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 **Dwarf Cichlids from Lake Malawi**



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Filialen mit Zoofachabteilung





Cichlids

Dwarf cichlids from Lake Malawi

by Andreas Jung

The colorfulness of the rock-dwelling cichlids of Lake Malawi - also known by the native name "mbuna" - sets the heart of practically every aquarist beating. And hence the question constantly arises of whether there are any small species that can also be kept and bred in smaller aquaria of around 100 liters volume.

Propos of which, it should be stated that, essentially, the aquarium size required for mbuna depends not so much on the expected eventual size but more on the social behavior of these cichlids. Male mbuna not only need to defend a territory against competing males, but this spawning territory must also be large enough to feed the so-called alpha male. Typical mbuna feed mainly on Aufwuchs, ie algae and the small organisms it contains. This way of life explains the huge aggressiveness shown by territorial mbuna males towards conspecific males. And the females are frequently attacked, as in the wild only females that are ready to spawn visit the territory of a male. In the aquarium, whose total size is often smaller than the spawning territory of an mbuna male in the wild, the courtship behavior of a male can thus easily change to aggression because the female isn't ready to spawn. To put it in human terms, the male doesn't understand what a female is doing in his territory if she isn't ready to spawn. She is then seen as a competitor for food and attacked.

What is a dwarf cichlid?

A large percentage of the mbuna species can be seen as dwarf cichlids, ie cichlids that don't exceed a total length of 10 cm, at least in Lake Malawi. Matters are, however, rather different in the aquarium, where many species grow a good third larger than they do in the wild. On the one hand this is linked to the appreciably higher nutritional value of the food supply that the

fishes receive in the aquarium, and on the other mbuna never live as long in the wild as in the aquarium. Because fishes keep on growing throughout their lives, many of the popular species can attain a good 15 cm long.

A true dwarf: *Pseudotropheus demasoni*

P. demasoni is one of the smallest of all the mbuna species and grows to only 6-8 cm long. In the wild males don't seriously defend their territories against conspecific males. This peacefulness is linked to the fact that this species is sexually monochromatic, ie male and female are (practically) the same in coloration. In almost all other mbuna the opposite is the case and male and female can

Pseudotropheus demasoni



All photos: Frank Schäfer

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be told apart without problem on the basis of coloration. In the wild and in the aquarium low-ranking males of many mbuna species adopt female coloration and thus avoid being attacked by territorial males. The fact that male and female are the same color in *P. demasoni* thus demonstrates the particularly peaceful character of the species. Unfortunately, however, this applies primarily to life in the wild. For unknown reasons *P. demasoni* are among the most intolerant of all the mbuna in the aquarium and hence should be kept in relatively large aquaria despite their small size.



A tiny distribution

As far as is known *Pseudotropheus demasoni* has only a tiny distribution in the wild, namely Pombo Reef and Ndumbi Reef in the Tanzanian part of Lake Malawi, where these fishes are found at depths of between 2 and 8 m. It may be that special conditions prevail at these two locations and prevent the males from living the normal lifestyle of an mbuna male described in the introduction. Perhaps it is the highly nutritious food supply in the aquarium that makes the species so aggressive there? The small distribution periodically leads to concerns that the species may be endangered by collecting for the aquarium hobby, but these fears have proved unjustified. It remains a scientific fact that no fish species has ever become extinct as the result of being collected alive and that it is extremely unlikely that anything of the sort could ever happen. In any case, almost all the *Pseudotropheus demasoni* in the trade are captive-bred.

Longitudinal banding - *Melanochromis cyaneorhabdos*

Many *Melanochromis* species, above all *M. auratus*, which has been one of the most popular mbuna for some 40 years, are absolutely gorgeous. Unlike the vertically striped *Pseudotropheus* and Co, *Melanochromis* usually have longitudinal banding. The above-mentioned *M. auratus* is one of the most aggressive mbuna and hence should be kept only in large aquaria and with robust tank-mates. But there is a species that is almost as

Melanochromis cyaneorhabdos, adult male.



Adult male *Iodotropheus sprengerae*.

peaceful in the aquarium as *Pseudotropheus demasoni* is in the wild, namely *Melanochromis cyaneorhabdos*, which is often to be found in the trade under its old, invalid trade name of *M. "maingano"*. Just as in *P. demasoni*, there is hardly any difference in color between the sexes and in this case too this is a sign of little or no territoriality being present. At the same time *M. cyaneorhabdos* usually grows to only 8-9 cm long, rarely larger, and is also suitable for medium-sized aquaria in this respect.

The Rusty Cichlid: *Iodotropheus sprengerae*

This cichlid, which is regarded as endangered in the wild (though this has nothing to do with the aquarium hobby), again exhibits no clear differences in coloration bet-

ween the sexes and grows to only 9 cm long in males and 7 cm in females. *Iodotropheus sprengerae* can't in all honesty be assigned to the mbuna as it isn't tied to any special biotope and in addition is an omnivore. This fish never establishes fixed territories, but lives solitary, with males trying their luck with any female they encounter. This lack of territoriality means that *Iodotropheus sprengerae* can also be numbered among the harmless dwarf cichlids from Lake Malawi that are well suited to smaller aquaria. Note that *Iodotropheus* is regarded as a relict species that may well be similar to the ancestor of all the mbuna. Hence this "living fossil" is particularly valuable for behavioral observation.

The yellow beauty: *Labidochromis caeruleus* "Yellow"

The last species that we will take a look at in this article is *Labidochromis caeruleus* "Yellow". It too is one of the largely sexually monochromatic species in which the male doesn't establish a territory and which is relatively peaceful as a result. *Labidochromis* feed on small organisms and hence represent no competition to the true mbuna that are typically aufwuchs-feeders and are usually tolerated in the territories of the latter. Strictly speaking *L. caeruleus* "Yellow" isn't a dwarf cichlid at all as old males can grow to 11-12 cm long in the aquarium. Females always remain somewhat smaller.



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But, as already stated at the beginning of this article, it isn't always just size but also behavior that actually counts here. And so *L. caeruleus* "Yellow" can only be recommended for a Lake Malawi community aquarium for peaceful dwarf mbuna.

Clever decoration

How peacefully or aggressively the cichlids portrayed here behave in the aquarium also depends on how clever the aquarist is in de-

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signing the set-up. It should be stated clearly that cichlids of all kinds, no matter whether large or small, have individual traits. Every species contains particularly belligerent and particularly peaceful individuals. And even the most peaceful cichlid will exhibit increased aggression for a short while when a (temporary) spawning territory is established. But the aquarist is responsible for how serious the effects of such undesirable characteristics turn out to be. When setting up the tank it is important to create line-of-sight barriers. As far as a fish is concerned the aquarium glasses don't exist, it is incapable of understanding such things. If, for example, there is a pile of rocks in a corner of the tank

and an mbuna male selects this rockpile as the center of his territory, then three quarters of the territory will lie outside the aquarium without the territorial male feeling there is any spatial limitation. This type of knowledge of animal-psychology should always be applied in smaller tanks. It would be totally wrong to build a wall of rocks the entire length of the aquarium. A dominant male could claim the entire aquarium as his territory and tyrannize the rest of the population. By contrast it is wise to have a rockpile at each end and an open area of sand in the middle as a neutral zone. Plants such *Vallisneria* can be grown there to provide additional cover.

Controlled overpopulation?

This method is a must for the larger and more aggressive mbuna, but not so much for the species under discussion here. And the ratio between the sexes also plays a subordinate role here. Females remain smaller in all the species mentioned and their coloration is somewhat less intense; but essentially courting males of all the species mentioned here will react in exactly the same way to a male conspecific as to a female: he displays to the conspecific to see what happens. In addition, with time fishes get to know each other personally in the aquarium. So the species listed here can either be kept in the classic manner with one male to three



Labidochromis caeruleus, „Yellow“

or four females, or simply with four or five individuals of the species in question regardless of sex. Perhaps with the exception of *Labidochromis caeruleus*, in which the old male can be quite intolerant of other males. If necessary just a pair will be fine in these peaceful species, but this is always the worst solution, as the subsequent introduction of newly-purchased individuals to an mbuna aquarium, as may be necessary if one of the pair dies through illness or accident, is always a problem because it disrupts the existing social status quo.

To sum up, the "giant aquarium" that is Lake Malawi has also produced species that are relatively small and peaceful, so even aquarists with limited space can enjoy these colorful mouthbrooders.

Lexicon

Dwarf Malawi cichlids...

Pseudotropheus means "false *Tropheus*"; *Tropheus* is another cichlid genus.

demasoni: in honor of Laif DeMason, an ornamental fish breeder based in Florida.

Melanochromis means "black Chromis"; *Chromis* was for a long time used as the name for all sorts of perciforms.

auratus means "golden".

cyaneorhabdos means "blue striped".

Iodotropheus means "red-brown *Tropheus*".

sprengerae: in honor of aquarist and authoress Kappy Sprenger.

Labidochromis means "forceps Chromis", referring to the dentition.

caeruleus means "sky blue"

Labidochromis caeruleus, „Yellow“, particularly brightly-colored specimen.



News on Indian barbs

by Frank Schäfer

The Indian barbs were transferred to the newly created genus *Dawkinsia* in a recent generic revision of the small Asian barbs (Pethiyagoda et al., 2012). The type species is *Leuciscus filamentosus* Valenciennes in Cuvier and Valenciennes, 1844. *Dawkinsia* was named in honor of the evolutionary biologist Richard Dawkins ("The egoistic gene"), and the gender of the genus is feminine. This means that adjectival species names must have an appropriate word ending, so the type species is now called *Dawkinsia filamentosa*.

D*awkinsia* is fairly well defined, as also demonstrated by the aquarium-hobby grouping of the included species as "Indian barbs". I don't propose to enumerate the anatomical details here, but anyone with a particular interest should refer to the original work by Pethiyagoda et al. (2012). All Indian barbs exhibit sexual dimorphism, expressed as free, prolonged dorsal-fin rays in sexually ripe males. All Indian barbs grow to 8-12 cm long (standard length, ie not including the tail) and are thus classified as medium-sized barbs from an aquarium viewpoint.

According to current knowledge the genus contains nine species: *D. arulius*, *D. assimilis*, *D. exclamatio*, *D. filamentosa*, *D. rohani*, *D. rubrotincta*, *D. singhala*, *D. srilankensis*, and *D.*

tambraparniei. *D. rohani* wasn't mentioned in my overview of the group (Schäfer, 2009) as the species wasn't scientifically described until 2010 and (as far as is known) first imported at around the same time. Aquarium Glaser is currently offering this attractive fish on a regular basis. A further change to the Indian barbs took place in 2011, when Knight et al. revalidated *Dawkinsia rubrotincta* (as *Puntius rubrotinctus*). Prior to then the species was regarded as a synonym of *D. arulius*. I have hitherto referred to *D. rubrotincta* (I treat the species name as an adjective (it means "with a red tinge"), while *arulius* is a noun and derived from the native name *aruli*) as *D. arulius*, the "real" *D. arulius* sensu Knight et al. (2011) is the fish mentioned in AF 205 in the last paragraph on page 32 and the first on page

The "real" *Dawkinsia arulius*. This fish has previously been regarded as a new species awaiting description



Dawkinsia tambraparniei



Dawkinsia srilankensis



Dawkinsia singhala



Dawkinsia rubrotincta



Dawkinsia exclamatio



Dawkinsia assimilis



Juveniles of all Indian barbids are striped. The photo shows *Dawkinsia singhala*.

33 and pictured on page 34 (top). Unfortunately an error has crept into the caption, as it is not the Maskara Barb, a form whose status remains unclear.

So much for the update on the systematics of these lovely fishes.

Aquarium Glaser has recently been able to import a number of Indian barbids that were listed by the exporter as *Dawkinsia exclamatio*. When I inspected them to check their identity I noticed two things:

1 - The consignment consisted of a mixture of two species that were very similar in color but clearly different anatomically. One of the species matched *D. assimilis* in-

most of its characters, the other *D. exclamatio*.

2 - Although many specimens of both (!) species had hints of the lateral spot so characteristic of *D. exclamatio*, it was also absent in some individuals of both species.

It would thus appear that the Indian barbids still have all sorts of surprises in store for us. Many populations are rather different in the

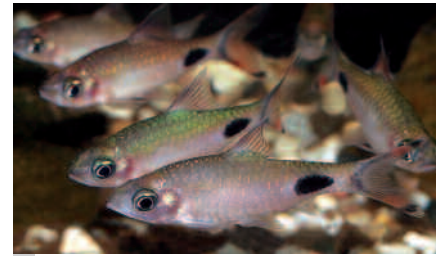


details of their coloration and it appears that there is a mimesis between *D. assimilis* and other *Dawkinsia* species.

Knight et al. de-

scribes four specimens that they describe as natural hybrids between *Dawkinsia tambra-panie* and *D. filamentosa*, as they were found syntopic with those two species. Could it be that there is a hybrid swarm of *Dawkinsia* species in southern India?

Question upon question, and aquarists may have a major part to play in answering



A group of half-grown *D. filamentosa*.



This is *Barbus mahecola*, an unremarkable fish that is as good as never maintained in the aquarium. It doesn't belong to the Indian barbids, and its inclusion in the group rests on a misidentification dating from 1878!

This newly imported species is very similar to *Dawkinsia exclamatio*.





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Pair of *Dawkinsia rohani*, a species only recently scientifically described.

Literatur:

Knight, J. D. M., Devi, K. R. & V. Atkore (2011): Systematic status of *Systomus rubrotinctus* Jerdon (Teleostei: Cyprinidae) with notes on the *Puntius arulius* group of fishes. *Journal of threatened taxa* 3 (4): 1686 - 1693
Pethiyagoda, R., Meegaskumbura, M. & K. Maduwage (2012): A synopsis of the South Asian fishes referred to *Puntius* (Pisces: Cyprinidae). *Ichthyological Exploration of Freshwaters* 23 (1): 69-95
Schäfer, F. (2009): Indianerbarben. *Aquaristik Fachmagazin* Nr. 205 (Februar / März): 28-34

them. It would be very welcome if those lucky enough to get hold of wild-caught specimens of such species were to report their observations and breeding experiences in the aquatic press.

The maintenance and breeding of Indian barbs presents very few difficulties, as they

are robust, adaptable, and peaceful fishes, which nevertheless require comparatively spacious aquaria. Water parameters are of secondary importance. Spawning usually takes place in the morning after a splendid courtship display. The major problem in breeding is in removing the spawn to safety before the adult fishes greedily devour it.

This newly imported *Dawkinsia* species most closely resembles *D. assimilis* in body form, but sometimes has a lateral spot like *D. exclamatio*.





Anabantoids

A new licorice gourami

by Wolfgang Löll

The licorice gouramis (*Parosphromenus*) belong to the labyrinthfishes. Until the 1980s only three scientifically described species were known; nowadays, mainly thanks to the hard work of the labyrinthfish associations – the IGL (Internationale Gemeinschaft für Labyrinthfische), the AAGB (Anabantoid Association of Great Britain), the AK Labyrinthfische im VDA, and the EAC (European Anabantoid Club) - the number of scientifically described species has increased to 20, and a number of others are already known in the hobby but not yet scientifically examined.

None of the *Parosphromenus* species grows larger than 4-5 cm. They are thus true dwarf fishes that should also be kept in correspondingly small aquaria. The maintenance of licorice gouramis does, however, require a degree of effort, as these fishes require live food for their long-term diet. Freshly-hatched *Artemia nauplii* have proved ideal as a staple food, and can be supplemented with Grindal Worms, Tubifex, small water fleas (especially *Moina*), copepods (including *Cyclops*), small mosquito larvae, etc, depending on what the pond

has to offer at any given time. In the wild these dwarf fishes are adapted to life-hostile waters that are extremely poor in minerals and have a low pH value. They don't in fact require such water conditions for maintenance, but undoubtedly do for breeding. When licorice gouramis aren't in spawning mood they look rather boring and don't exhibit any interesting behavior either. On the other hand, specimens kept in suitable water are constantly courting and will also breed year-round. In such circumstances the males of almost all species

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are breathtakingly beautiful. For this reason *Parosphromenus* should normally be kept with near-natural water parameters, that is practically distilled water (0-2°dGH) at a pH of 4.5 – 5.5. Interestingly these dwarf forms are significantly longer-lived than their larger cousins, and you can usually reckon on

Parosphromenus sp. „Ampah“, displaying male.

Photo: Horst Linke





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enjoying them for 5-6 years. Specialists have somewhat differing views as regards the correct water temperature. Some swear by temperatures of around 22 °C (room temperature), while others prefer temperatures 2-3 °C higher (at least for breeding).

Threatened with extinction

Licorice gouramis are usually exceptionally common where they occur. They can almost be compared with picking mushrooms – once you've found one then you will find even more. For this reason the (in any case comparatively limited) collecting of wild individuals for the aquarium represents no threat to these fishes. But the natural habitats of these dainty little fishes, namely the small blackwater streams that trickle from the peat bogs and jungles, are being destroyed at an alarming rate. As a result not only licorice gouramis but also entire communities of animals and plants are in serious danger. Where just a few years ago there was still unspoiled nature there are now endless expanses of oil-palm plantations. The chemical composition of the water in the streams changes so much in such plantations that blackwater fishes can no longer survive there.



Newly imported female *Parosphromenus* sp. "Ampah".

Photo: Frank Schäfer

There is a dedicated conservation breeding program for licorice gouramis, popularly known to enthusiasts as "Paros" for short, and you can learn more about this at <http://parosphromenus-project.org>. Here you will also find further detailed hints on maintenance and breeding, as well as a lot of additional interesting information.

Only very local in their distribution

The specialization on blackwater biotopes also means that the distributions of licorice

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gouramis – members of the genus are found on the Malayan peninsula, the large Sunda Islands of Sumatra and Borneo, as well as a

Newly imported male *Parosphromenus* sp. "Ampah".

Photo: Frank Schäfer





number of smaller islands belonging to Indonesia – are isolated from one another. Experience has shown that the Paros at each site differ somewhat in appearance because of this geographical isolation. In many cases the differences are limited to details of coloration. It is a matter of opinion whether these color differences are seen as the external manifestation of different species or whether a species is permitted a certain range of variation in habitus.

The phantom

The best-known – at least as far as the name is concerned - Paro species is *P. deissneri*, which was described back in 1859 by Pieter Bleeker and is also the type species of the genus. In 1974 leading aquarist Walter Foersch from Munich published his many years of experience with a Paro that he believed to be *P. deissneri* at the time. His trail-blazing observations first made the Paro hobby more widely possible, and thanks to his photos and

those of Hans-Joachim Richter *P. deissneri* was elevated to the position of the dream fish of all labyrinthfish fans. But we now know that the species being maintained back then was either *P. tweediei* or *P. rubrimontis*, both first scientifically described in 2005 (or a very similar species, as the fishes imported back then can't be identified with certainty retrospectively, they originated from Ayer Hitam). The "real" *P. deissneri* is a not quite so colorful species and has a prolonged, lanceolate, pointed tail. The species *Parosphromenus deissneri* isn't at present available in the hobby, although practically all the licorice gouramis that turn up in the trade are labeled "*Parosphromenus deissneri*", because the various species can be determined only with difficulty when not in courtship dress, and non-specialists among aquarists, if familiar with *Parosphromenus* at all, have the beautiful fishes from the Foersch and Richter photos in their mind's eyes. The species occurs only on the island of Bangka, from where there are at present no commercial imports.



This historic photo by Hans-Joachim Richter has influenced the aquarist's conception of *Parosphromenus deissneri* for many decades. In reality it is either *P. tweediei* or *P. rubrimontis*, both first scientifically described in 2005, or a close relative of those species.

The Paro fans involved in conservation breeding would be only too happy to take the species under their wings.

False alarm

The majority of licorice gourami species have a round caudal fin. In mid November

Acclimatized male *Parosphromenus* sp. "Ampah"

Photo: Martin Hallmann





2012 Aquarium Glaser imported a number of licorice gouramis in which the males had a lanceolate caudal fin. Unfortunately licorice gouramis can only be identified for certain when the male is in courtship coloration. But there was much to suggest that the new imports might be the legendary *Parosphromenus deissneri*. The word spread and the Paro specialists were eager to see the fishes. But it wasn't very long before a number of males were in full color, and now it could be seen that they weren't *P. deissneri* at all, but a species very close to *P. filamentosus*. At around the same time the eagerly-awaited collecting locality information finally arrived from the exporter. According to him the fishes originated from south-east Kalimantan (Borneo), where they can be found from Ampah to Muarateweh. The new *Parosphromenus* is now provisionally named after the first of these locations:

Parosphromenus sp. "Ampah"

Despite the very short time that these fis-

Lexicon

Paros

Parosphromenus means "(phylogenetically) close to *Oosphromenus*"; *Oosphromenus* is another labyrinthfish genus. *deissneri*: named in honor of the collector, "F. H. Deissner, officier van gezondheid der 3e klasse". *filamentosus* means "with threads" (referring to the caudal fin). *rubrimontis* means "of the red mountain", after the type locality, Bukit Merah. *tweediei*: named in honor of Michael Willmer Forbes Tweedie (1907-1993).

hes have been swimming in our aquaria, they have already been bred successfully. As in practically all licorice gouramis, the sexes can be told apart fairly easily, as the caudal fin is always completely colorless in females.

It is still totally unclear whether *P. sp.* "Ampah" is a local variant of *P. filamentosus* or a distinct



Male of the "true" *Parosphromenus deissneri* in full color. Photo: Horst Linke

species. Paros don't make such distinctions easy. But – from an aquarium hobby viewpoint – the question is academic and of secondary importance, as in both cases, regardless of whether the fishes represent a particular population or a separate species, they should be bred true to type.

Now, if we manage to breed such fishes true for successive generations then the knowledge thus obtained will help towards a better understanding of the natural history of licorice gouramis. And that is, after all, what the aquarium hobby is all about – obtaining information and increasing our knowledge!

When excited, males of *P. filamentosus* turn dark in color (lower photo), while *P. sp.* "Ampah" don't.

Photo: Martin Hallmann



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Raritäten

Rediscovered: Meinken's Red Rasbora

by Frank Schäfer

Anyone who is fascinated by nature will have an inescapable desire to see certain creatures in the flesh at least once in his or her lifetime. I don't know exactly why, but in my case one of these fishes is *Rasboroides nigromarginata*, also known as the Red Rasbora, Meinken's Fairy Rasbora, or Meinken's Mother-of-Pearl Rasbora. But the species had apparently disappeared off the face of the Earth since its first importation and description back in 1957.

Nobody had seen it again since then, even though searches had been made. Only one thing was clear: the species originates from the island of Ceylon, nowadays Sri Lanka. But although the renowned ichthyologist Rohan Pethiyagoda had made an intensive search for the species for his monograph on the freshwater fishes of Sri Lanka, it remained missing.

Rediscovery

On 15th August 2010 the following article

by Malaka Rodrigo appeared in the Sri Lankan newspaper The Sunday Times*:

Fairy Dandiya swims back from oblivion
A rare endemic fish species that has remained a mystery for 53 years will make it to Sri Lanka's freshwater checklist after it was rediscovered in the streams of Athwelthota

By Malaka Rodrigo

The Wildlife Conservation Society of Galle (WCSG) research team had been busy surveying the fish in streams of Athwelthota in

Differences in coloration between *Rasboroides vaterifloris* and *R. nigromarginata*:

- In all color variants of *R. vaterifloris* the lower half of the caudal fin is orange red, the upper transparent, while in *R. nigromarginata* the lower half of the caudal fin also exhibits virtually no color.
- The eye in *R. vaterifloris* has a black vertical streak that is absent in *R. nigromarginata*.
- Only *R. nigromarginata* has metallic blue scales on the dorsal part of the caudal peduncle.

the first week of July hoping to find Martin-stine's Goby. The fish had been scientifically described based only on a single specimen collected from these pristine streams.

Luck though seemed not with them, until a researcher noticed a fish with different characteristics in their net. They quickly slipped it into a sliding tank for further observation. It looked similar to the Vateria Flower Rasbora (Hal Mal Dandiya) which is rather common in these streams, but its body depth was less than that of the Hal Mal Dandiya. It was about two cm long with the male having a distinctive iridescent copper-red upper part of the eye.

"We immediately realized this was a special fish," said Madura de Silva, WCSG president.

Wild-caught male *Rasboroides nigromarginata*. Note the typical caudal-fin and eye coloration.

All photos: Frank Schäfer





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The research team's first impression was that they had discovered a new fish. They shared the photos with fish experts of the country and the answer was soon found. Rohan Pethiyagoda – Lanka's foremost expert on fish - identified it as Meinken's Fairy Rasbora (*Rasboroides nigromarginata*) that had been scientifically described in 1957. German scientist H. Meinken had made this discovery based on some specimens he re-

ceived through the ornamental fish trade. But although Meinken knew it was exported from Sri Lanka, he had no idea where exactly the original population was; hence the species had remained a mystery for 53 years.

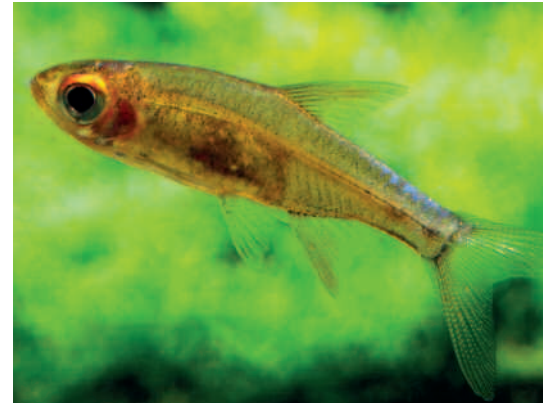
This endemic fish was thus not included in the country's recent Freshwater fish checklists. Now it will be making the tally 85 fish species.

Sri Lanka has 44 endemic freshwater fish though this number is thus under review. The new fish's scientific Latin name *Rasboroides nigromarginata* reflects its other distinctive character of having a black margin on its fin. The Fairy Rasboras are endemic to south-western Sri Lanka where they inhabit streams associated with rainforest habitats. Athwelthota has been a widely researched area for freshwater fish, but Meinken's Fairy Rasbora escaped previous researchers' watchful eyes. Pethiyagoda who had done a comprehensive freshwater fish study in late 1980 said, "Although I had collected fish at this very same location when writing my book, I missed this one," adding "it is a remarkable discovery."

The Wildlife Conservation Society of Galle is



Male of the variant of *Rasboroides vaterifloris* found syntopic with the Red Rasbora.



For comparison: male Red Rasbora

expected to include the *Rasboroides nigromarginata* on the list of strictly protected fishes considering its rarity. "We think Meinken's

Female *Rasboroides nigromarginata*. The fins are less extensive in females, no color differences exist.





Fairy Rasbora is restricted only to these streams in Athwelthota," said Madura, highlighting the need to protect these freshwater sources conserving their habitats.

He fears the fish could thus be a victim of over collection as Athwelthota streams are frequently raided by ornamental fish collectors who catch fish for export.

National Survey on Freshwater fish

The rediscovery of Meinken's Fairy Rasbora is the fruit of the National Survey on Freshwater Fishes conducted by WCSG together with the Biodiversity Secretariat of the Ministry of Environment.

The research team had already discovered several species of freshwater fishes that are new to science as part of this survey started last year.

Systematic Freshwater Fish study in Sri Lanka began as far back as 1830 by Pieter Bleeker.

During this period of 170 years, nine major research studies were carried out disclosing the rich diversity of Sri Lanka's freshwater fish. The last major research was done in late 1980 by Rohan Pethiyagoda bringing to light many more fresh water fishes.

Assessment of the population status of each freshwater fish species in major river basins and assessment of the species that have not been recorded for a long time -

more than 30 years - are the main objectives of the present survey.

Studying the river basins in the north and east is thus one of the major objectives of the project.

The research team who made the discovery included Nadeeka Hapuarachchi, Sameera Akmeemana, Krishan Wewellwala, Indika Wijesekera and Lasith Siriwardena.

They were thankful to the Nations Trust Bank whose funds helped support this research.

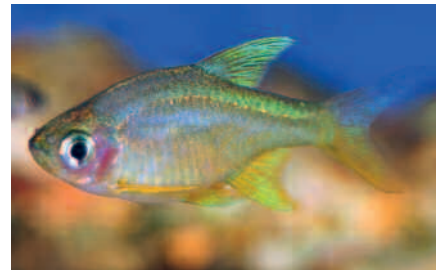
So much for M. Rodrigo in the Sunday Times.

Chance importation

The Red Rasbora will thus never intentionally turn up in large numbers in the trade. But I was absolutely delighted when, in December 2012, while inspecting an importation of what were purported to be *Rasboroides vaterifloris* at Aquarium Glaser, I found that it did indeed contain a few of that species but the majority of the consignment consisted of the elusive Meinken's Fairy Dandiya. This will undoubtedly be the only opportunity I ever have to see this fish in such large numbers. But since then there have been 15 specimens swimming in one of my aquaria, demonstrating



Rasboroides vaterifloris, red variant



Rasboroides vaterifloris, yellow variant



Rasboroides vaterifloris, blue variant

The species-typical black fin edging is readily visible under this lighting.



that old dreams can come true even after 35 years.

These little - only around 2-3 cm long - fishes have proved fairly undemanding when it comes to maintenance. They are neither particularly susceptible to disease nor prone to stress. Even so, such delicate fishes are best maintained in a species aquarium, as they tolerate competition only poorly.

*The original article can be found at: http://www.sundaytimes.lk/100815/Plus/plus_16.html

Lexicon

Red Rasbora

Rasboroides means "similar to *Rasbora*"; *Rasbora* is another cypriniform genus.

vaterifloris means "colored like the flowers of the *Vateria* tree".

nigromarginata means "with a black margin".



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Water Chemistry

Acid is good!

by Heiko Blessin

In the first two parts of this series of articles we looked at water hardness. In so doing it was quite impossible to avoid mentioning acids, more precisely carbonic acid, and the related subject of the pH value. So it is now high time we also looked at acids and pH in more detail! Note that you can read the first two articles in the series again at www.aqualog.de, if you have misplaced them.

But now let us get down to business!

Let us start by explaining the term. What is an acid?

You might think that the answer to this question was obvious, along the lines of "Acids are corrosive liquids that taste acidic - hence their name; for example vinegar or citric acid". But it isn't quite that simple. Leaving aside the fact that the taste test should be avoided at all costs, as even everyday battery acid can cause serious injury and many acids can even lead to death, there are other liquids that are corrosive,

for example alkaline solutions. So what makes acids acids? Acids are chemical compounds that can give up hydrogen ions (ie H^+ , another word for these is protons) to a partner in a reaction. In an aqueous solution (as is the case with all acids that come into contact with aquarium water) this lowers the pH value.

What is the pH value?

The pH value is the negative decimal logarithm of hydrogen-ion activity. Sounds great, doesn't it? But it isn't that complica-



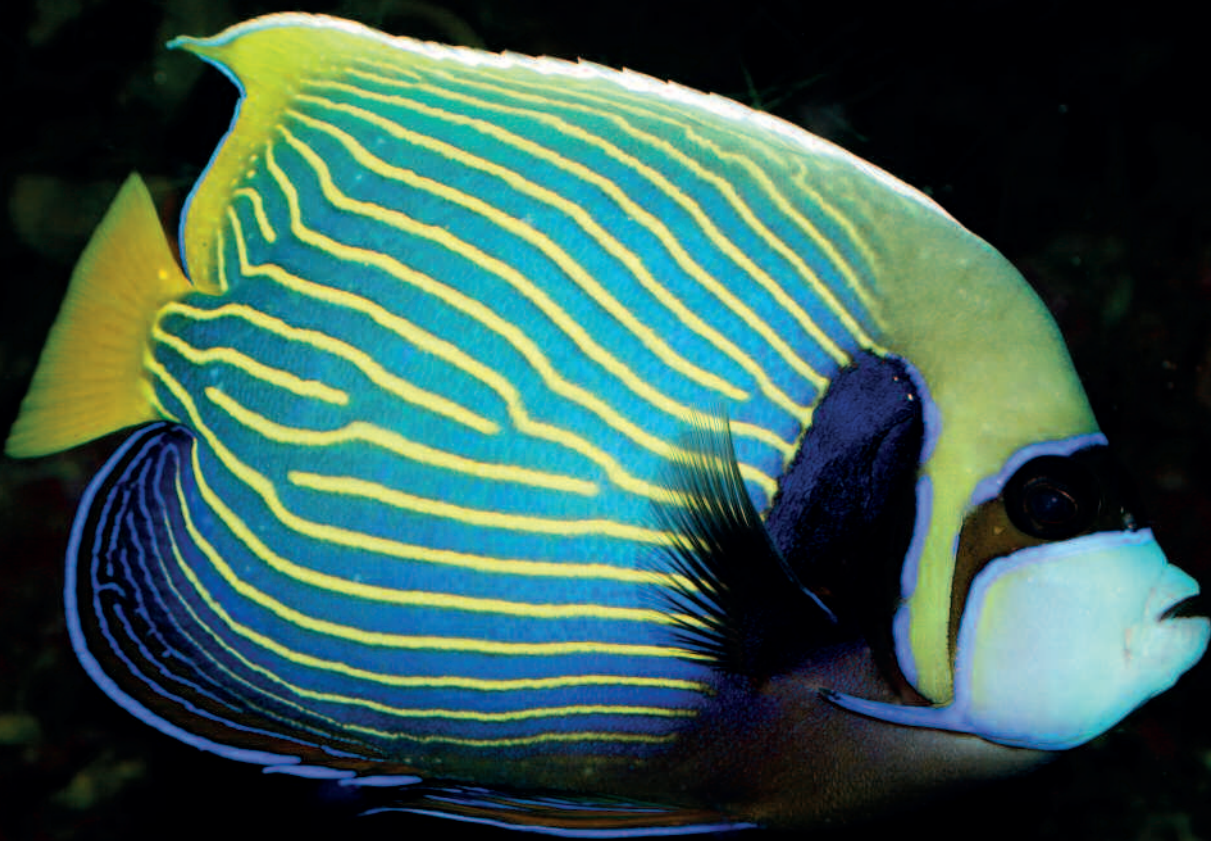
The shell color of crustaceans is greatly influenced by the water.

ted at all. You need only to know that the pH scale, which runs from zero to 14, isn't linear but advances in powers of ten. Thus pH 6 (= 10^{-6} , ie 0.0000001) is ten times as acid as pH 7 (= 10^{-7} , thus 0.00000001) and 100 times as acid as pH 8 (= 10^{-8} , ie 0.000000001). If you keep that in mind then it rapidly becomes clear why delicate fishes can react dramatically to apparently small fluctuations in pH.

The small numerical difference between pH 6 and pH 8 creates the illusion of a slight chemical difference, but that isn't correct at all. The abbreviation "pH" is always written with a small p and a large H. The p is a randomly-selected letter chosen by the inventor of the term for no special reason and the

Coral fishes like this Emperor Angelfish (*Pomacanthus imperator*) require a stable pH above 8.

All photos: Frank Schäfer





H is the chemical symbol for hydrogen.*

As already mentioned pH can lie between zero and 14. The pH of chemically pure water is exactly 7, and this value is termed neutral pH. If the pH lies below 7 then the water is acid, if it lies above 7 then the water is alkaline. In the wild fishes normally live at pH levels between 4.5 and 9.5. There are a few specialists among fishes that also tolerate either higher or lower pH values, but they can be ignored here. Drinking water in Germany must have a pH in the range minimum 6.5 to maximum 9.5. The lower limit wasn't selected for health reasons but because water with a lower pH eats away metal water pipes.

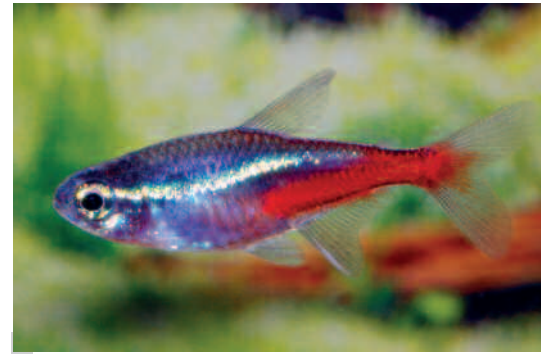
Bases, the counterparts of acids

Chemically speaking, an acid is a proton donor. By contrast the term for a proton recipient is a base. If an acid is added to water then the pH drops, while if a base is added to water then it rises. If chemically identical amounts of an acid and a base are added simultaneously to water then the pH will re-

main neutral and a salt will form from the acid and base. For example, hydrochloric acid (chemical formula HCl, ie hydrogen chloride) is a powerful acid, caustic soda (NaOH, ie sodium hydroxide) a powerful base. But when combined they neutralize one another, and the result is water (H₂O) and common salt (NaCl, ie sodium chloride).

pH in the aquarium

The worst thing you can inflict on your fishes is an unstable body of water with a fluctuating pH. Freshwater fishes are very adaptable as regards pH, but this adaptation needs to take place slowly. It is essential to realize that all fishes – from an evolutionary viewpoint – originate from the sea. Sea water all over the world has a constant pH of 8.2. Experience has shown that fishes that live in alkaline water in the wild find it much harder to adapt to an acid pH than vice versa. A Cardinal Tetra, for example, which lives in very acid water with a pH of 4-4.5 in the wild, can survive happily in the aquarium for years at pH 8.2. A cichlid from



Neon Tetra, *Paracheirodon innesi*, a typical blackwater fish.

Lake Malawi or a coral fish, on the other hand, will have real problems even at pH 6, and these fishes won't survive at all or do very poorly at so low a pH. But worst of all is a constantly fluctuating in pH! And these will be more dramatic the more poorly the water is buffered.

Buffering

Buffer is the term for chemical compounds that function as proton donors or proton recipients as required and thus keep the pH stable. The best-known and exceptionally effective buffer is the carbonate hardness (see parts 1 and 2 of this series of articles in

In some dwarf cichlids - this is *Apistogramma panduro* – sex is determined by pH.





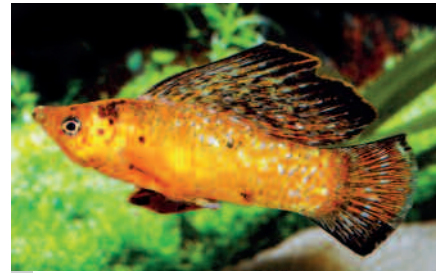
News 104 and News 105). The calcium bicarbonate responsible for the carbonate hardness is in equilibrium with the carbonic acid produced in the aquarium through the respiratory processes of fishes, plants, bacteria, etc. This is termed the calcium carbonate-carbonic acid-carbon dioxide balance. It is somewhat difficult to explain as it is very complex and in addition depends on temperature. It cannot be understood without a basic knowledge of chemistry. So for once suffice it to say here that it works. There is no need to worry about sudden leaps in pH in water with a carbonate hardness of 5-10° dKH. Water with this hardness is also exceptionally well suited for the maintenance of fishes of all species, though there may be problems with the breeding of all softwater fishes in such hard water. Why is this the case?

Soft acid water required?!

As has already been stated several times, medium-hard water with a roughly neutral to slightly alkaline pH is suitable for the maintenance even of fish species that live

in very soft, practically distilled water with a highly acid pH in the wild. But fishes are multicellular organisms with complex systems of organs. By contrast, egg and sperm cells consist of just a single cell (unicellular). And they are very sensitive to the chemical influences of their environment. Sperm cells, for example, have a tail that enables them to swim. This tail is made of protein and works only at certain (species-dependent) pH values. This explains the sometimes miserable fertilization levels encountered when the breeding water for blackwater fishes has the wrong pH. But the egg cells are also sensitive to pH. After deposition the fish egg swells to many times its original size. This is mainly due to osmotic processes (and is why the water needs to be soft for breeding some fishes), but also to certain proteins known as channel proteins in the cell membrane that function as ion pumps and are again dependent on pH.

Soft water can be produced at home using a reverse-osmosis unit (other methods are very much out of fashion nowadays as they are rather time-consuming) or, if only small



Sailfin mollies like hard water.

amounts are required, purchased in the form of distilled water.

The acid of choice is always humic acid, which can be introduced into the water via acidic black peat. The water is filtered over this peat until the desired pH is reached. The packaging for the peat should state what its pH is. It shouldn't be significantly higher than 4.

The humic acid in this peat has an exceptional buffering effect so the pH in peat-filtered aquaria is usually very stable even if you are working with pure reverse-osmosis water. This is why specialist aquarists are able to keep and breed certain very delicate fishes – such as the licorice gouramis featured in this issue or some killifishes – successfully for generations in tiny aquaria. In addition peat has a hormonal effect on many fishes and encourages willingness to breed.

You can learn more about peat and other aids to water conditioning in the next article in this series!

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Turtles

The Indian Star Tortoise

by Christoph Fritz, www.reptilia24.com

The Indian Star Tortoise, *Geochelone elegans*, is regarded as one of the loveliest tortoises occurring in India and adjacent countries. It has long been a firm favorite with terrarium enthusiasts, but it is only recently that it has been bred so regularly that it can be regarded as readily maintained and even suitable for novices.

Unfortunately things were different in the past. Inadequate, inappropriate holding conditions in the country of origin and long-distance transportation meant that specimens that reached Europe were often moribund. It was in those days that this robust tortoise gained the reputation of being extremely delicate and difficult to keep alive.

Potential confusion!

The starry pattern so striking and attractive to

our eyes is fairly widespread among tortoises. In the wild it acts as camouflage, breaking up the outline of the tortoise. Hence a number of other species are likewise known colloquially as "star tortoises," for example *Geochelone platynota*, a close relative of *Geochelone elegans* from Burma, or even the huge and impressive *Astrochelys radiata* from Madagascar. For this reason it is always wise to use the scientific names that are universally valid worldwide in order to avoid any confusion. The only relevant synonym of the name *Geochelone elegans* is *Testudo ele-*



This photo of the hatching of two southern Indian Star Tortoises was taken on 21.1.2013.

Photo: C. Fritz, www.reptilia24.com

gans. The majority of the tortoise species are comparatively closely related to one another, they have proved to be a successful evolutionary template that has required only a few anatomical adaptations over the course of millions of years. It is ultimately a matter of opinion whether the many species from several continents should be united in the catch-all genus *Testudo* or that this genus should be split up

Adult female of the form of *Geochelone elegans* from southern India.

Photo: Frank Schäfer





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into smaller units, but at present the majority of professional herpetologists are of the latter view and assign the two species *elegans* and *platynota* to *Geochelone*, and not to *Testudo*.

Three variants

The species *Geochelone elegans* occurs in three populations that are readily told apart by eye. They are also well separated geographically – possibly in part due to human influence in historical times - and unable to mix. The form from western India and Pakistan has the finest ray pattern of them all; it grows to 25-35 cm long and is only very rarely seen in the hobby. The form most frequently kept in captivity lives in the south of the Indian subcontinent. In this case males grow to only 14-17 cm long, while females attain 18-24, usually around 20 cm. The pattern is relatively extensive. And finally there is the variant from the island of Sri Lanka, which can grow comparatively large (occasional specimens up to a maximum of 38 cm, but with 25-30 cm being the norm) and which has a very attractive fine-rayed pattern. As already mentioned, the form from southern India is the most popular in the hobby, in part because it remains manageably small.

Two young females of the form of *Geochelone elegans* from southern India.



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A tropical species

It is important not to forget the provenance of the Indian Star Tortoise. The climate it enjoys in the wild is very hot. So in captivity it likewise requires a daytime temperature of 26-32 °C, 20-25 °C at night, with a relative humidity of 70-80%. A heat lamp and a good UV lamp are likewise indispensable. At our latitudes outdoor maintenance is advisable and possible



Adult male of the Sri Lanka form. Photo: C. Fritz, www.reptilia24.com

only in the height of summer, and even then a hotbed or small greenhouse should be available as a refuge on days when the weather is bad. The tortoises should be taken indoors in the event of lengthy periods of bad weather.

An excellent species for the terrarium

But herein lies one of the advantages of this species, which is not only beautiful but remains small: it is exceptionally well suited to

Photo: Christoph Fritz, www.reptilia24.com



Adult female of the Sri Lanka form.

Photo: C. Fritz, www.reptilia24.com

long-term terrarium maintenance in the home. The terrarium size should be such as to provide a bottom area around eight times as long and four times as wide as the carapace length of the largest specimens. On this basis a terrarium with a bottom area of 200 x 100 cm, which can generally be accommodated in a standard living-room, will suffice for the form from southern India, whose carapace length doesn't exceed 25 cm. However these tortoises are slow-growing, so juveniles require only a fraction of this space, and many specimens,

especially males, remain smaller all their lives, so you can very often get by with a significantly smaller terrarium. The substrate for the terrarium should consist of a mixture of sand and garden soil. Because these tortoises invariably feed from the substrate to some extent, it is important that the sand is natural river sand and not builders' sharp sand which has sharp edges and can cause irritation of the stomach and intestines.

Plenty of roughage!

Numerous mistakes continue to be regularly made in feeding tortoises. These animals require nutrient-poor, fiber-rich foods such as wild herbs (grass, plantains, dandelions, mallow, etc), while in winter they can be offered endive, radicchio, Romaine lettuce, shredded carrot, plus hay and hay pellets, the latter pre-soaked if possible. Cabbage lettuce and Iceberg lettuce are not good foods, while fruit and meat are best avoided completely. The food should be dusted once per week with proprietary calcium for reptiles. Fresh drinking water should be provided regularly; because these tortoises are fond of defecating in the water the container should be removed from the terrarium soon after drinking. A



Male of the form from southern India.

Photo: F. Schäfer

daily "shower" using hand-warm water from a plant spray is very much enjoyed.

Regularly bred

Males of *Geochelone elegans* are fairly peaceful among themselves. Nowadays these tortoises are bred regularly. The clutch consists of 2-6 eggs, and a female can produce up to five clutches (but usually less) per season. Incubation takes place at 27-33 °C and 80-90% relative humidity. During the breeding season you can obtain youngsters from www.reptilia24.com for example, or get your pet store to order them for you.

Juvenile of the form from southern India.

Photo: Christoph Fritz, www.reptilia24.com





Marines

Anthias

by Levin Locke

Thanks to comparative anatomy we nowadays know a fair amount about phylogenetic relationships in the animal kingdom. Some of it is confusing. Who would think on seeing a Rock Hyrax, an animal that looks like a plump marmot, that they were looking at a very close relative of the elephants? There is a similar huge difference between the anthias and their closest relatives as well.

The anthias or fancy basses (Anthiinae) are a group of relatively small fishes that are usually breathtaking in their coloration. At present some 22 genera with a total of almost 250 species are recognized. All species live in the sea. But their closest relatives are in fact the groupers (Epinephelinae), whose largest representative can measure a good 3 m long and weigh more than 400 kg. Together with the groupers and the Serraninae the anthias make up the family Serranidae.

Shoaling fishes

Not only do anthias differ considerably in ap-

pearance from their larger cousins, but their behavior is also completely different. Specifically, the groupers are very intolerant of one another and solitary, and can be accustomed to one another in the aquarium only with a lot of effort and much patience, while anthias on the other hand are shoaling fishes that should always be kept in groups if possible. They will then display their entire behavioral spectrum as well as the full splendor of their coloration.

Protogynous hermaphrodites

But the anthias and the groupers do have one thing in common: they start life as females and



Pseudanthias ventralis, male, and...



...*P.ventralis*, female. The species grows to 8 cm long.



Female *P. bimaculatus*.

Pseudanthias bimaculatus lives in the Indian Ocean and grows to around 15 cm long. The photo shows a male.

All photos: Frank Schäfer





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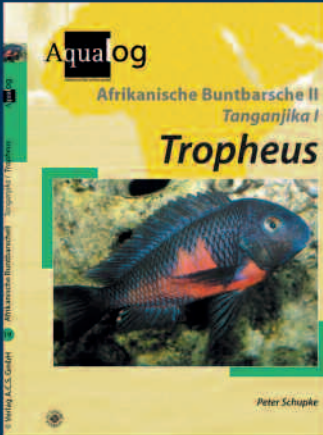
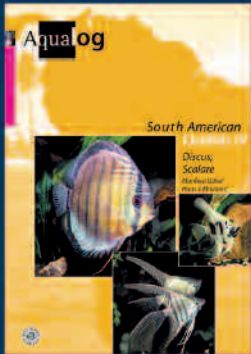
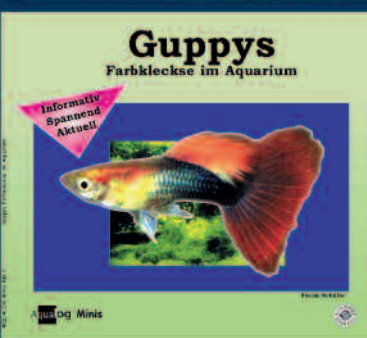
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end it as males. They are hermaphrodites, and species with this order of sex change are termed protogynous, while a hermaphrodite that starts life as a male and then changes into a female is termed protandrous. Hermaphrodites that are simultaneously male and female are termed functional hermaphrodites, but this occurs only fairly rarely. The rationale of protogynous hermaphroditism is obvious. One male can fertilize the eggs of numerous females. Because the likelihood of survival constantly decreases the older an individual becomes, in protogynous hermaphrodites it is sufficient if just one individual out of many makes it to being a male. The survival of the species is guaranteed nonetheless. Hence fish species that practice protandrous hermaphroditism are encountered only comparatively rarely.

Life in a harem

The average shoal of anthias always consists of far fewer males than females. The males display vigorously among themselves, but this



The Mediterranean anthias (*Anthias anthias*) is gorgeous, albeit coldwater, species.

hardly ever leads to harmful battles and serves more to show the females what splendid fellows they are. As it is usually the females

among these fishes that decide which male they want to mate with.

If you have the opportunity then you should obtain one or several males (naturally this depends on the size of the aquarium) and three to five females per male. Unfortunately, however, males are exported more frequently than

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Odontanthias borbonius, a jewel measuring up to 15 cm long. This fish lives at great depths.





Pseudanthias fasciatus, length to around 20 cm.

females as males are much more attractive in coloration and have larger fins.

But even if the dealer has only males, you should still buy several specimens by preference, because social animals such as anthias will suffer psychologically if they are maintained without conspecifics. If you buy two males then there is a risk that one individual will dominate the other and in the medium term the subordinate specimen will die as a result of the permanent nega-

tive stress. A group of at least five specimens is always better (if aquarium size permits), as they will then develop a complex social structure that is most enjoyable to watch and very educational.

Anthias don't practice any brood care, but simply release their eggs and sperm into the water, where the fertilized eggs develop among the plankton. This strategy is apparently very successful, as anthias are among the commonest fishes on the reef.



Male (above) and female (below) of the extremely rarely imported *Sacura margaritacea*, which grows to some 15 cm long.



Plankton feeders

Unlike their larger cousins the groupers, which

Pseudanthias pulcherrimus; the name of this around 8 cm long species is very apt: pulcherrimus means "most beautiful".





Serranocirrhitus latus is another gorgeous anthias species. These fishes grow to around 10 cm long.

are predators, the anthias are specialized plankton feeders. Plankton is the term used for all organisms that live in the open sea. The largest planktonic animal is thus the Blue Whale, which is simultaneously the largest animal on Earth. But the term plankton isn't used so precisely in common parlance and chiefly denotes small organisms.

Thus anthias snap up everything that floats free in the water and fits into their mouths. The acclimatization of delicate species sometimes requires live food, especially if the fishes are very timid. They will then be so afraid of their owner that frozen or dry food will have long since disappeared before they have calmed down again. But once they have settled in, almost all anthias will accept "dead foods" such as the above-mentioned frozen or dry food without problem.

Even so many aquarists regard anthias as difficult to keep. Why so? These fishes require food several times per day in order to remain

healthy, as they aren't able to eat food to create reserves. But who can feed fishes 5-7 times daily? The answer is very simple – an automated feeder. Once your anthias will eat dry food, then you can use an automated feeder to provide these plankton-feeders with the type of feeding they require.

Unfortunately a lot of mistakes are made with automated feeders and dry food. Dry foods, be they flake or granulate, are perishable foods that need to be stored in an airtight container in a cool, dark place. Otherwise the valuable unsaturated fatty acids become oxidized, vitamins are destroyed by light and heat, and bacteria and fungus attack the carbohydrates and proteins. Hence such foods are best kept in the refrigerator, and ideally the automated feeder should be refilled daily.

Once opened a pot of food should be used within four weeks at the latest. Anyone who buys large containers should freeze the bulk.

If in addition you also feed them morning and evening with frozen food, then anthias are not only gorgeous, but also fairly problem-free, and will repeatedly enchant you with their splendid coloration and their interesting social behavior.

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Frogs

Phyllomedusa frogs - wonderful

by Volker Ennenbach

The red-eyed tree frogs of the genus *Agalychnis* are among the most popular of all terrarium frogs. In order to satisfy the constant demand, practically all red-eyed tree frogs are captive-bred nowadays. The leaf frogs of the genus *Phyllomedusa* are closely related to the red-eyed tree frogs, but much less well known. A pity, as they too include wonderful frogs for the terrarium!

The genus *Phyllomedusa* currently includes 30 generally accepted species that are distributed in South and Central America. One of them, *Phyllomedusa hypochondrialis*, will be discussed in some detail. Its distribution encompasses eastern Colombia, northern and eastern Venezuela, the Guianas, and the whole of Brazilian Amazonia. Within this vast distribution region this adaptable species is widely found in association with human settlements and considered not to be endangered.

Not a rainforest-dweller

Of all the species of the genus *Phyllomedusa*, those least adapted to the rainforest are the up to around 5 cm long *Phyllomedusa hypochondrialis* (females grow somewhat larger than males) and its close relative *P. azurea*, which has an adjacent distribution to the south. (The two of them are sometimes regarded as subspecies of one and the same species, *P. hypochondrialis*.)

This also explains their success in the modern world. Their habitat is bush and scrub

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vegetation in seasonally flooded grassland, as well as dry woodland.

These frogs have a special adaptation to this comparatively dry (by day) habitat - during the day they coat themselves with a

The special toe configuration in the genus *Phyllomedusa* permits these frogs to climb even the thinnest twigs.

All photos: Frank Schäfer





waxy layer that protects them from dehydration.

This doesn't mean of course that these frogs should be kept in a desert terrarium. They too require a relative humidity of 60-80% at 24-26 °C by day, while at night the humidity rises as the temperature drops to 20-22 °C. But *Phyllomedusa* do require dry resting places, as otherwise there is a risk of disease. There should always be a bathing dish with constantly fresh (but aged) water available in the terrarium.

Climb like monkeys

These frogs hardly ever hop, they climb! They don't have webbed feet and can grip because the first two toes are opposed to the others. This means that *Phyllomedusa hypochondrialis* can also clamber along quite slender twigs. These medium-sized frogs do exceptionally well in a terrarium with varied planting as the plants will be virtually unaffected by the frogs. The size of the terrarium should be around 50 x 50 x 80 cm (length x breadth x height).



The underside of *Phyllomedusa hypochondrialis* is inconspicuously colored.

Like all *Phyllomedusa*, *P. hypochondrialis* has vertical pupils.





Lexicon

Phyllomedusa

Agalychnis means "extremely bright"
Phyllomedusa: according to Wagler, who originated the name, it means "King of the hylids" (more literally "King of the leaves").

hypochondrialis: refers to the stripes on the flanks (Ancient Greek ὑπο-χόνδρια (ypochondria) = "beneath the ribs")

Readily bred

The species-rich tree-frog family (Hylidae) is divided into several subfamilies. *Phyllomedusa* belong to the Phyllomedusinae. All members of the subfamily Phyllomedusinae whose mode of reproduction is known spawn in the same way, out of water. They deposit their spawn in bags which they construct from leaves overhanging a pool. When the tadpoles are ready to hatch the gelatinous mass surrounding the eggs liquifies, and the tadpoles drop into the pool, where their further development takes place.

In order to make all this work properly in the terrarium we have to simulate a dry period

and a rainy season, as these frogs spawn only during the rainy season in the wild. In the case of *Phyllomedusa hypochondrialis* the daytime temperature is raised to 29-32 °C during the dry phase. Two weeks are sufficient to condition the frogs. They are then transferred to a "rainfall tank" where they usually start to spawn very quickly. Fenolio (1996) portrays *P. hypochondrialis* as the fastest of all frog species to respond to rainfall!

Spatyphyllum or *Monstera* can be offered as spawning plants. It is a good idea to use plants raised in hydroculture in order to avoid potting compost getting into the water. Care must always be taken in setting up the rainfall tank, as *Phyllomedusa hypochondrialis* are very poor swimmers and can easily drown.

The tadpoles can usually be reared without problem using flake food for aquarium fishes. Alder cones in the water and peat filtration are very helpful in keeping the water in the rearing tank stable.

If you are now filled with the desire to keep and breed *Phyllomedusa hypochondrialis*, then your pet dealer can undoubtedly order some



No sign of the striking flank and thigh is visible when the frog is at rest.

for you from a wholesaler of his acquaintance, for example Tropenparadies in Oberhausen, Fax +49 (0)208-665997.

Literatur:

Fenolio, D. (1996): Captive reproduction of the orange-legged monkey frog (*Phyllomedusa hypochondrialis*), and development of a protocol for phyllomedusine frog reproduction in the laboratory. *Advances in Herpetoculture* 1: 13-21

The preferred mode of locomotion in *Phyllomedusa* is a slow walk. They hop only exceptionally.



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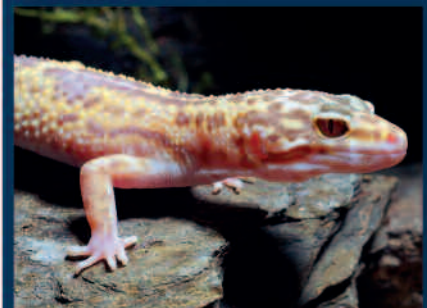
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Lizards

The Knight Anole - a Cuban exile in Florida

by Thorsten Holtmann

With 400 species, *Anolis* is one of the most successful groups of lizards in the world. Its wealth of forms and individuals is incomparable. The Knight Anole, *Anolis equestris*, is one of the largest of all the species.

This splendid lizard has long been the dream of many terrarium enthusiasts. Originally the species was found only in Cuba, where 11 subspecies, often distinguishable by their coloration, inhabit the tree-tops. As long ago as the late 1950s years the Knight Anole was released in Florida and since then has spread rapidly. Not entirely without consequences for the environment, as while these large lizards – they can attain a head-body length of 15-16 cm, and can measure a good 50 cm long including the

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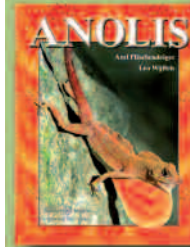
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tail – feed mainly on relatively small insects, if the opportunity arises small lizards (including other *Anolis*) or frogs may disappear into their stomachs. For this reason Meshada has described the species as a veritable *Tyrannosaurus rex* of the trees. Knight Anoles tend to be omnivores and will even eat fruit

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if the occasion arises. To date there has been no research to determine to which subspecies these "Florida Knight Anoles" belong, but they are usually regarded as being the nomi-

Portrait of a female Knight Anole. Females also have clearly visible dewlaps.

All photos: Frank Schäfer





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nate subspecies. The scientific status of the Knight Anoles found in the trade is likewise unclear, but as a rule they originate from breeding farms in the USA.

Anolis wave flags

Despite all the differences between them, the *Anolis* species also exhibit a lot of features in common. This, for example, all species have prehensile toes. They may not be quite as good at climbing vertical glass surfaces as many geckos, but they aren't far behind. The German name (now somewhat out of fashion) "Saumfinger" (which means "seam finger") for *Anolis* refers to the special structure of the toes.

And all *Anolis* have extensible dewlaps that are very striking and species-specific in their coloration. They are "waved" mainly by the males, but by females as well in the Knight Anole. This has a rather similar function to singing in birds. Displaying the dewlap indicates



Adult male Knight Anole. The dewlap is a delicate pink in color.

that the territory is occupied and warns conspecifics to clear off or else there will be trouble. For *Anolis* are rather intolerant of one another. Two males can never be kept together in the terrarium, and females may also quarrel. Hence it is best to keep Knight Anoles in pairs.

Recently (Nicholson et al. 2012) there has

been an attempt to clarify the classification of the large number of species in *Anolis* by dividing them up into a number of different genera. According to this work the Knight Anole should be assigned to the genus *Deiroptyx* and would then be called *Deiroptyx equestris*. The work of Nicholson et al. is a matter of vigorous controversy among specialists in the field.

Newly hatched Knight Anole. The head in young specimens is noticeably shorter than that of adults, but they are already the same color.





Tall terrarium required

Despite their size Knight Anoles don't require a large terrarium at all, as compared to many small *Anolis* species they are rather inactive fellows.

But if the terrarium is too small, and above all sited too low down, they can suffer panic attacks. As tree-top dwellers they regard every shadow from above as a deadly threat, as their worst enemies are predatory birds. By contrast, if the terrarium is set up correctly the Knight Anole can become fairly tame, and it is often even possible to keep these lizards semi-free in the home, with the terrarium then serving only as a refuge.

Moving water is important

Like many other arboreal lizards, Knight Anoles have a problem recognizing still water as such. In the wild they drink when it rains, there are no water bowls there. A miniature waterfall in the terrarium will help alleviate this problem. If these lizards don't drink enough then it is essential to give them a drink from a pipette!

Adult Knight Anoles rarely present pro-



These lizards turn dark when excited.

blems with feeding. The usual food insects (always dusted with calcium) and occasional sweet fruit will permit a varied diet. UV radiation is important for these tree-dwellers. Freshly hatched youngsters are often reluctant to accept the food and must then be force-fed. The reason for this remains unknown.

Literatur:

Meshaka, W.E. (2011): A runaway train in the making: the exotic amphibians, reptiles, turtles, and crocodylians of Florida. Monograph 1. Herpetological conservation & biology 6: 1-101
 Nicholson, K.E., Crother, B.I., Guyer, C. & J.M. Savage (2012): It is time for a new classification of anoles (Squamata: Dactyloidae). *Zootaxa* 3477: 1-108

Lexicon

Knight Anole

Anolis: derived from a name used for these lizards on the Caribbean islands.

Deiropyx means "neck fold" *equestris* means "equestrian"; "of a knight"; why is unknown, but Merrem, the original describer, wrote that it was "*Le grand Anolis à écharpe*" (= "the large *Anolis* with a sash", probably with reference to the coloration) of Cuvier; perhaps Merrem regarded the sash as an emblem of knighthood.

The light green coloration of this Knight Anole indicates that he is relatively relaxed.





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Plants

The mystery Ludwigia

by Sarah Nieten

During an excursion in the vicinity of the town of Pak Chong in central Thailand, we came across a small pool with a gorgeous flowering aquatic plant whose identification caused us a number of problems.

We quickly realized that it was a member of the genus *Ludwigia*, which includes some of the most popular aquarium plants. There is even a species native to Europe: the Water Purslane, *Ludwigia palustris*. Unfortunately this species is in decline everywhere, without the reasons being known. Our native species has only very inconspicuous flowers as it doesn't develop any petals. By contrast the species we found in Thailand was notable for its splendid flowers, a good 3 cm across and snow white in color apart from yellow at the base of the petals. The genus *Ludwigia* belongs to the willowherb or evening primrose family (Onagra-

ceae), familiar in Germany mainly in the form of the evening primroses (*Oenothera*), originally from North America.

Roots for breathing

The *Ludwigia* that we found near Pak Chong had very characteristic roots adapted for use as respiratory organs. Among the *Ludwigia* species known in the aquarium hobby, this type of root formation is very typical for the species *Ludwigia helminthorrhiza*. *Ludwigia helminthorrhiza* is a plant very rarely cultivated in the aquarium, as the species is extremely light-hungry, but if grown successfully the re-

Lexicon

Ludwigien

Ludwigia: Widmungsname für den Botaniker C. G. Ludwig (1709-1773)
palustris: bedeutet „im Sumpf lebend“

helminthorrhiza: bedeutet „mit madenähnlichen Wurzeln“

adscendens: bedeutet „klettern“

hyssopifolia: bedeutet „mit Blättern wie ein Ysop“; Ysop ist eine andere Pflanze

octovalvis: bedeutet „mit acht Fächern“, bezieht sich auf die Frucht

ward is a splendid plant. But usually it is possible to cultivate *L. helminthorrhiza* only during the summer in a sunny garden pond and very difficult to get the plant through the winter. *L. helminthorrhiza* isn't usually available in the aquarium trade, but can sometimes be obtained from botanic gardens. It is native to South America.

The gorgeous flower of *Ludwigia adscendens*

All photos: Frank Schäfer





What species?

None of the fairly numerous publications on *L. helminthorrhiza* mentioned this plant having become naturalized in Asia. But the literature on Asian plants – especially that on ricefield weeds – rapidly brought us to the species *Ludwigia adscendens*. In addition numerous pictures on the Internet showed “our” plant, complete with the white flowers as well as the roots adapted for respiration.

Ludwigia adscendens

Naples & Kessler (2005) list three *Ludwigia* species as ricefield weeds in Laos and Cambodia: *L. adscendens*, *L. hyssopifolia*, and *L. octovalvis*. They can easily be told apart by their flowers, as *L. hyssopifolia* and *L. octovalvis* have yellow flowers with four petals, but by contrast *L. adscendens* has white flowers, yellow at the base, with five petals. All three species are also to be expected in Thailand. *Ludwigia adscendens* is not without demerits, as it is poisonous to cattle and can cause inflammation of the gastro-intestinal tract. On the other hand *L. adscendens* is used to treat numerous ailments in human medicine (according to NAPLES & KESSLER, 2005): an infusion

of the leaves is used against some sexually transmitted diseases, a paste to treat pimples is made from it, it is used against diarrhoea and as a poultice for swellings and skin diseases, in Papua New Guinea the plant is even regarded as preventing pregnancy, and elsewhere the young shoots are eaten as salad. From an aquarium viewpoint it is rather interesting to note that antiseptic healing properties are ascribed to the entire genus *Ludwigia*.

Very difficult in the aquarium

Unfortunately this attractive and interesting (because of its respiratory roots) plant is hardly ever cultivated in indoors, or at least there is no mention of it in the relevant aquarium literature, although it is sometimes recommended for summer cultivation in a sunny garden pond. Anyone able to obtain this plant should give it a try, as the gorgeous flowers will reward the effort.

Literatur:

Naples, M.L. & P.J.A. Kessler. Weeds of Rain Fed Lowland Rice Fields of Laos & Cambodia. Illustrations, Identification, and Information Retrieval. Version: 12 september 2005. <http://www.nationaalherbarium.nl>



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The respiratory roots in *Ludwigia adscendens* aren't quite as numerous as in *L. helminthorrhiza*, but are nevertheless very striking.





Invertebrates

A new crayfish from New Guinea

by Roman Neunkirchen

The maintenance of invertebrates in the freshwater aquarium has long since ceased to be a marginal activity. More and more aquarists are discovering how interesting it is to study the ecology of these simple - compared to fishes - life forms. And the trade is responding and trying to keep supplying aquarists with more new, interesting species.

The natural distribution of the genus *Cherax* encompasses Australia, with 24 species, and New Guinea. There are another 17 species on this large island, which is divided politically into two halves - since 1963

the west has been owned by Indonesia and called Irian Jaya, while the east is politically independent and called Papua New Guinea. The distributional pattern of the *Cherax* species in New Guinea is very remarkable. Specifically,

Portrait of the new *Cherax* species from New Guinea.

All photos: Frank Schäfer

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they occur exclusively in the southern half of the island, which is divided in half practically lengthwise by a mountain chain (the Maoke, Bismarck, and Owen Stanley mountains). While the distribution can apparently be explained by the geographical barrier that this mountain chain represents, it is difficult to understand why to date no *Cherax* species have been found in the south-west of New Guinea.

Evidence of the ice age

Some of the *Cherax* from New Guinea are conspecific with those from Australia, and *Cherax* are also found on the islands of Aru and Misool, which lie between New Guinea and Australia. Some freshwater fishes also have a similar distribution, for example the rainbowfishes popular in the aquarium hobby. This demonstrates that the process of speciation sometimes takes place only slowly, as the last time there was a land bridge between New Guinea and Australia was during a major ice age, when so much water was tied up in the ice cloaking the Earth that sea level was a good 200 m lower than it is today. The last time this happened



Cherax sp., "Rusty"

was around 21,000 years ago, at least the peak of the last ice age is estimated as having occurred around then.

Two subgenera

The *Cherax* species are divided into two subgenera on the basis of an easily recognizable external characteristic. The species in which males have soft, colorful vesicles, without calcium carbonate inlays, on the outer anterior

surface of the claws are assigned to the subgenus *Astaconephrops*, and the rest to the nominate subgenus *Cherax*. The newly imported crayfish clearly belongs to the subgenus *Astaconephrops*, which means that the sexes can also be readily differentiated: namely only males possess the - in this case delicate orange to pink - claw vesicles. But the sexes can readily be told apart in any case if the underside of the cray is examined. The male sexual opening is at the base of the last

The rusty red coloration of the abdomen of *Cherax* sp. "Rusty" can be seen particularly well in this photo.





pair of walking legs, while that of the female is at the base of the second pair. Like all decapod crustaceans, *Cherax* have four pairs of walking legs. The sexual openings are visible as light dots and the scientific term for them is gonopores.

Relatively small and peaceful

The six species of the subgenus *Astaconephros* known to date - specifically *Cherax albertisii*, *C. boesemani*, *C. lorentzi*, *C. minor*, *C. misolicus*, and *C. monticola* - are of moderate size, growing to a maximum 15 cm long but usually remaining significantly smaller. The new species is apparently most closely related to *C. lorentzi*. Hence it is probably reasonable to assume that its maintenance and breeding requirements don't differ appreciably from those of *C. lorentzi*, which has already been in the hobby for a number of years.

Mainly scavengers

Fluviatile crayfishes are - generally speaking - opportunists that eat whatever comes within range of their claws. To date no trophic specialists are known. But there are nevertheless distinct differences in the behavior of the various species. For example, it is not without reason that *Cherax quadricarinatus* has become one of the most important species worldwide in economic terms and bred in its millions for food. Of all the river crays known to date it is the fastest-growing and provides the greatest yield. Such a species can be expected to eat everything that comes along, and in large quantities. By contrast the small species *C. lorentzi* feeds mainly on dead plant material. The new species, which we will provisionally call *Cherax* sp. "Rusty" (because of its attractive red-brown armor), was first imported by Aquarium Glaser in December 2012. Since then three of these crays have been living in a relatively small aquarium (40 x 40 x 40 cm) together with six *Ancistrus* catfishes around 5 cm long. These crays always have as many leaves as they require available as food. Under these conditions there have been no attacks of any kind by the crays on the suckermouth catfishes, although one of the *Ancistrus* males has even been sharing the cave with one of the crays. Various snail

species sharing the aquarium have also remained unscathed. It can thus be assumed that *Cherax* sp. "Rusty" is a very peaceful crayfish species that can generally be kept in the company of fishes, though there always remains a small element of risk in so doing.

Gourmet tastes?

It has been found that *Cherax* sp. "Rusty" is particularly fond of the leaves of cherry trees, while those of Aspen, for example, are largely ignored. So the species does have certain preferences when it comes to feeding. We can't yet say how *Cherax* sp. "Rusty" behaves towards aquatic plants, but the species, like all *Cherax* species, will dig if it isn't provided with sufficient hiding-places. It is to be expected that in such cases larger specimen plants with an extensive root zone will be undermined and possibly uprooted. To avoid such mishaps, valuable plants shouldn't be grown in crayfish aquaria, but fast-growing stemmed plants used instead, as they can if necessary survive floating unrooted in the aquarium.

Sensible décor

As with all aquarium livestock, it is primarily the expertise of the aquarist that determines whether and how much harm an animal causes in the tank. Crays are all crepuscular and nocturnal and require cover by day. This means that they must be provided with hiding-places. In order to simultane-



Cherax sp. "Rusty" in its cave.

ously get to see something of the crays, it is advisable to lean a flat stone or similar against the front glass of the aquarium. The crays will seek shelter there but you will nevertheless be able to observe them without problem. The area around the cave should be left unplanted, as the little diggers will undertake home improvements here. So with a little effort you can keep both sides - the cray and its owner - happy!

Lexikon

New Guinea crays

Cherax means "engraved" or "chiseled"

Astaconephros: a combination of the genus names *Astacus* and *Nephrops*, two other crayfish genera
lorentzi: named after the discoverer of the species, Hendrikus Albertus Lorentz (1871-1944)

Male *Cherax lorentzi*. This species is undoubtedly closely related to the newly imported species.





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