive of endemics, initially locally and later generally. The loss of Licorice Gouramis is a great shame, but it is one of the smaller problems of mankind. We humans are, however, able to react when we become aware, and the *Parosphromenus Project* is such a reaction.

Every life form, every species is a response to a habitat. Looked at logically, the effects of physical size and the influence of biological parameters, such as food organisms, competitors, and predators, are too important to have random consequences. The result is numerous inventions of evolution, usually inconspicuous, but also very complex and sometimes fantastic-looking. The occupation of ecological niches, the development of display coloration, and the special modes of behavior in Licorice Gouramis are examples of this. As aquarists we can and must learn lessons from this if we want to maintain Licorice Gouramis correctly, breed them, and preserve them. 🐟

The *Parosphromenus linkei* (Linke’s Licorice Gourami) shown here is using reflected light from above, as well as light shining through, to display his “starry sky” courtship coloration and iridescent lateral ocellus. This photo shows the sort of contortions the fish performs in order to achieve the maximum effect.



M. HALLMANN



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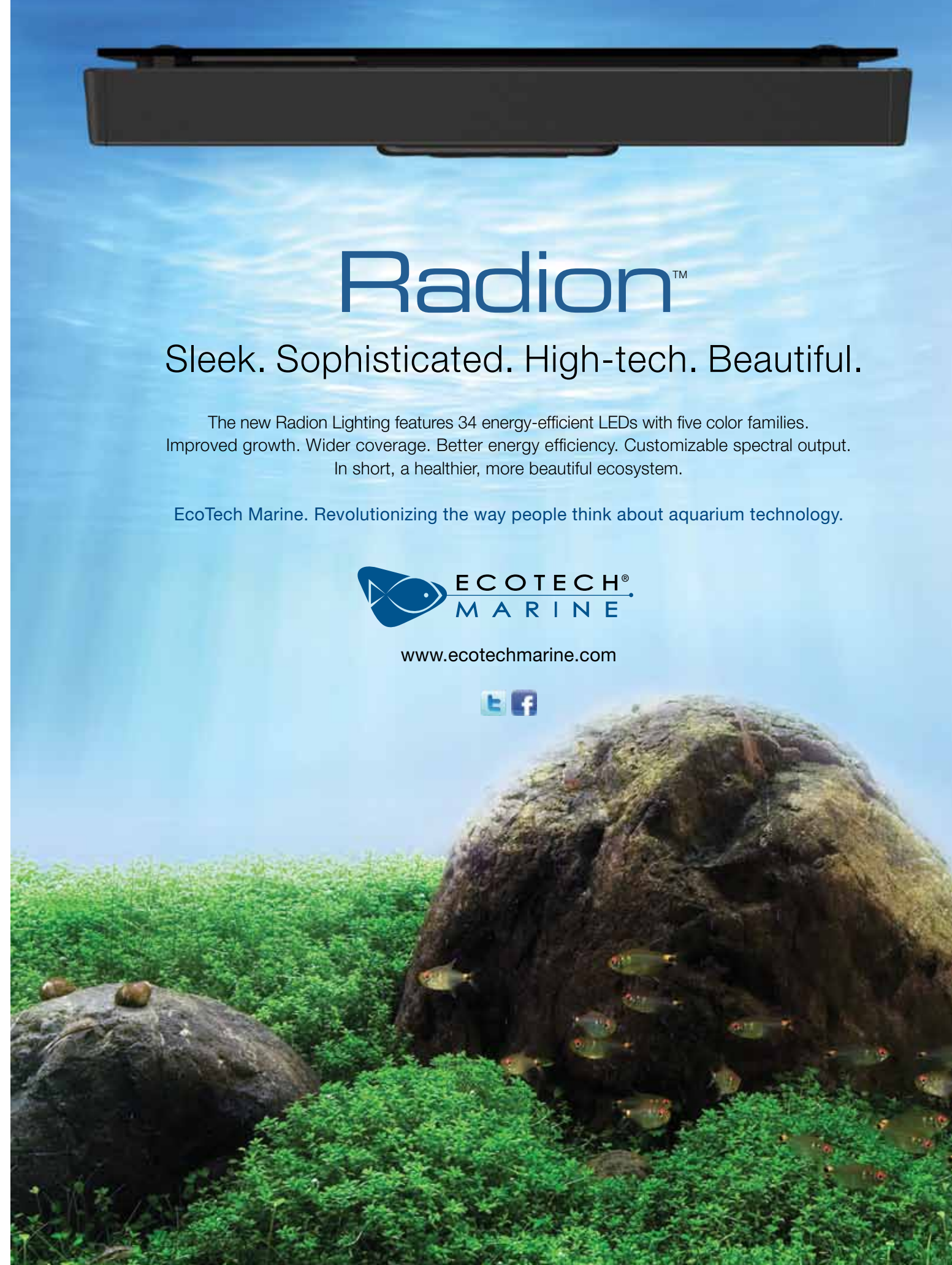
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article and images by Horst Linke • Licorice Gouramis are very special fishes, but they can be quite challenging to keep in the aquarium. Information on their natural habitat is indispensable in order to provide them with optimal living conditions in the aquarium. How do these fishes live in the wild? What niche biotopes do they occupy? What water parameters occur in their natural habitat, and can we replicate those conditions so we can keep Licorice Gouramis in our aquariums?

The fact that I have been a devoted fan of the colorful little *Parosphromenus* species for many years has been reason enough for me to carefully investigate their distribution regions during my travels. In recent years I have been able to find around 20 of the roughly 30 different species, both described and undescribed scientifically, and study their habitats.

Blackwater biotopes

All the known Licorice Gouramis of the genus *Parosphromenus* live in stained blackwaters. Note, however, that blackwaters aren't really black, but a dark red-brown color, produced in part by peat-like materials but mainly by the decomposing leaves of trees and scrub that grow close to the banks. These dead leaves accumulate in multiple thick layers and release numerous substances, especially humic substances, which prevent any noteworthy population of bacteria in the water. These substances are very important to the health and well-being of the resident fishes, and often even essential for their survival.

The staining of the water can be particularly strong during the rainy season or after a heavy rainfall, as the runoff percolates through the layers of leaf litter and peat and washes large amounts of humic substances into the rivers. However, despite the variation in color, the water parameters alter only slightly during these seasonal changes; the water is always very soft and mineral-poor, very clean, and very acid, with a carbonate hardness that is

Traveling in Licorice Gourami biotopes

Above: Around 2 miles (3 km) from the village of Kurau we investigated a large blackwater swamp area that is fed by and drains into a small river. *Parosphromenus deissneri* (Licorice Gourami) lives here among dense marginal vegetation.

Above right: In this small river about 2 miles (3 km) from Kurau, we found numerous *P. deissneri*.

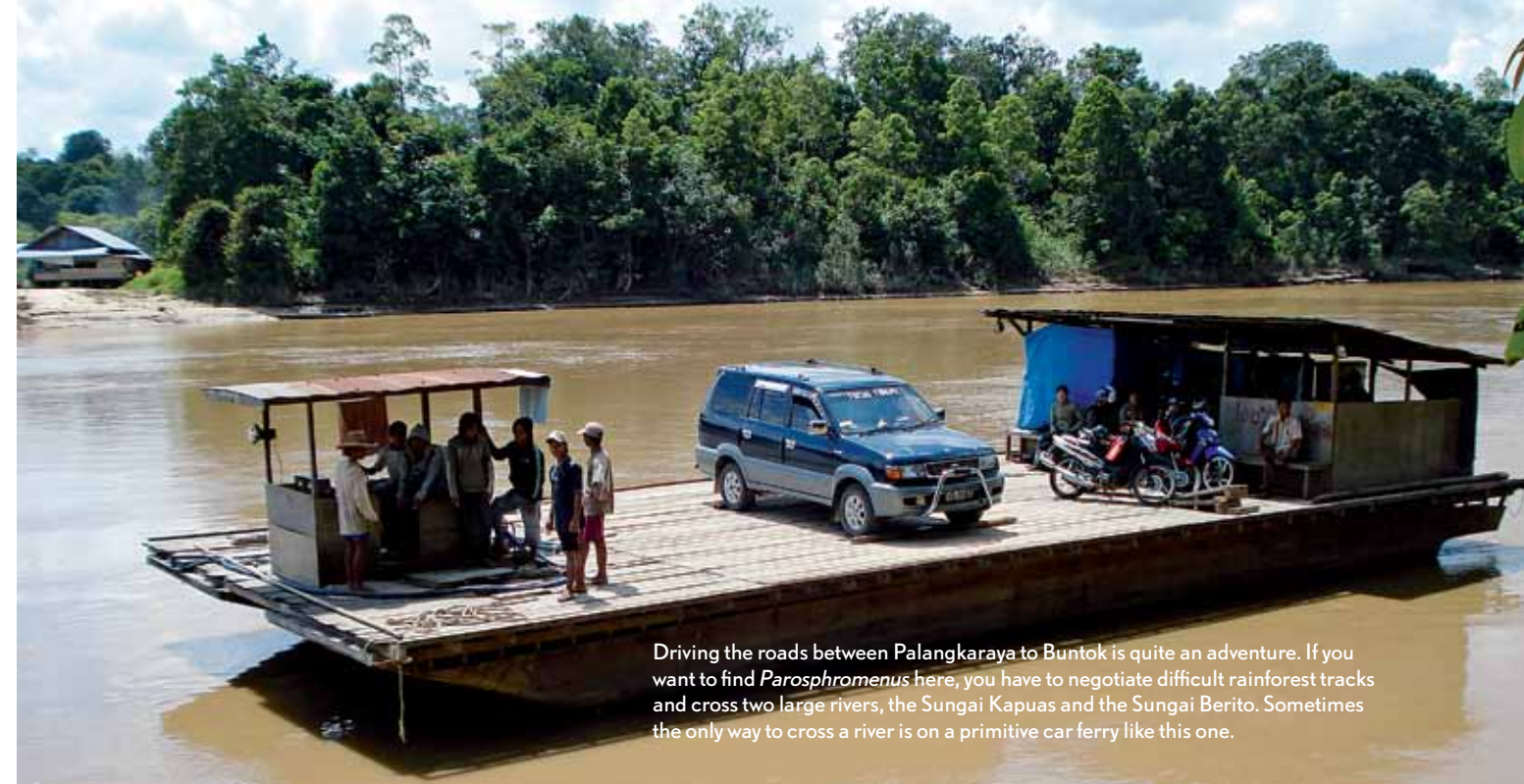
Left: Two male *P. deissneri* in the aquarium, in normal coloration. Note the elongated hard ray in the center of the lanceolate caudal fin.



Right: Deissner's Licorice Gourami, *Parosphromenus deissneri*, from the area north of Kurau. These fishes exhibit impressive coloration and markings, particularly when displaying. They are among the most beautiful Licorice Gouramis.

Below, left: The research site at Kepayang on Belitung. The water here was only slightly brownish after a heavy rainfall. This was the habitat of *Parosphromenus* sp. "Belitung", a rarely seen Licorice Gourami species.

Below, right: In large parts of Kalimantan, the rainforest has given way to a low-lying scrub landscape. Due to increased exposure to the sun, the water temperature in these areas tends to be elevated.



Driving the roads between Palangkaraya to Buntok is quite an adventure. If you want to find *Parosphromenus* here, you have to negotiate difficult rainforest tracks and cross two large rivers, the Sungai Kapuas and the Sungai Berito. Sometimes the only way to cross a river is on a primitive car ferry like this one.

barely measurable.

It can also happen, though, that the water color becomes temporarily lighter following very heavy rainfall if the runoff doesn't percolate through peat-like material. It is then only weakly brownish, and as the result of minerals being washed in the pH may rise briefly from below pH 4 to slightly more than pH 5. However, the rest of the water parameters usually remain unchanged.

To aid would-be *Parosphromenus* keepers, here are a number of examples of the natural habitats that I have visited at a variety of seasons over the course of the years.

***Parosphromenus deissneri* on Bangka**

The Licorice Gourami best known by name is undoubtedly *Parosphromenus deissneri*, although until recently its actual appearance was unknown to many aquarists because other forms were being sold under the same name. Adult males of this species have a lanceolate caudal fin with a prolonged fin ray at its center. They exhibit a strik-

ing gray, but no red in the otherwise black fins with no edgings. During display, however, red longitudinal bands appear on the body between the typical dark stripes.

For many decades the name *Parosphromenus deissneri* was used as a catchall for all Licorice Gouramis that couldn't be identified for certain, and by some for all Licorice Gouramis, regardless of their appearance. Some in the trade continue this practice even today. But the natural habitat of this species is the small Indonesian island of Bangka off the southeast coast of Sumatra, well away from the main collecting areas for Licorice Gouramis. I last visited this island at the beginning of September 2008, during an expedition by the EAC/AKL (the German labyrinthfish association). Unfortunately, the Bangka landscape is being taken over by oil-palm plantations, and the habitats of many wild creatures are becoming severely limited.

Parosphromenus deissneri is found mainly in the northern and eastern parts of the island. Our first study

site lay around 2 miles (3 km) from the village of Kurau, 17 miles (27 km) south of Pangkalpinang, the island's capital, heading in the direction of Toboali. It was a small blackwater stream with little current, with some wider sections and links to large swampy areas on either side of the road; it flowed through dense scrub at this point. The water here was "deep black," a dark red-brown. The visibility was less than 20 inches (50 cm) and the water was clear. The pH was 4.72 and the electrical conductivity measured 4 $\mu\text{S}/\text{cm}$ at a water temperature of 80.5°F (27.0°C). The water in the bank zones was 32–40 inches (80–100 cm) deep and easily negotiable. There was a dense growth of plants, sometimes emerge, that formed thick clumps in places, and a gentle current prevented the water from stagnating among this vegetation. We found mainly *Parosphromenus deissneri* in this habitat. The population density was amazingly high.

Another site we investigated was likewise situated in the eastern part of the island, but this time north of the road from Sungailiat to Puding Besar. This was a small stream, only around 40 inches (1 m) wide, that issued from an area of woodland, flowed parallel to the road for a short distance, and then crossed it. This, too, was a dark blackwater, with a temperature of 81.7°F (27.6°C), a pH of 4.84, and an electrical conductivity of 8 $\mu\text{S}/\text{cm}$. The water was very clear and had a slight current. The water depth was 16 inches (40 cm) on average. *Parosphromenus deissneri* was particularly numerous in small areas of low current among the plants. Here, too, the population density was high, and all the fishes were in good physical condition. Dur-

ing the time of our visit there was repeated heavy rainfall, and hence the water was in motion.

Parosphromenus deissneri is endemic to the island of Bangka, and its distribution on the island probably covers an area around 44 miles (70 km) in diameter. Its purported occurrence on the neighboring island of Belitung to the east has not yet been confirmed. However, Belitung is home to one or possibly even two species of the genus *Parosphromenus*.

My research revealed that *Parosphromenus deissneri* is exclusively a blackwater dweller, so in the aquarium these fishes should be maintained only in water with plenty of humic substances (that is, peat) added to approximate their natural habitat.

Undescribed Licorice Gouramis on Belitung

During our travels on the island of Belitung we were able to find Licorice Gouramis in several places, but we were of the opinion that they were all one species. These fishes, too, were living in blackwater biotopes, albeit of a less extreme type but nevertheless containing water with a pH in the acid range. As an example, I will discuss a site at Kepayang, on the road from Tanjungpandan, the largest town on Belitung, to Kuala Kampit in the east of the island. This was a watercourse around 10 feet (3 m) wide, up to 16.5 feet (5 m) in places, flowing through a scrub and woodland landscape and shaded almost everywhere. At the time of our research (September) the water here was only slightly brownish following heavy rainfall during the night. The pH was "only" 5.59 and the conductivity measured 9 $\mu\text{S}/\text{cm}$ at a water temperature of 77.4°F (25.2°C). The water had a slight to moderate current and averaged 28 inches (70 cm) deep. The Licorice Gouramis were found among overhanging branches and





Left, top: The population density of *Parosphromenus parvulus* is very high at the edges of the forested areas that remain between the large rivers Kapuas and Berito.

Left, bottom: Male *Parosphromenus parvulus* in display coloration. At this time the color and markings of these fish are noticeably different from those of all other *Parosphromenus* species.



only faintly brownish in color after heavy rainfall. The pH was 5.03 and the conductivity 8 $\mu\text{S}/\text{cm}$ at a water temperature of 77.5°F (25.3°C).

These Licorice Gouramis exhibited no parallels with *Parosphromenus deissneri* in their appearance, and their coloration was more like that of one of the *P. bintan* group. It should nevertheless be noted that male fishes from Belitung lack any blue in their display coloration. Apart from a faint turquoise stripe pattern on the fins, they exhibit a bold black body coloration. On the basis of study of other groups in July, it is thought that these *Parosphromenus* live predominantly in less acid water and hence may be less problematical to maintain in the aquarium. The species is thought to have only a small distribution on Belitung, with a diameter of 31 miles (50 km) and getting smaller due to increased clear-cutting for plantations.

***Parosphromenus* in Kalimantan Tengah**

Parosphromenus parvulus, the Red-Spotted Pygmy Licorice Gourami, was described by Vierke in 1979 and is one of the smallest of the genus, but surprisingly, it is thought to have

aquatic plants, mainly along the margins where the current was weak, and in small bays. The substrate consisted of light sand like that in the biotopes on Bangka, and in places was covered in dead, black leaves.

We also caught the same *Parosphromenus* species during our investigation of a woodland region between Bantan and Pelulusan in the south of the island of Belitung, where they were living in a small stream in almost complete darkness due to the close-packed trees. The stream was only about 6.5 feet (2 m) wide and up to 2 feet (60 cm) deep; the current was moderate and the water was

the largest distribution region of the *Parosphromenus* species. *Parosphromenus parvulus* lives in the blackwater rivers of southern Borneo. Its natural habitat is in the Indonesian part of the island and is believed to be restricted to the province of Kalimantan Tengah.

Edith Korthaus and Walter Foersch first caught these little Licorice Gouramis in 1978 in Palangan in the west of the huge province, where we also recorded this species in 1990. But during my own travels in 2009 I netted

Right: Displaying male *Parosphromenus* sp. "Belitung" in full color.



Bottom, left: Numerous fish species, including *P. parvulus*, can often be found in pools of water only 4–8 inches (10–20 cm) deep and in water-filled ditches along the rainforest tracks.

Bottom, right: A large percentage of the watercourses in Kalimantan Tengah are blackwater biotopes. They are the habitat of numerous very interesting fishes popular in the aquarium hobby.

fishes of this species between the Kapuas and Berito Rivers, as well as to the east of Buntok in the eastern part of Kalimantan Tengah. The species is thus distributed from Palangan via Pundu, Tangkiling, and Babugus to Buntok, an area around 310 miles (500 km) in diameter, the largest distribution known to date for any *Parosphromenus* species.

These fishes always live in blackwaters with slight current. They are found in the richly vegetated marginal zones of smaller rivers, as well as in small streams, swamp regions, shallow vegetated residual pools, and ditches along rainforest tracks. The most westerly occurrence known to me is the so-called Planduk (deer stream) of Korthaus and Foersch, on a tributary of the Sungai (River) Sampit at the edge of the village of Palangan. In July 1990 we found *Parosphromenus parvulus* in this stream, along with *Betta foerschi* (Chameleon Betta) and other species. The stream was also home to a second species of *Parosphromenus*, so far not described scientifically, which is currently termed *Parosphromenus* sp. "Palangan" and has rarely been imported. The stream was only around 6.5 feet (2 m) wide, up to 10 feet (3 m) in places, with a slight current and water that was dark red-brown in color. It was very mineral-poor and had a pH of 4.6

with a conductivity of 18 $\mu\text{S}/\text{cm}$ and a water temperature of 76°F (24.5°C). The Licorice Gouramis were found almost exclusively in the sometimes densely vegetated marginal zones, and were not very numerous at this site. The stream followed the edge of a cultivated woodland area and flowed past rubber plantations.

Some two years previously, in August 1988, we had caught *Parosphromenus parvulus* around 155 miles (250 km) to the east in the Tangkiling area, some 18 miles (29 km) north of Palangkaraya. The site was a small river with strongly red-brown, slightly flowing water. The shallow bank zones were vegetated with dense clumps of plants. The water was very clear and mineral-poor; carbonate and general hardness were both less than 1 degree (German), the pH was 4.1, and the conductivity measured 28 $\mu\text{S}/\text{cm}$ at a water temperature of 82.8°F (28.2°C) in the shallow marginal zones and 78°F (25.5°C) at a depth of 20 inches (50 cm).

Parosphromenus parvulus was living syntopic (sharing a habitat) here with two species of Chocolate Gourami, *Sphaerichthys selatanensis* and *Sphaerichthys acrostoma*, but there was no second Licorice Gourami species at this site. The rainforest here had already given way to a low-growing brush landscape on both sides of the road. Around





Bank zones in blackwater biotopes are among the preferred haunts of *Parosphromenus* species. The water here is always slow-flowing and very mineral-poor.

necessary to tackle sometimes difficult-to-negotiate rainforest tracks and cross two large rivers, the Sungai Kapuas and the Sungai Berito. In 2009 there were still small, primitive car ferries across both rivers, but large bridges were under construction.

Once they are completed it is likely that the majority of this region will be transformed into plantations, resulting in the loss of further large tracts of forest and perhaps the disappearance of the small, water-filled ditches, usually only 4–8 inches (10–20 cm) deep, along the tracks.

Successful maintenance

Biotope information and the remarks at the beginning of this article are very important as a basis for the successful maintenance of Licorice Gouramis in the aquarium.

The above-mentioned sample habitats of a number of Licorice Gourami species from Indonesia are not identical in every detail to the habitats of other species, but are representative of most of them. Awareness of their most important characteristics is necessary for the keeping and breeding of these fishes in the aquarium. They also convey a picture of the changes to which many of these habitats are currently being subjected.

Extremely soft water, the complete absence of carbonates, and the huge importance of humic substances are three fundamental elements of Licorice Gourami biotopes, but in many places these are being greatly limited and devalued by changes in land use. I strongly feel that we can and must preserve in the aquarium that which is present in ever-decreasing quantities in the wild. 🐟

20 years later, during our visit in June 2007, the area had changed completely, but we were still able to find *Parosphromenus parvulus* in the Tangkiling area. Large rivers and small streams, sometimes with associated swamp regions, can still be found in this area today.

The most easterly occurrence we investigated was an area of blackwater swamp by the road from Buntok to Ampah, about 155 miles (250 km) east of Tangkiling/Palangkaraya. Here *Parosphromenus parvulus* was living syntopic with *Parosphromenus filamentosus*. The clear, gently flowing blackwater had a pH of 3.7 and a conductivity of 20 µS/cm. The water temperature was 84.7°F (29.3°C) in the shallow areas exposed to the sun. The water was heavily stained dark red-brown, indicating that the humic substances content was very high and the bacterial density very low. During our research in June 2009, the population density of *Parosphromenus parvulus* was still high.

In order to reach Buntok from Palangkaraya, it is

Why are almost all *Parosphromenus* in the trade labeled “*deissneri*”?

Parosphromenus deissneri was the first Licorice Gourami species to be described, as long ago as 1859. For almost 100 years it was thought to be the only *Parosphromenus* species, although fishes that looked different were sometimes found at a wide variety of places. Even today the name is still in popular use, but hardly anyone is familiar with the fish to which it actually belongs. Until recently the true *Parosphromenus deissneri*, endemic to the island of Bangka, had never turned up in the trade, although almost all species sold are known by this name. Why?

The reason is that two species occur on Bangka, and the second, which we now know as *Parosphromenus bintan*, has a much wider distribution. It is easy to distinguish the two species by the difference in the structure of the caudal fin in males, but the over-100-year-old type specimen of *Parosphromenus deissneri* was a female that was so

damaged that this character could no longer be checked. For this reason the much more widely distributed fish was for many years thought to be *P. deissneri*, plus almost none of the finds during that 100 years originated from Bangka.

The situation wasn't clarified until 1998, when it finally became clear that the genus contained multiple species. An officially sanctioned re-description was published and a so-called neotype designated, but many people still haven't changed their ways. Even today it is a pretty safe bet that the fishes labeled *P. deissneri* in the trade are not that species at all. But the lesson is being learned, and recently exporters and importers have been making the effort to apply the correct names to the fishes they supply.

—Peter Finke

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Breeding Licorice Gouramis

Male *Parosphromenus ornatacauda* (Ornate Licorice Gourami) in display coloration in front of the spawning cave.

article and images by Günter Kopic • Breeding Licorice Gouramis requires following certain protocols, but with a little effort any conscientious aquarist can succeed. Günter Kopic, who has been keeping and breeding *Parosphromenus* species, the genus known as Paro, for more than 25 years, tells us how he does it.

I was still a boy when I started keeping my first fishes, including labyrinthfishes such as the Dwarf Croaking Gourami, *Trichopsis pumila*. As a married adult still without a permanent home, I found my desire to have an aquarium was reawakened. My wife had no objection, so in 1984 I set up my new aquarium. I still had the old angle-iron tank from my boyhood, but I didn't want to put it in the living area, so the cellar of our rented apartment became my fish room.

The aquariums proliferated fairly quickly. Because of the limited size of the cellar they were mostly smaller affairs. I had an increasing desire to keep killifishes, but this was virtually impossible because they were so hard to find. An unconventional dealer tried to obtain some for me, but what I actually received were Brown Spike-Tailed Paradise Fish (*Pseudosphromenus dayi*) and Peaceful Bettas (*Betta imbellis*). My interest in labyrinthfishes continued to grow, and I joined the IGL (International Labyrinthfish Association). I purchased my first Licorice Gouramis, six young *Parosphromenus nanyi*, at my very first IGL meeting in October 1986. A good six months and a new tank later, they spawned and the first young Nagyi's Licorice Gouramis were soon swimming in my tanks. I was infected with the Paro virus. When we built our own house five years later, I planned the cellar fish room well in advance, specifically designing it for the maintenance and breeding of *Parosphromenus* species.

Small aquariums

I have found that a 5-gallon (20-L) aquarium is suitable for maintenance and breeding. The shelves of my racks are 16 inches (40.6 cm) wide, so I place the tanks end-out. In addition to the space-saving aspect—more aquariums can be fitted in side by side—I have found that Licorice Gouramis, which are rather shy, can be seen more easily using this arrangement. I think this is

because a larger flight distance is available. Hence I have been able to observe the majority of spawnings, which take place in the caves nearest the front.

The setup of my aquariums is spartan. Two or three homemade caves (half flowerpots), a small air-powered internal filter containing two fine-pored foam inserts with peat granules sandwiched in between, and a small piece of slate to hold the filter in place are sufficient for Licorice Gouramis. The cave ceiling shouldn't rise toward the front, because if the fish construct a bubblenest it could slip out. Dark substrate and/or beech leaves (*Fagus sylvatica*) can be used as décor, but aren't necessary and may sometimes even hinder effective breeding. It is important to have a tight-fitting cover glass, as Licorice Gouramis are very good at jumping. The lighting is less important, but shouldn't be too bright.

Larger aquariums are required for rearing only if the number of fry is high. In most cases the brood can be left in the breeding tank up to a size of .5 inch (1.27 cm), providing they are fed accordingly.

I always try to move my Licorice Gouramis to newly set-up aquariums at intervals of around three months. Usually a water change isn't necessary for that period of time. Larger, fully decorated aquariums are suitable for keeping groups of Licorice Gouramis. There will always be a number of young maturing, provided there are no other fishes present.

For many species, soft, slightly acid water will suffice for maintenance, but when it comes to breeding Licorice Gouramis the water parameters are especially important. In my experience they must be very close to the parameters in their natural habitat, especially when dealing with wild-caught fishes or the first tank-bred generations. For example, in 1988 I was maintaining a form from the *Parosphromenus bintan* group, sold in those days as *P. deissneri* "Red", which didn't spawn unless the pH was less than 3. The subsequent tank-bred generations weren't as demanding.

Luckily, I have access to spring water for my *Parosphromenus*. The conductivity is between 85 and 115 $\mu\text{S}/\text{cm}$ and the carbonate hardness less than 0.01°dKH, while the pH is 6.5 at the spring and 7.0 after being left to stand. The pH can then be adjusted to the range required for breeding the Licorice Gouramis via the quantity and quality of the peat granules used. Because carbonate hardness is virtually non-existent, it may even be possible to lower the pH below that of the peat granules. De-ionized or reverse-osmosis water makes a suitable alternative. Newly set-up aquariums shouldn't be populated with fishes

immediately, but only after 7–14 days of monitoring the water parameters.

Live food

Availability of a suitable food supply is a further prerequisite for the keeping and breeding of Licorice Gouramis. Only in the rarest of cases will they accept prepared foods such as flake or granules. Occasionally individual fishes can be persuaded to eat suitably fine frozen or dry foods,



Top: Pair of *P. ornatacauda* spawning. In this species the male closes the embrace with his tail.

Bottom: As in many species, the female *P. ornatacauda* attaches her eggs to the ceiling of the cave (a half flowerpot); the male often assists her. In most species the female becomes much paler during the spawning phase, but in this species she colors up like the male—light above, dark below.



Left: Pair of true *P. deissneri* (Licorice Gourami) spawning in the cave. I have found these fishes to be rather shy.

Right: In *P. deissneri* the spawning embrace isn't closed by the male's tail. The eggs can be seen emerging from the female.

more harmoniously the pairs put down to breed behave, the easier breeding them will be. Ideally, you should buy six to eight half-grown juveniles and let them mature together. Assuming both sexes are present, loose pairs will form at the onset of sexual maturity. These pairs should then be used for subsequent breeding attempts.

But most *Parosphromenus* species don't spawn on command. Sometimes you wait in vain for courtship, pairing, spawning, and fry. Even if these hurdles can be surmounted, breeding may still founder on a variety of factors. For example, a poor fertilization rate in young and, above all, older pairs often results in the male eating all the eggs after one to three days, even if a number of eggs were developing. I once obtained a pair of *Parosphromenus nanyi* around four years old; they spawned regularly, but the eggs always disappeared after three days at most. So I removed a complete clutch—with some 150 eggs, it was the largest *Parosphromenus* clutch I had ever had—and incubated it artificially. After a short time I had around 50 free-swimming *Parosphromenus nanyi* fry.

Another reason for failure is egg-eating parents,



Above: A trade form of *P. anjunganensis*. As this photo shows, during the spawning phase, the female turns pale and her stripe pattern almost disappears.

Below, left: This gorgeous Licorice Gourami male originated from an import consignment and is very probably *Parosphromenus allani*.

Below, right: The stripe pattern of the female also fades in *P. cf. tweediei* (also known as *P. sp.* "Pontian") during the spawning phase.

Clockwise from top left:

Pair of *P. linkei* (Linke's Licorice Gourami) beneath the bubbler. The photo clearly shows the dark bars through the "sexy eyes."

Usually the pair sink during the "paralysis" that follows a spawning pass. Only rarely do they float upward, as this male *P. linkei* is doing.

Pair of *P. linkei* collecting the eggs after a successful spawning pass.

Male *P. linkei* guarding the not-yet-free-swimming larvae. The brood comprises about 50 young.

such as CYCLOP-EEZE.

(Editor: Nano fish importer and breeder Rachel O'Leary says that she augments live foods with very high quality fine and crushed rations with newly arrived wild fish. "I fed them live white worms initially, but now they are eating crushed flake and Repashy Shrimp Souffle as well as Xtreme Catfish Scrapers—those pellets are like crack for fish.")

However, you must be prepared for the fact that the long-term maintenance and breeding of these fishes may require the virtually permanent availability of mouth-size live foods.

Fortunately, the cysts ("eggs") of *Artemia* species provide us with a food that is available year-round and

easy to handle. Depending on the size of the fry, *Artemia* nauplii are usually an excellent and easily regulated rearing food. In my view, long-term maintenance and breeding are possible using *Artemia* nauplii, but it is better to improve the menu with assorted other food organisms. One can, for example, resort to culturing various food organisms such as *Moina*, Grindal worms and micro-worms, and vinegar eels. I usually have the last two of these available. In general, springtails (order Collembola) and fruit flies (*Drosophila*) are less suitable as foods because they remain at the surface.

Obviously, "pond foods" are very suitable for Licorice Gouramis, provided relevant conditions are met. In addition to suitable bodies of water at a convenient distance, legal restrictions, and the seasons of the year, you must consider quality and quantity. Try to find minimally polluted waters that contain the correct size of food organisms and no fishes.

Natural breeding

And now we come to the most important part—the breeding itself. Only in the rarest of cases is it possible to select broodstock specially. Usually you have to start with the few specimens you have managed to obtain. The





Above, left: These Licorice Gouramis from the Bintan group were imported by Aquarium Glaser.

Right: Male *Parosphromenus cf. bintan* courting his female. The "sexy eyes" with black eye bars indicate that both are ready to spawn.

though this is relatively rare. More often, the parent fishes regard the free-swimming fry as food and hardly any young grow on. For this and other reasons, I usually transfer the parents to another aquarium shortly before the fry become free-swimming. The best time to do this is when the larvae are positioned horizontally on the ceiling of the cave.

Artificial breeding

I always prefer the relatively natural method of breeding described above to artificial incubation of the eggs. Only when natural methods don't work and I have no

other adults available do I remove one or more clutches. The method and equipment I use for artificial hatching originate from Jakob Geck, and I have adapted them very little. A stock solution of 1 gram Trypaflavin (Acriflavin) to 1 liter distilled water is an important aid. Warning: this anti-bacterial remedy will kill plants.

When removing clutches I carefully transfer the eggs underwater into plastic bowls containing about 6.75 ounces (200 ml) of water, to which I add 0.01 ounces (0.3 ml) of the Trypaflavin solution. I remove one or two dead eggs from the bowls every day. After hatching I carefully change two-thirds of the volume of water from the breeding tank. Shortly before they become free-swimming, the larvae and the contents of the bowl are transferred into a 1.8-pint (.85-L) jar. A day after feeding begins I add a small ramshorn snail to eat dead food organisms; the snail's droppings can be removed relative-

Where can I buy Licorice Gouramis?

Licorice Gouramis are rarely available in the aquarium trade. And when they are, they are almost invariably wild-caught specimens from the previous breeding season.

Try to buy healthy specimens: not emaciated, no external signs of disease, no clamped fins. Perhaps they like to hide or their colors are faint, but that is quite normal. Don't worry too much about the name under which they are being sold—it will often be incorrect. It is more important that both sexes are present. All specimens with a hint of colored banding in the unpaired fins will be male.

Females almost always have colorless, transparent dorsal, caudal, and anal fins.

It is best to buy Licorice Gouramis as tank-breds directly from a good breeder, as then you will be sure to obtain healthy, vital individuals, often from a guaranteed location, with the correct species name. They also will have been kept in the right water and fed with the right live food.

If you don't know such a breeder, then go to the auctions held by your local labyrinthfish association. But the best course is membership (free) in the *Parosphromenus* Project and an email to distribution@parosphromenus-project.org. The project is currently developing a distribution service to help new Licorice Gourami fans obtain fishes. As a beginner you shouldn't set your heart on a particular species right away—that usually doesn't work and is also not particularly sensible.

—Peter Finke



Left: The circling of the pair and their spawning passes often cause previously attached eggs to detach from the ceiling of the cave. Plenty of pairings are unsuccessful on the first attempt.

Below: These gorgeous fishes were imported as *P. sp.* "Pontian". They are very probably *Parosphromenus tweediei*.



Right: Several geographical variants of *P. nanyi* (Nagy's Licorice Gourami) are known, but they differ only slightly. This adult pair are tank-breds from parent stock from the collecting site "Mersing Kluang 16/314" in Malaysia. Egg counts of more than 100 are possible in this case.





Left: Juvenile *P. ornaticauda* at the age of 10 weeks.

even in the acid environment, while microworms sink to the bottom and die more rapidly. Other food organisms of suitable size should be added to the diet as soon as possible. Subsequent rearing usually presents no problems.

Depending on the species, young fishes reach sexual maturity at 9 to 12 months old. *Parosphromenus* can sometimes live to be relatively old—my records show that my oldest tank-bred female from the F2 generation of *Parosphromenus deissneri* attained an age of about nine years and five months—but are then of only very limited use for breeding. In my experience the optimal age for broodstock is between one and three years old.

Licorice Gouramis are gorgeous and very interesting pets, but certainly not suitable for every aquarist. A certain amount of experience is required, as well as the ability to provide the correct water parameters and live foods of the right size. The maintenance and breeding of these fishes places demands on the aquarist, but they are generally achievable. Breeding, including for several generations, is readily possible in the case of many species, and invariably fascinating.

I have tried to share some of my experiences during 25 years of keeping and breeding *Parosphromenus*. My breeding records (which I recommend that everyone keep) show, for example, that in the space of two years I documented 96 spawnings (35 of which successfully produced fry) of nine different species and forms. In another year I had a total of 146 spawnings from 19 pairs. However, I must warn everyone who is interested in Licorice Gouramis after reading this article: Beware! the Parovirus is quick to strike—but it's well worth it. 🐟

ly easily from the jar by stirring briefly so that they collect in the middle of the bottom. Every day I top up the jar by about .40 inch (1 cm) using water from the breeding aquarium. Two to three weeks after free-swimming I am able to carefully transfer the fry into an aquarium previously prepared for them.

Rearing using *Artemia*

The best food for rearing the fry is very freshly hatched *Artemia* nauplii, though I initially feed smaller fry with vinegar eels as well. These have the advantage that they continue to swim actively for several hours in the water,

Below: In my fish room, the middle row, with side-by-side 5-gallon (20-L) tanks, is mainly reserved for Licorice Gouramis. The setup for breeding these fishes is Spartan—the aquarium contains only a filter weighed down by a piece of slate and two homemade pottery caves. A close-fitting cover glass is important.



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The *Parosphromenus* Project: a global conservation network

by Peter Finke • Despite all the taxonomic difficulties, the genus *Parosphromenus*, with 18 recognized species and an additional 20–40 local variants (and even more to follow), is still easy to overview. And despite all the diversity and publicity, one thing can be agreed upon: the existence of the entire genus is seriously endangered. It is thus a prime example of the need for well-organized conservation activity in the aquarium hobby. But there are two major hurdles to be surmounted: these colorful little fishes will eat only live food, and they obligatorily require extremely soft, acid water with a low bacteria count.

The days of the vast majority of the blackwater jungle swamps, streams, and upland bogs of Malaysia and Indonesia are numbered. Since 1960, large areas of primary forest have been falling victim to chainsaws and burning, initially in western Malaysia, then on the major islands, such as Sumatra, and currently in Kalimantan (Borneo) and Sarawak. The lowland wetlands are being drained to make way for plantations (oil palms and tropical woods), the blackwaters are being channeled away in the direction of the sea, and even the hilly regions are increasingly subject to destruction and drainage.

The indigenous peoples have long since realized what immense destruction is taking place in their homelands. But they are powerless in comparison to the powers in charge of the development. The orangutan is put forward as a symbol of the wildlife conservation that is taking place, but the success is very patchy. The formerly rich biodiversity of this hotspot on our planet is disappearing—and with it, totally unremarked by most people, numerous small fishes such as the truly gorgeous Licorice Gouramis.

This was all foreseeable in 2005, when, with the unstinting help of Martin Hallmann, I founded the “Paro-AG” (the nucleus of the current *Parosphromenus* Project) in the IGL (International Labyrinthfish Association); our chief motivation was to do something to counter the destruction. For decades, aquarists and their organizations have neglected to get involved in any attempt to make the hobby conscious of its political dimension and take action on that level. It was clear to us right from the start that the most important task—making an effective contribution to saving original habitats—was going to be very difficult. We felt powerless in the face of the concentrated economic might of international concerns at work in Southeast Asia. Nevertheless, we are doing what we can; he who fails to take the first small step will never be able to do anything more far-reaching later.

Experiences so far

Unfortunately, conservation activity in the aquarium hobby is often based on a number of illusions, if it is practiced at all. Some people believe that the fishes we breed can be reintroduced into the wild—a false hope

Top right: This is what the majority of Licorice Gourami biotopes used to look like. This still unspoiled biotope of *P. anjunganensis* is in the drainage of the River Kapuas, Kalimantan Barat. It's hard work collecting in the jungle!

Bottom right: This is how the destruction begins. The former bed of a jungle stream has become a makeshift track for four-wheel-drive vehicles, which are used to open up further access.





Far left: Islands of clear-cutting appear in the primary forest. First the trees are felled and taken away, and then the remaining vegetation is destroyed.

Left: After a downpour the cleared area looks like this: a planting bed for the oil palms that seal the fate of the former swampy jungle and its rich, specialized flora and fauna.

Terrarium Association (EATA), are now equal partners and the resources of all the organizations are shared. Major museums, such as the Natural History Museum in London and the Raffles Museum in Singapore, are now cooperating institutions. The same applies to a number of research organizations, such as the Fish-BOL group in Guelph, Canada.

We don't run the Paro Project on anyone's behalf or under the auspices of any organization or sponsor, but as an independent network of people whose sole agenda is Licorice Gouramis.

Current activities

The current activities of the *Parosphromenus* Project are twofold: the preparation of truly reliable information and practical networking, both on a global level. In 2011, using private donations from Licorice Gourami enthusiasts, we established a large, advertisement-free, trilingual (German, English, and French) website for the *Parosphromenus* Project, accessible at www.parosphromenus-project.org.

Two older important instruments of the project have also been integrated into the website: the regular newsletter, now available in three languages via a global distributor from some 250 addresses in 17 countries, as well as the census that has taken place every six months in spring and autumn since 2005, and thus provides a

(or a show of ignorance) for all sorts of reasons. Others believe that they can achieve something significant working alone or with a few friends from a club—also an illusion. Or they think that a few years' effort can make a substantial contribution to the future. Sadly, conservation is often little more than a passing interest for many aquarists.

But the real problem is one of much greater dimensions. In light of what we know now, we were comparatively ignorant and naïve when we started back in 2005. In our first years we have attempted to avoid making certain major mistakes, though in so doing we have made other ones.

One such mistake was believing that problems obtaining stock, experienced by many aquarists who would have liked to work with us, were none of our concern. We got a large number of inquiries along the lines of, "How can I get hold of some Licorice Gouramis?" We passed on a few addresses, but otherwise replied, "Unfortunately, not from us. We aren't responsible for distributing Licorice Gouramis, we're just trying to organize their conservation. Setting up a supply line would overstretch us." Even though that was true, it was nevertheless a mistake. Large numbers of young fishes were sometimes available, but in spite of that a lot of people who were really interested gave up in disappointment because they couldn't obtain stock.

Another mistake we made was underestimating the general information deficit regarding Licorice Gouramis. Nowadays there is more aquarium literature available even on killifishes and L-number catfishes than there is on *Parosphromenus* species. We could have made a lot of information available via our newly founded Paro-Forum, which by now has had well over a million hits,

but this operated almost exclusively in German and was inaccessible to many who might have been interested. By limiting it to the central European sphere of activity where it was founded, we hampered the growth of a project that we now realize must be active globally and in multiple languages.

Compared to many similar endeavors, we were relatively well organized even back then, but not well enough. Most people who go to the effort of initiating conservation programs talk a lot about maintenance conditions, methods, and stud books, but too little about networking, organization, communication, and management. We, too, initially underestimated the importance of those elements, but those were years of learning and development, and we did achieve valuable initial successes and gather experience that stood us in good stead during the reorganization of the project in 2010.

A new beginning

A serious conservation network has a chance of success only if it can involve professionally organized projects across the globe. My experience with the organization of international research groups proved useful here. The Internet is a real blessing when it comes to this sort of thing; it requires little material expense, albeit a heavy expenditure of time, to establish virtual links across international and intercontinental boundaries.

Although we started in Germany, the potential for real growth lies in the Scandinavian countries, in the U.S., and in Asia, where many of the fishes originate. So English and French are now the main languages of the project. Linguists and translators are important members of our staff. Japanese still presents problems, but that will have to change, as there is a strong Licorice Gourami

scene in Japan. In 2012 the project homepage will be accessible even in Chinese (Simplified Chinese).

The one-man organization has now become the steering group, a team of people with separate roles who meet twice a year and remain in close communication the rest of the time. An international advisory board of well-known experts has been appointed to advise the steering group. Its members come from Germany, England, France, the U.S., Japan, Malaysia, and Indonesia.

Cooperation with other interested parties is important. We approached every expert and those with a serious interest right from the start, whether or not he or she was a member of the IGL. Nevertheless, the link with the IGL proved an impediment that had to be eliminated during the professionalization of the project.

The German Paro-AG, now headed by Martin Hallmann, remains the nucleus, but other organizations in Europe, including the European Anabantoid Club (AKL/EAC), the Anabantoid Association of Great Britain (AAGB), the Verband Deutscher Vereine für Aquarien- und Terrarienkunde e.V. (VDA, the association of German aquarium clubs), and the European Aquarium and

Right, top: Nowadays the surviving *Parosphromenus* biotopes often look like this one in western Malaysia: no longer any jungle, a dead, straight track with a roadside ditch and oil palms on the other side. The blackwater organisms have vanished or been driven to the edge of existence as a result of the intensive human activity.

Bottom: Can Licorice Gouramis still be found here? Maybe, if the soil still has an adequate peat content and springs still rise in the islands of remaining jungle. But the habitat (here in western Malaysia) is by and large suboptimal.



very detailed picture of the aquarium populations of what are now more than 50 different *Parosphromenus* forms, a critical evaluation of trends, and information on who has which species. Moreover, the website includes an innovative open forum for information from and communication with interested outsiders. This forum is designed to be free of linguistic constraints. Anyone can use the language of his or her choice, though English predominates.

We have set up four sections: three major regional sections for Asian, European, and American users, where they can express their very different perspectives, and a global section where we can talk about Licorice Gouramis and their problems independent of these regions. Additional special features of the new website are interactive land maps, allowing the user to zoom in on the home territory of the fishes via Google Maps, multiple links to the literature and other websites, and regularly updated

news from the world of the Licorice Gourami hobby.


Because it is the best way to spread the word about the possible impending extinction of these fishes, our most important current activities are being played out in the field of networking. There are two elements that will determine success or failure. First, enlisting additional aquarium enthusiast friends of these fishes who are willing to try breeding them, and second, the onerous but absolutely essential task of bringing influence to bear on the authorities in Malaysia and Indonesia, in order to effect a change of heart there.

Involving the hobby

Licorice Gouramis are not fishes for the mass market, and they won't and shouldn't become such. But we are convinced that among the hundreds of thousands of aquarists all over the world, there must be a few hundred

who won't be deterred by the water and food problems of getting involved in conservation breeding, because they would like to add a sense of purpose to their hobby. Many young people feel attracted by precisely this motive. Reducing the burden on the still-too-small number of breeders, so that instead of the current two to five species/forms per breeder, in future there are two to five breeders to a single species/form, is a sensible goal and one that is attainable on an international scale. To achieve this we will need to organize exchanges of fishes, and in addition we don't want to sever all links with the trade.

Ending the habitat destruction in the countries of origin is much more difficult to organize. We are working in three directions here: we are trying to forge links with conservation organizations that are already active on the spot; we are eagerly seizing upon every hint that

the indigenous populations are wise to the damage that their governments, regional authorities, and locally active concerns are causing; and we are establishing links with everyday life in the industrialized western world and demonstrating that we aquarists are playing a part in the destruction by purchasing palm-oil products or tropical woods. We also need to criticize the oft-lauded plantation agriculture. Only if our awareness of our own involvement in the destruction becomes sharper and more precise can we expect to influence people living on the spot, and through them the landscape itself. Even if this comes to pass too late for many *Parosphromenus* species, the aquarium hobby cannot simply sit back and wait for the news of their demise. We must make an active contribution to the necessary changes. We are involved. 

Below: The central part of the author's *Parosphromenus* setup.

LICORICE GOURAMI INFORMATION and LIVESTOCK SUPPLIERS

Unless you have access to an exceptional aquarium shop, or a dealer willing and able to special-order *Parosphromenus* spp., finding Licorice Gouramis may require a bit of research.

The *Parosphromenus* Project has an active coordinator who can connect would-be Licorice Gourami buyers with private breeders and dealers known to import these fishes from time to time. Contact is easily made by email.

Beginners may have to be flexible about the species they acquire, as availability varies greatly.

Information

The *Parosphromenus* Project

www.parosphromenus-project.org/en.html

Distribution hotline:

distribution@parosphromenus-project.org

Anabantoid Association of Great Britain (AAGB)

www.aagb.org/

American Labyrinth Fish Association (ALFA)

www.anabantoid.org (Coming soon.)

Livestock

The Wet Spot Tropical Fish

Anthony Perry

Portland, Oregon

www.wetspottropicalfish.com

Exotic Aquatics

Michael Hellweg

St. Louis, Missouri

www.minifins.com

Invertebrates by Msjinkzd

Rachel O'Leary

York, Pennsylvania

<http://msjinkzd.com>

Anubias Design

Mark Denaro

Indianapolis, Indiana

anubiasdesign@yahoo.com

The Fish Hut

Lanarkshire, Scotland

<http://www.thefishhut.co.uk/>

Tropical Fish Importers & Exporters

London, England (wholesale only)

<http://www.tfie.co.uk/>



“Wow!”



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