

Aqualognews

THE JOURNAL FOR AQUARISTS

NO 64



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Dear Reader,

It is the less commonplace creatures among those we keep which help to "spice up" our hobby. Of course, an attractively decorated community aquarium with plants and small, peaceful, colourful shoaling fishes is all very well. But there is an element of the researcher lying dormant in everyone who keeps an aquarium or terrarium. And thus we all sooner or later find ourselves keeping something or other about which nothing or very little has as yet been reported. This issue of the News is veritably teeming with suggestions on this theme, whether it be the splendid *Leporinus characins*, the rarely-seen *Aegla* crabs, or the insects and reptiles of Egypt – all of these are still in much need of study. Happy reading!

Your Aqualog News Team

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TOP TEN

The Top Ten of German rarities

The company Aquarium Glaser imports freshwater fishes from all over the world. From time to time these include rarities and new forms that find their way into the aquarium shops and rapidly become popular aquarium fishes on account of their attractiveness or usefulness. This time we bring our readers a completely up-to-date hit parade of the most popular rarities. In doing so we have selected only species which will in all probability continue to be encountered in the trade in future, ie where successful breeding is already a certainty or where sufficient wild-caught individuals are entering the trade from their native lands.

The best algae-eater among the otocinclus catfishes is the so-called "*Otocinclus negros*" (which is actually an undetermined species from an undetermined genus), which originates from Paraguay. To date it has been bred successfully in the aquarium only on rare occasions. The species should not be kept long-term at temperatures of more than 26 °C as it originates from the rather cooler river systems of Paraguay. These fishes do best in a small group of around 10 individuals.

The giant shrimp *Atya gabonensis*, which originates from west Africa, is a real eye-catcher in any aquarium. At the same time these imposing crustaceans are absolutely peaceful and attack neither fishes nor plants. These creatures have specially evolved fan-



TOP TEN

- 1 Black otocinclus
"*Otocinclus negros*"
- 2 Giant Gabon shrimp
Atya gabonensis
- 3 Moss algae
Cladophora aegagropila
- 4 Blue apple snail
Ampullaria sp. "pigeon blue"
- 5 Blue Nhamunda Heckel Discus
Symphysodon discus
- 6 Banded peckoltia
L134 *Peckoltia* sp. "vittata"
- 7 Rufous garra
Garra rufa
- 8 Dwarf chain loach
Botia sidhimunki
- 9 Piraya, black piranha
Pygocentrus piraya
- 10 Tricolor leptosoma
Cyprichromis leptosoma "tricolor"

like mouthparts for filtering planktonic organisms from the water. Their coloration is variable and can change from dark blue to white-grey marbled. If necessary they can also be fed on flake food or food tablets.

For a number of years a particularly attractive aquarium plant - actually a green alga - has regularly turned up here. This algae species is somewhat disrespectfully known in some quarters as the dumpling plant. It was first imported for the aquarium hobby in Russia and its round mossy appearance, without any roots, makes it a real eye-catcher. These little balls of algae can live for several years and in nature attain a diameter of up to 20 cm. Under aquarium conditions, by contrast, they remain appreciably smaller at 5-10 cm. Given intense light these algae produce a lot of oxygen, and this can result in the little balls rising slowly to the water's surface.

The blue apple snail is an attractive colour mutation from the genus *Ampullaria*. The strain has now been fixed so that these dove-grey snails are

guaranteed a permanent place in the aquarium hobby. Apple snails are among the most interesting invertebrates that can be kept in the aquarium.

It is currently once again the season for wild-caught discus. Particularly lovely





specimens are coming in from the Rio Nhamunda in Brazil. These fishes have reddish stripes on a steel-blue background and are one of the most sought-after wild-caught discus colour variants. Only experienced aquarists should undertake the care of these gorgeous fishes, as a very low pH, soft, top-quality water, and a varied diet are indispensable for successful maintenance.

Peckoltia sp. "vittata" (the species has not yet been scientifically described), which is also labelled L-134 in the trade, is an attractive black and white loricariid catfish from the Rio Tapajos. This rather small (8 cm) catfish is now also available as tank-breds. These fishes are a real alternative to *Hypancistrus zebra* (L-46), which can no longer be exported from Brazil for conservation reasons. *Peckoltia sp. "vittata"* should be provided with a few pieces of bogwood as hiding-places. As regards diet, frozen foods such as mosquito larvae are the preferred option.

Garra rufa is a species which originally came from the area near Kangal in eastern Anatolia, Turkey, where there is a warm spring with mineral-rich water, beneficial in the treatment of skin ailments. In addition *Garra rufa* nibbles particles of dead skin from patients bathing in the water, and this apparently encourages the healing process.

As a result these fishes have acquired a reputation for working minor miracles in cases of psoriasis, so that they are introduced largely for medicinal/therapeutic purposes.

It is currently once again the season for the charming dwarf chain loach *Botia sidthimunki* from Laos and Thailand. These companionable loaches should be kept in a small shoal. They do particularly well if the aquarium is



Brackish-Water Fishes
All about species, care and breeding
by Frank Schäfer

Scats, monos, archerfishes and puffers are all standard fare in the aquarium trade. Their splendid colours and their unusual appearance persuade many aquarists to buy them. For long-term good health all these fishes require the addition of salt to the water to create so-called brackish water, but if we search the literature for information on the setting-up and maintenance of brackish-water aquaria, our quest is usually in vain. This book will thus fill a gap in the aquarium literature, as it is devoted exclusively to the subject of the brackish-water aquarium. It portrays in depth the special characteristics of the brackish-water zones of our planet, describes the equipment required to run a brackish-water aquarium, and details how such an aquarium should be set up and maintained. Considerable emphasis is placed in this book on the description of fish species that are suited to maintenance in a brackish-water aquarium. Not only are the classic brackish-water fishes mentioned above covered in detail, but many other beautiful, interesting, or bizarre species are presented as well. In addition, mention is also made of those fish species that, because of misidentification or incorrect information, are often classed as brackish-water fishes when they are in fact no such thing. ISBN 3-936027-82-X, 80 pages, format DIN A4, full colour photos throughout.

decorated with alternating areas of caves and large-leaved plants, on which the loaches live to rest. They prefer live foods such as *Artemia* and *Daphnia*, but don't mind tablet and flake foods either.

The black piranha, *Pygocentrus piraya*, lives in the river system of the Rio Sao Francisco, a clearwater river in eastern Brazil which has an extraordinary fish fauna. This piranha grows up to half a metre long.

Only the upper surface is dark in colour, while the entire lower half of the body has a brilliant orange-red sheen. Anyone who can provide the very capacious tank and live feeder-fishes necessary for the maintenance of these predatory characins will undoubtedly gain pleasure from these "aquatic wolves".

In their homeland these piranhas are also known as carabito, which translates as "cannibals".

The last entrant in our current Top Ten is rather more peaceful: the blue cyprichlid *Cyprichromis leptosoma*, sometimes known as the yellow-tailed cyprichlid, has enjoyed considerable popularity for many years.

It originates from Lake Tanganyika in East Africa and can be bred without problem in the aquarium. In the Ötricolor variant the fins of males are also coloured dark blue.



FISH OF THE MONTH

Little striped hares with character - banded *Leporinus*

by Roman Neunkirchen

The characins of the genus *Leporinus* (the genus name is derived from the Latin word "*leporinus*" = "hare-like" or "relating to hares") are characteristic river fishes of South America. The name relates to the mouth shape in combination with the prolonged "hare teeth" in the lower jaw in some species, which reminded the describer of the genus of a miniature hare's snout. Around 90 species have been scientifically described, but the actual number of species is disputed, as separating the taxa from one another is difficult.



Leporinus fasciatus



Leporinus affinis

There are a number of basic colour patterns within the genus, seen in a variety of species. The majority of species undergo a change in coloration, from juvenile to adult coloration, and in addition can vary their colour dramatically according to mood. This article will discuss the species that have a pattern of chocolate-brown to black vertical bands on a whitish or yellow

body - the *Leporinus fasciatus* group, the banded *Leporinus*.

The identification of the individual species is difficult and at present there is no guaranteed method.

The names normally used in the aquarium-hobby literature will be used in this article as well, but that isn't meant to imply that this is

the last word on the subject.

The most attractive species and that also most regularly available in the aquarium trade is undoubtedly *Leporinus fasciatus*, which also adorns the front cover of this News. The vertical bars stand out very effectively on the golden yellow, sometimes silvery white background. The throat region is always patterned with bright yellow, sometimes verging on orange-red. For a long time this very widely distributed species, which can grow to around 30 cm long, was divided into subspecies: the nominate form, *Leporinus fasciatus fasciatus*,

occurs in the Guianas. Unfortunately it is practically never imported, although its coloration is truly gorgeous. All the fins in this form are deep red. In addition it can be recognised by the fact that the body stripes in front of, beneath, and immediately behind the dorsal fin are X-shaped; in other words there is in each case a light triangle left clear on the back and belly. The majority of

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Leporinus of the *fasciatus* group in our aquaria come from the Peruvian Amazon; this form doesn't only occur in Peru, and specimens occasionally exported via Manaus cannot be visually distinguished from those from Peru. The correct name for these latter fishes (*L. fasciatus altipinnis*, *L. multifasciatus*, and *L. holostictus* were all described from the region) is totally unclear.

Interestingly, however, this Amazonian "fasciatus" is always imported together with a similar species: *Leporinus affinis*. The external similarity between the two of them is initially confusing, but it can clearly be seen that they are actually different species. By far the easiest way of distinguishing them is by looking at the banding beneath the adipose fin: in *L. affinis* there is a single wide band, in "fasciatus" two narrow bars that lie noticeably closer together than the rest of the body stripes. It is unknown whether these two species live together in nature, or whether they have simply been mixed up through carelessness on the part of the exporter. Unlike the "fasciatus" form, *L. affinis* has a brilliant white body background colour. This species grows to 25 cm long.

Equally little is known regarding whether the third banded species, specifically *Leporinus yophorus*, which occasionally appears in importations, lives together with "fasciatus" and/or *L. affinis* in nature. Luckily the identification of this species is easy, as the Y-shaped band in front of the dorsal, from which it derives its name (*yophorus* = Y-bearing), is always readily apparent. A noteworthy feature of this species is that it can lighten the colour of its body stripes dramatically when it is frightened or unwell. A fright coloration of this kind is unknown from the last two *Leporinus* mentioned above. At 15-20 cm *L. yophorus* remains somewhat smaller than the latter.

The fright coloration of *Leporinus desmotes* is quite the reverse. In stress situations this species from Guyana turns very dark. It is much higher-backed than the previous species and somewhat reminiscent of the headstander, *Abramites hypselonotus*. *L. desmotes* attains a length of around 20 cm.

Enough of enumerating the species, which in any case cannot be done in full. In the aquarium hobby it is common for *Leporinus* to come with a "health warning," as they are relatively large-growing fishes and noted for their omnivorous habits, including a taste for aquarium plants. Such warnings are justified if you are interested only in keeping fishes that can be maintained long-term in small, densely-planted aquaria. But is the aquarium hobby really so one-sided? I think not! Nowadays aquaria 150 cm long are no longer any rarity and such tanks are excellent for keeping *Leporinus*. Even those species that in nature grow to 30 cm



Leporinus yophorus, regular coloration



Leporinus yophorus, colour when frightened

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long (eg *L. fasciatus*) rarely attain more than 20 cm in the aquarium. And unplanted aquaria can themselves look very attractive, as owners of large cichlids have long since demonstrated.



Leporinus desmotes

The social behaviour of these fishes is very interesting and, unfortunately, little studied to date. They develop an order of rank among themselves. Given the opportunity, they like to occupy caves and defend their living space rather energetically against conspecifics. But this hardly ever leads to injuries, at least in the species *L. fasciatus* and *L. affinis*. Unfortunately, however, *Leporinus*

also include out-and-out fin-nippers that harass other fishes with astonishing pertinacity. There hasn't actually been any precise study of the subject, but I regard it as probable that this is abnormal behaviour

resulting from conditions in captivity, and which manifests itself above all when these fishes are kept singly. If you want to keep *Leporinus* then whenever possible no less than five individuals should be purchased.

In nature these splendid characins inhabit sections of fast-flowing rivers where the current is particularly strong. Here they swim in small groups, but maintaining a relatively large distance from one another. Although a number of *Leporinus* species have already been bred in the aquarium, reports on this are few and far between. Usually the species bred are members of the so-called "macula-

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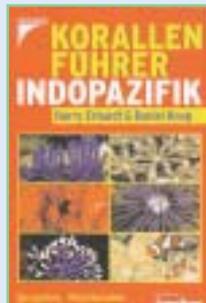
tus group". In nature *Leporinus fasciatus* from Guyana are sexually mature at a length of 15 cm. They spawn during the months from December to May. All in all, breeding should be possible in suitably large aquaria. Perhaps you would like to have a try?



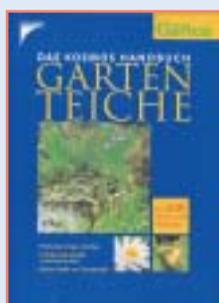
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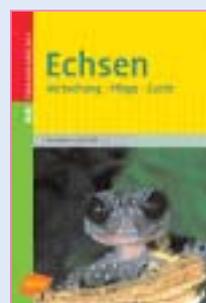
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Manfred Rogner, Hürtgenwald, war Deutsch- und Biologielehrer. Er ist Autor in den Bereichen Biologie, Naturschutz, Terraristik und Natur-Reiseführer und ein renommierter Echsenpezialist

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REPORT

Living fossils

by Peter Hoffmann

Japan turned into North America. While that may sound incredible, in the aquarium section of the "Wilhelma" in Stuttgart it is "no big thing". Because the koi have been moved out of their tanks in the wintergardens, whereupon the animal keepers, handymen, and gardeners have arrived on the scene. Within weeks they have completely altered the scenery: "At last our gars can have a more spacious home!"

Now the land area is stocked with North American plants, and under water too the greenery is largely in keeping with the home of the fishes. They are not just the "oldest" inhabitants of the aquarium at the Wilhelma: "No," says their

In addition they are able to breathe atmospheric air via their swimbladders – an extremely useful ability in warm, swampy, and hence oxygen-depleted waters. The fossil representatives of the gars were frolicking in the shallow



keeper, they are among the oldest fishes on Earth!" This is readily evident externally - from the very ancient "Inside they have an articulated spine - and are thus the only fishes alive today that can nod their heads!"

freshwater pools of the prehistoric Earth back in the Jurassic, ie 180 million years ago.

The modern gars inhabit eastern North America - practically all the way south from



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the Great Lakes to Mexico. "But these ancient fishes are also found in Cuba!" Three species of these lurking predators with their crocodile-like heads are now exploring their new tanks. "Later on there will be four species. A large number of our existing gars came as a gift from the Shedd Aquarium in Chicago - but these fishes are now available even from wholesalers!"

Another living fossil is the Tuatara (*Sphenodon punctata*), which today is found only isolated in New Zealand. Its closest relatives died out 100 million years ago! These somewhat more than half a metre long lizards grow extraordinarily slowly and can live to be more than 50 years old. It is less well known that turtles - at least in the broader sense - are also survivors from ages long past. For they had to avoid being trampled by the mighty dinosaurs and their "design" has altered hardly at all since then!

Normally the term "fossil" refers to animal and plant remains that have been turned to stone, eg this ammonite (upper photo: Hoffmann), a prehistoric cephalopod. But the gars (lower photo: Sch. Nakano), some of the oldest fishes on Earth, are regarded as living evidence of ages long past.

MARINES

Soft and leather corals Worthwhile occupants for a reef aquarium - Part 10

Text and photos: Joachim Frische

Family Xenniidae:
Genus: *Xenia* LAMARCK, 1816

Siting

Current

Indirect current, ie the outflow from the pump should be diverted by bouncing it

Newly imported *Xenia* sting very hard and can overwhelm many other corals.

Tips on taking cuttings

In *Xenia* cuttings can be taken as described previously, but the best method of propagation is to place a piece of suitable substrate in front of or within the

example, iodine. If these substances aren't these provided in adequate quantities then entire *Xenia* colonies can die off overnight. Sexual reproduction can also have a similar radically destructive effect on a colony. To date no details are known of the reasons for these spontaneous total losses.

Many *Xenia* species are able to open and shut their crowns as if pumping. Initially it was thought that this behaviour was connected with food uptake, but it is now known that these animals regulate their gas exchange in this way. Colonies in direct light pump faster than those sited in peripheral light. Interestingly the pumping activity stops almost completely



Probably the best-known soft corals are the species of the genus *Xenia*, which belong to the family Xenniidae. These corals include species that pulsate rhythmically.

off an object. *Xenia* will also tolerate a strong current, in which case a fluctuating current, ie one that is strong only some of the time, is preferable to a constant direct current.

Light

If HQI lamps are used *Xenia* can be kept in all parts of the cone of light. If fluorescent tubes are used then a site in the directly lit area should be chosen.

Companion species

Xenia that have been propagated in the aquarium and given to other aquarists lose their powerful stinging ability in the course of captive maintenance. From then on they are no longer a danger to other corals and can even be sited between stone corals, where they will have a preventative effect against thread algae. Algae can no longer colonise areas where *Xenia* are growing. But beware!

colony. Depending on the vigour of the *Xenia* colony, the substrate will be colonised within a few days and can then be moved elsewhere.

Feeding

Feeding takes place entirely via the light. The necessary minerals and trace elements are taken from the water.

Hardiness

The species of the genus *Xenia* are problem-free in their maintenance as long as the water has already achieved a degree of maturity. In my experience this takes around six months from the time the aquarium was set going.

Special features

Species of the genus *Xenia* often grow immensely rapidly immediately after introduction and use a disproportionate amount of essential minerals and trace elements for this growth, including, for

at a nitrate concentration of 50 mg/l. The same also occurs where phosphate levels are elevated.

Species that pump are no more difficult in their maintenance than their relatives that don't exhibit this behaviour.

Xenia can become infested with snails, which gradually overwhelm the colony and cause it to disappear. These are generally the same snails that are also fond of *Sinularia* and *Cladiella*.

Heteroxenia are similar in form but can be distinguished from *Xenia* by their additional siphonozooids. The species of the genus *Heteroxenia* KÖLLIKER, 1874 are rather more sensitive in their maintenance than species of the genus *Xenia*. The same applies to the species of the genus *Cespitularia* MILNE-EDWARDS & HAIME, 1850.

TERRARISTIC

The most beautiful turtle in the world

Rhinoclemmys pulcherrima manni

by Harald Jahn

Some creatures would have to be invented if they didn't exist already. Without doubt these include the colourful turtles of Cost Rica. They grow to only a little more than 15 cm long, and are thus eminently suited to the domestic terrarium. They are almost unbelievably colourful. And, being omnivorous, easy to feed. In addition they have a peaceful, pleasant nature.



From a systematic viewpoint these turtles belong to the swamp turtles, although ecologically they are land turtles. They nevertheless require a high humidity and a large, shallow basin of water to keep them happy and healthy. The sexes are easy to distinguish by the shape of the tail. The males have a noticeably larger tail. The clutch contains up to 6 eggs. Feeding is, as already mentioned at the beginning, very easy. Very ripe, soft, fruit – bananas are particularly suitable – is enjoyed as are the special tinned foods that are nowadays offered by numerous food manufacturers for feeding carnivorous turtles. They can also be offered mealworms and zophobas as titbits, but not too many, as otherwise vomiting may result. Earthworms and

crickets are also taken. The latter are best fed using forceps to avoid too many escaping before they are eaten. The optimal temperature is 24-26°C during the day, but at night this can drop to room temperature. A heat lamp isn't necessary, but the installation of a UV lamp has



proved very beneficial. The substrate should not be too shallow, as these creatures like to bury themselves now and then. They are peaceful among themselves so that several specimens can be kept together without worry.



If you too are now filled with the desire to keep these interesting creatures, then your pet dealer can undoubtedly order them for you from a wholesaler of his acquaintance, for example from TROPENPARADIES in Oberhausen, Fax +49 208 665997.

Frank Warzel dies

Shortly before our final copy deadline we received the sad news that Frank Warzel had died. He was only 42. In Frank Warzel the aquarium hobby has lost an outstanding cichlid expert and excellent photographer. There was probably nobody else in the world who knew so much about the genus *Crenicichla*, the pike cichlids of South America, as Frank Warzel. Our heart-felt sympathies to those he has left behind.

TERRARISTIC

Terrarium inhabitants from the land of the Pharaohs

by Thorsten Holtmann

Around 5,000 years ago the Nile saw the rise of the civilisation that created the pyramids, the sphinx and the hieroglyphs. We know that the ancient Egyptians were meticulous observers of their environment and saw the embodiment of their gods in many creatures. The world of ancient Egypt is long gone, but the animals that the Egyptians once watched are still there. Some of them are fascinating terrarium occupants and when we watch their activities then with a little imagination we can envisage ourselves back in the time when a dung beetle was as a deity.

The sacred scarab (*Scarabaeus sacer*) insects in the terrarium is becoming ever more popular. Occasionally it is possible to

The maintenance and breeding of

insects in the terrarium is becoming ever more popular. Occasionally it is possible to



Scarabaeus sacer

buy the "real" scarab from Egypt in the pet trade. This beetle shapes the dung of ruminants (in the domestic terrarium it is best to use horse dung as it doesn't smell much) into round balls which it then transports using its hind legs to a pit, and then lays its eggs in it.

The ancient Egyptians saw this activity as an allegory of the rising and setting of the sun and worshipped the scarab. For as long as the scarab had the strength to roll the ball, the sun would likewise continue to rise again in the morning.

The terrarium for such beetles, which measure 3-4 cm long, should not be too small – a bottom area of 40 x 20 cm is the minimum if you want to observe the behaviour of the beetle, but the larger the better.

The beetle larvae feed on the dung, while the adult insects can readily be fed on pieces of over-ripe banana.



Miomantis pharaonica

The Pharaoh mantis (*Miomantis pharaonica*)

This small praying mantis is an excellent beginner's species for everyone who wants to try their hand with mantids. The Pharaoh mantis attains a length of 35 to 40 mm and imitates plant stems. Its coloration ranges from green to brown, with green individuals preferring to sit on green plants and brown ones on dry stems. A number of observations indicate that this species can also readily be kept in groups, as long as sufficient live food is



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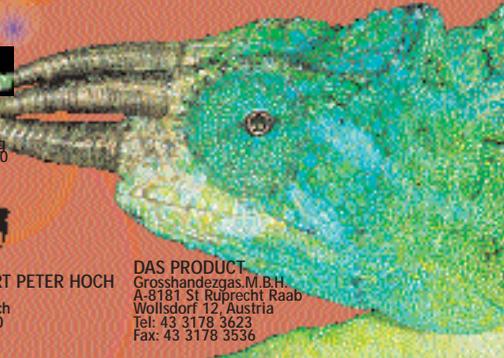
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provided in the form of small insects. But because there remains a risk of cannibalism, as a precaution a few specimens should also be kept in isolation to



Miomantis pharaonica

avoid the possibility of the strain dying out. Breeding takes place year-round and in the course of her approximately six months of adult life a female can produce 6-13 ootheka (the term for the egg-packets encased in a foam-like mass). It is known from laboratory research on *Miomantis savignii*, a closely related species, that "virgin birth" (parthenogenesis) can also take place, but the resulting juveniles (exclusively females) are frail and weak.

The Sahara frog (*Rana saharica*)

An attractive, typical frog, difficult for laymen to distinguish from our native German aquatic frogs (*Rana ridibunda*, *R. lessonae*, and their hybrid, *R. x esculenta*). The Egyptian specimens are not all that



Rana saharica

large, generally around 5-6 cm long. They are best kept in aquaria containing around 5-10 cm of water, in which rocky islands should be constructed, protruding a few centimetres from the water. Because these frogs sometimes like to sunbathe, the rocky structures should be illuminated with a spot-lamp. These frogs will eat anything that moves and will fit into their mouths. As frogs go, these creatures are

rather clever and soon learn when a bowl of mealworms is in the offing. This is a good way of ensuring the basic calorie requirement of the greedy bunch (always keep several specimens, from four upwards). But never feed just mealworms, as in the long-term this will damage their health! The Sahara frog is blessed with a rich vocal repertoire, and it is not a good idea to install a terrarium with Sahara frogs in the bedroom, as they often like to call in the middle of the night.

Reuss's toad (*Bufo regularis*)

Toads have a completely different temperament to frogs. While the sole defence mechanism of frogs is flight (everything wants to eat them!), toads



Bufo regularis

produce a skin secretion that tastes so foul that they have few predators. A frog must initially learn that its keeper poses no threat and that it is not necessary to flee helter-skelter at its owner's approach. By contrast a toad shows great interest in its owner and quickly becomes tame. Reuss's toad is a very nice pet. Each individual should be provided with a hiding-place into which it can retire during the day. The substrate should be slightly damp but not wet. A large, stable water bowl made of earthenware is essential. The toads can then immerse themselves in this when required and regulate their water budget.

The Egyptian leopard lizard and Bosc's lizard (*Acanthodactylus pardalis* and *A. boskianus*)

These are small lizards (head-body length around 6 cm, plus around 12 cm of tail) that have adapted to life in dry regions. They have more or less strongly developed comb-like fringes on the toes of their hind feet, hence their German common name

of fringed-finger lizards. These fringes enable them to make rapid forward progress across loose soils. These normally colonial-living lizards are exceptionally



Acanthodactylus boskianus

entertaining as they are out and about all day, constantly searching for edibles (small insects). They are not quarrelsome among themselves and so can readily be kept in large groups. The substrate must be at least 15 cm deep and consist of a sand-earth mixture (1:1), so that the lizards can dig and construct tunnels. The accuracy of the internal clocks of these nice little lizards is astonishing.

By around 18.00 hours at the latest they will have disappeared, and the terrarium will appear to be empty. Then next morning the entire bunch will be there again around 07.00 and "sunning" themselves - even if the light in the terrarium hasn't been switched on yet and it is still pitch dark! A water bowl and a UV lamp, as well as a heat lamp, are "musts" for



Acanthodactylus pardalis

an *Acanthodactylus* terrarium.

Steudner's gecko (*Tropicolotes steudneri*)

A breathtaking little creature which attains a head-body length of just 3 cm, on top of which there is a further 3.5-4 cm of tail. A mini-terrarium 20 cm in length is perfectly adequate for a pair of this species. In nature they are found in both sandy and stony deserts. The species is very wides-



Tropiolotes steudneri

pread and is found not only in Egypt but also in further large areas of northern Africa and south-western Asia. These dwarfs can be fed on buffalo worms and fruit-flies (*Drosophila*). A water dish is unnecessary, a daily spraying will adequately provide for the water requirements of these geckos.

The rough-skinned gecko (*Cyrtopodion scaber*)



Cyrtopodion scaber

Another dwarf gecko, but unlike the previous species this one has a pronounced burrowing way of life. A particularly striking feature of this species, which attains a head-body length of about 4-5 cm (the tail is somewhat shorter than the body), is its "snub nose". A sand-earth mixture in the ratio 1:1 should be chosen as substrate in order to permit this dainty little gecko to construct its tunnels. As for many digging species the depth of substrate should be no less than 15 cm, as then the substrate humidity can be regulated so that it is slightly damp right at the bottom. Any accumulation of water won't be tolerated.



Tarentola mauretana



Tarentola annularis

The Moorish gecko and Egyptian gecko (*Tarentola mauretana* and *T. annularis*)

Anyone who likes robust geckos that can also bite hard if anyone dares to come too close, will be very happy with the Tarentola species. Although Tarentola are actually nocturnal or crepuscular creatures, they are also fond of sunbathing. These lizards are best kept in pairs, and the terrarium should be decorated with large rocks so as to create plenty of hiding-places. A small water dish, which should always contain fresh water, is essential, but by contrast the substrate is of lesser importance, as these geckos only rarely visit the ground.

The gold skink (*Eumeces schneiderii* *aldrovandii*)

This classic among terrarium inhabitants is now available again from Egypt. It is an inhabitant of relatively dry, stony regions. These gorgeous creatures are best kept in pairs (males have a broader head) in



Eumeces schneiderii



Mabuya vittata

terraria with a bottom area of 80 x 50 cm upwards. They can be fed the usual food insects. A UV lamp will help ensure that these skinks remain lively and healthy for years.

The bridled skink (*Mabuya vittata*)

A charming species which to date has only rarely been maintained in the terrarium. The head-body length measures 7 cm and the tail length 11 cm. These skinks have proved very peaceful towards hetero-specific lizards, but they need to be carefully accustomed to members of their own species and kept in separate terraria in the event of constant disputes. The species loves to dig and hence is best kept with an earth-sand mixture (1:1). These skinks will eat the usual food insects.

The bean skink (*Mabuya quinquetaeniata*)

This widespread species has been a favourite terrarium occupant for decades.



Mabuya quinquetaeniata ♀

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*Mabuya quinquetaeniata* ♂

There are several subspecies, with the nominate form living in Egypt. Males and females are completely differently coloured. The young look quite different again, and have bright blue tails. As long as the little ones retain their juvenile coloration they are not harmed by the adults. Because these are rather boisterous and fast-moving fellows the terrarium should be as large as possible. They are best kept in pairs. These skinks live where there are human habitations, and they shouldn't be kept too dry. In any case they are not notably desert-dwellers. Their terrarium is best arranged to simulate a section of a very sunny garden with a few rocks or a dry-stone wall.

The changeable agama (*Agama mutabilis*)

This relatively small agama (head-body length 8 cm, tail length 12 cm) is a very entertaining terrarium occupant. It is a

*Agama mutabilis*

desert lizard which in Egypt inhabits the desert regions to the west of the Nile. The throat region in males is spectacularly striped with blue. Unusually, in the terrarium these agamas exhibit no tendency to flee from humans. But they demonstrate their intrinsic fire when hunting for fast-moving food insects. This species both hibernates and aestivates and is active only in March, April, and at the beginning of May, as well as from October to December. This should be borne in mind when maintaining this agama.

The diademed sand-snake (*Lytorhinchus diadema*)

A nice little snake that rarely grows longer than 45 cm. Its porcelain-like appearance is somewhat reminiscent of the common skink (*Scincus scincus*) and like the latter it has a burrowing, partially subterranean lifestyle. Accordingly it requires a dry



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*Lytorhinchus diadema*

terrarium with fine sand. Unfortunately the species, which is non-venomous and hardly ever tries to bite, cannot be recommended unreservedly as not all specimens will accept new-born mice as food. But small lizards, their natural food, are not easy to obtain.

A flourishing "gecko culture" (eg of *Hemidactylus frenatus*), which can provide around five juveniles per snake per month, is a prerequisite for the survival of fussy (as regards mice) eaters. The food animal(s) should always be offered at night as this species hardly ever feeds during the day.

Clifford's snake (*Spalerosophis diadema*)

The same specific name, but a totally different snake. This again non-venomous snake grows to around 150 cm (exceptionally 180 cm) long and is an excellent pet for the terrarium. It will eat small mice without problem. Despite its somewhat sinister facial expression it hardly ever tries to bite, although there are individuals that "act big" and on human approach inflate themselves, hiss, and spit.

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All show of course, but pretty impressive nonetheless. Because the species is somewhat similar in coloration to the highly venomous carpet-viper (*Echis carinata*), one can well imagine that all but the most determined attackers are scared away completely by the display and look for other prey instead.



Spalerosphis diadema

If you too are now filled with the desire to keep one or more of these interesting creatures, then your pet dealer can undoubtedly order them for you from a wholesaler of his acquaintance, for example from Tropenparadies in Oberhausen, Fax +49 208 665997.

EVENTS

The largest mobile aquarium in Europe!

The Verband für Fischerei und Gewässerschutz in Baden Württemberg e.V. (VFG) (Association for the Conservation of Fisheries and Waters in Baden Württemberg) is to operate, via its service and publishing company, a mobile display aquarium.

This tank is unique in both scope and size: 60,000 litres capacity, 12 metres long, and 18 m² of viewing surfaces.

The VFG is taking a step into the unknown with this unique project. It hopes to promote awareness of the multitude of life-forms in and around bodies of water, and also draw attention to their problems. Using this very large mobile aquarium it will go to the people, pick them up, and show them the habitat that is water. It hopes thereby to stimulate awareness and interest. In addition the immense variety of ways in which this



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display aquarium can be utilised make it a crowd-puller that can be hired out for use at a huge variety of events and occasions. The realisation of the aquarium has taken place under contractual partnership with AquarienWelten in Ludwigshafen.

The aquarium can be hired out for a huge variety of uses and events. In the case of events with a watery theme the VFG will be available as a partner in the enterprise. Potential uses include:

- * Exhibitions
- * Tourism displays
- * Marketing campaigns
- * Educational projects (eg in schools)
- * Environmental and wildlife conservation
- * Events
- * Film and video productions

The VFG will provide didactic concepts and

presentation formats for specific sets of themes that can be used to clarify, for example, ecological or physical contexts.

Technical data

* The dimensions of the aquarium correspond to those of a standard 40-foot container (12m x 2.5m x 2.5m) with a capacity of 60 m3.

* Transportation is via a container tractor unit.

* The body is made of steel and was specially designed and manufactured.

*The viewing panes consist of acrylic glass, 60 mm thick, with toughened surfaces (scratch-proof).

* The aquarium can be filled with practically any non-permanent material; if in doubt the inside of the panes must be covered with film to protect against scratching.

* As far as is known at present, the aquarium will be the largest mobile aquarium in Europe.

* 4 C-tube connections, 2 connections for current pumps.

* Top capable of bearing human weight.

* Lighting via 12 x 1000 watt.

* The only installation requirements are adequate space and access, and suitable inlets and outlets (C-tubes with hydrant connectors).

The next event at which the aquarium can



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be admired will be on 4th June 2005 in Stuttgart: the City of Stuttgart Environment Day, in the Schloßplatz (Germany).

Further information can be found on the Internet at www.mobiles-grossaquarium.de or direct from the VFG: Urachstrasse 34, D- 70190 Stuttgart, Germany. Tel.: +49 711 60 47 42

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SCIENCE NEWS

Green crabs from Paraguay

Aegla platensis imported for the first time

by Frank Schäfer

There are more than 60 species, all of them exclusively inhabitants of freshwater, in the genus *Aegla*, which belongs to the family Aeglidae. As well as *Aegla* there are two further genera in the family, but their members are known only from fossils. All *Aegla* species are inhabitants of southern South America. To date they have hardly ever been seen in the aquarium hobby. The specimens recently imported by Aquarium Glaser demonstrate, however, that *Aegla* are thoroughly interesting aquarium occupants

In the aquarium the first (obviously very short-term) observations indicate that these little creatures live a very secretive life. If they are given fine sand as substrate then they like to bury themselves, disappearing tail-first into the bottom. *Aegla* crabs don't appear to have any special food preferences, and both frozen foods (mosquito larvae, *Artemia*) and dry are taken.

The specimens now imported originate from a river called the Arroyo Pozo Hondo near Carayao, in the north of Cnel. Oviedo, 137 km to the east of Asunción, Depart-



A *egla* are relatively small crabs - *A. platensis* grows little longer than 5 cm. The tail is carried folded beneath the belly, as in the short-tailed crabs. Within the Decapoda the Aeglidae form part of the Anomura, which also includes, for example, hermit crabs, jumping crabs, and porcelain crabs. The phylogenetic position of the Aeglidae within the Anomura remains unclear. Some authors regard them as close relatives of the Galatheidae (jumping crabs?), while others see them as relatives of the hermit crabs.

A number of sexual differences are known in *Aegla*, but they aren't as immediately obvious as in many other crabs. In sexually mature females with a carapace length of more than 12 mm (the carapace is the large "head armour") there are four pairs of pleopods on the belly; the males have a longer, broader carapace; in males the pincers are larger; the left-hand and right-

hand pincers are unequally developed in males; males have a narrower posterior body; and the sexual openings (gonopores) are positioned differently in males and females, specifically at the basal joint (coxa) of the last (fifth) pair of walking legs in males, in females at the basal joint of the third pair of walking legs (the second pair of legs behind the pincers). (Easily visible with a hand-lens).

Aegla platensis is sexually mature at an early age. A female of this species with a carapace length of 9.57 mm holds the record for the smallest egg-carrying female known in any *Aegla*. The eggs undergo direct development, and the hatching young immediately look very similar to the parents. There are no free-swimming larval stages. In *Aegla platensis* in particular egg-carrying females are found year-round, and this species is thus not restricted to breeding at particular times of the year.

ment Caaguazu, Paraguay. Like fishes imported from Paraguay, *Aegla* may also appreciate a slight "winter rest" at 16-18 °C, and in general they should not be kept too warm. If possible the maintenance temperature shouldn't exceed 24°C even in summer.

We thank Sandra Kalscheid from Dirk Brandis's workgroup for identifying the specimens.

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ZZF-supported KHV research project

by ZZF, Langen, Germany

WZF, a daughter company of the Zentralverbands Zoologischer Fachbetriebe (ZZF), is financing a research project at the Tierärztlichen Hochschule Hannover (Hannover Veterinary College) on the transmission of the koi herpesvirus infection via symptom-free carrier fishes.

For some years increasing numbers of ornamental carp worldwide have been dying from infection with the koi herpesvirus (KHV).

In order to prevent further spread of the epidemic and discover possible ways of protecting against infection, WZF GmbH, a daughter company of the Zentralverbands Zoologischer Fachbetriebe e.V. (Central Consortium of Zoological Enterprises, ZZF), is financing a two year research project on KHV at the Hannover Veterinary College, at the suggestion of the parent organisation. The Bundesforschungsinstitut für Tiergesundheit (State Research Institute for Animal Health) on the island of Riems is collaborating on the project.

Ensuring the continuing existence of the koi trade

"With our support we hope to ensure the continuing existence of the German and international koi trade, and to discover suitable (from the fishes' viewpoint) protective measures against this highly infectious virus", explains WZF Managing Director Herbert Bollhöfer. Carp intended as food as well as koi can succumb to the generally fatal KHV infection. The virus is harmless to humans. "Sick koi can be recognised by skin lesions, hyperproduction of mucus which comes away in shreds, and sometimes mortification of the gills", explains Professor Dieter Steinhagen of the Department of Fish Diseases and Pisciculture at the Hannover Veterinary College.



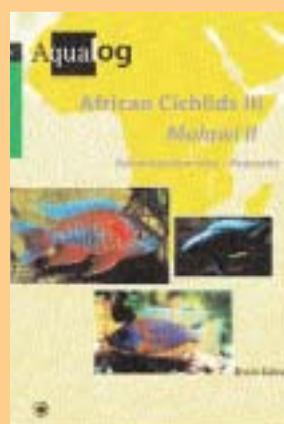
Kindai Showa, an incredible, healthy specimen

Existing measures inadequate

In central Europe the disease occurs mainly in the summer months from June to October and in water temperatures of around 16 to 28 degrees Celsius. A number of countries where carp are bred have

attempted to immunise their koi on the basis of this observation. They have exposed entire koi populations to the virus and then treated the disease by placing them in warmer water with a temperature of more than 30 degrees. The surviving koi showed no further signs of the disease following subsequent contact with the virus. However, it is now known that they remain carriers of the virus and can infect previously uninfected fishes. "The immunity doesn't last life-long, and because it remains as yet unclear under what conditions the virus breaks out again with deaths resulting, the risk of a worldwide epidemic is too great. And an epidemic spread of the disease with a resulting mass die-off of food-fish carp - for example, in the South-East Asian countries where carp are of pivotal importance as a source of protein for the population - could lead to a massive shortfall in the food supply", explains Dr. Markus Biffar, the specialist veterinarian at amtra Aquaristik GmbH and Aquarium Glaser GmbH and a member of the ZZF consortium of ornamental fish and aquatic plant wholesalers.

For this reason, at the beginning of 2003 the ZZF-member ornamental fish wholesalers decided to have all imported koi spot-checked using the then newly-established PCR testing method. They pledged to market exclusively fishes from KHV-negative stocks. "This selective measure has contributed to the fact that in



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NEW!

The main topic of this third Aqualog pictorial lexicon on the cichlids of Africa is the genus *Aulonocara*. These splendid fishes, known in English-speaking countries as Malawi Peacocks, are among the most magnificent and beautiful fishes in the world. Their glorious colours, their relatively peaceful nature, their small body size, and their interesting behaviour combine to make the members of this genus ideal aquarium fishes.

In addition, this volume also presents all the species and variants of the genera *Alticorpus*, *Lethrinops*, *Taeniolethrinops*, and *Tramitichromis*, as well as the variants of the species *Astatotilapia calliptera* that live in Lake Malawi.

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2003 and 2004 there were significantly fewer KHV outbreaks in koi in Germany, as confirmed by the vets involved in the outbreaks that did occur." says Dr. Markus Biffar. And the road pioneered by ZZF-member koi importers has also provoked great interest internationally.

But because even the PCR method, which tests for virus DNA in the fish tissues, and other testing procedures are not a hundred percent reliable, there remains a need for further research in the area of diagnosis. It is often impossible to establish the presence of the virus, especially in infected fishes that show no clinical signs of disease. In addition it remains unclear under what conditions fishes that have survived the disease carry the infection and can infect healthy koi.

Research project offers hope

Hence the ZZF/WZF financed research project will specifically investigate in which fish tissue(s) the virus remains latent: "We will observe koi that have survived infection with the KHV virus for a number of months and look for the virus in blood, gills, milt, kidneys, brain, faeces, and urine. Only then will we be able to recognise the spontaneous excretion of infective virus. In addition we will look into the question of whether the fishes resume the production and excretion of infective virus as a result of



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Healthy Kohaku - that's the way it should be!

stressors such as transportation, dietary deficiency, or infection with other pathogens", explains Prof. Dieter Steinhagen of the project.

New screening procedures and immunisation

The Friedrich Loeffler Institute (FLI) of the

Bundesforschungsinstitut für Tiergesundheit was attracted to the research project because intensive work was being performed there on improving methods of testing for KHV. For example, the Institute has been searching for KHV antibodies in the blood serum of affected fishes, from which a new testing method might be developed. In addition the Hannover Veterinary College, in collaboration with the FLI, plans to develop a vaccine against KHV from already known viruses that do not affect koi. This is based on the fact that an organism often doesn't differentiate between two related viruses and develops an immune response against the desired pathogen, in this case KHV. Professor Steinhagen is confident that the research will produce interesting results: "We will make helpful discoveries even if the herpesvirus turns out to be one of the most unpredictable viruses."

Further information:

TIERÄRZTE IN IHRER NÄHE

Mit Hunden, Katzen, Vögeln und Nagern findet man im Notfall schnell und überall einen kompetenten Tierarzt. Mit kaltblütigen Pfleglingen ist das nicht so einfach. Die Tierärzte in dieser Rubrik haben sich neben der normalen Ausbildung speziell für Fisch-, Reptilien- und Amphibienerkrankungen fortgebildet - zum Wohle Ihrer Pfleglinge!

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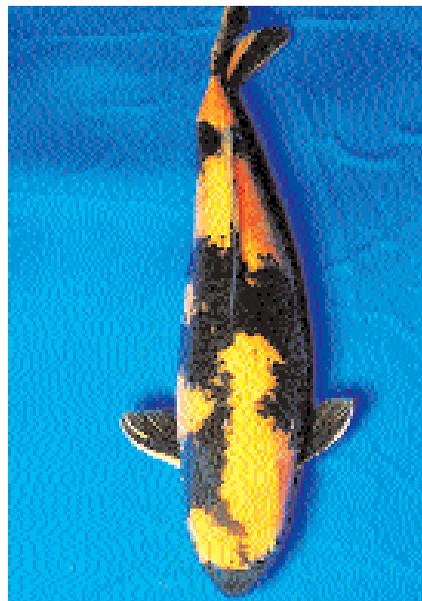
Beware of guarantees!

The infection of a koi population with KHV represents a personal and financial loss for koi keepers, but if the disease affects stocks in the ornamental fish trade this can lead to economic catastrophe. Hence RA Rolf-Dieter Gmeiner, Managing Director of ZZF, warns the ornamental fish trade against underplaying the problem. As both wholesaler and retailer must bear in mind the requirements for compensation if infected koi are sold. "In the case of KHV-infected fishes the purchaser is entitled to a replacement from a subsequent consignment. If an infected fish is sold and infects a healthy private population, there is the additional threat of legal action for damages as the result of negligence. Even in the case of a small private collection that falls sick this can rapidly mount up to 8,000 to 10,000 Euros", says Mr Gmeiner, who provides legal advice to ZZF members in the event of such disputes. There has even been an award of damages of more than 75,000 Euros in Great Britain. The requirement for compensation applies even if the dealer has been only slightly negligent, for example, if he failed in his duty of care with regard to quarantine and checking and hence failed to recognise the problem. In addition, lack of care in his choice of supplier can militate against him.

Recommendations for the koi trade

Importers should without fail establish a quarantine facility where new imports can be accommodated and placed in quarantine. The water temperature here should be between 17 and 28 degrees Celsius (average around 23 degrees).

Because in our current state of knowledge the PCR method is the most reliable way of detecting KHV, the ZZF recommends that



Prevention is necessary to make sure that your koi stays as good as this Ki Utsuri.

all wholesalers should send samples from every importation for testing at a suitable

diagnostic laboratory; these samples may take the form of whole fishes, gill scrapings, or blood samples. Infected fishes should be killed and disposed of safely. The affected quarantine tanks should be completely disinfected before the next importation. A complete record should be kept of the origin of all fishes, their analysis numbers, and their whereabouts in the trade, in order to be able to identify the source of the disease if necessary. Those in the pet trade should select their suppliers very carefully and avoid importing koi themselves or in partnership. The ZZF urgently recommends choosing only those suppliers who have their koi checked with the aid of PCR analysis, can show a certificate of negative test results, and employ a suitable quarantine facility. Pet dealers should keep new consignments of koi from different suppliers in separate tanks. For safety's sake a further calculated period of quarantine is suggested. And a separate net for each tank should always be standard.

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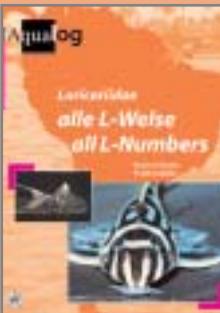
First spawning success in *Barbus denisonii*

In the recent past hardly any other fish has created such a storm of enthusiasm as this wonderful barb from southern India. To date definite external sexual differences have been sought in vain. Wild speculation has been rife: supposedly only males have been exported or the species attains a size in the wild that makes breeding in the aquarium impossible. None of this seems to have been true. A spontaneous spawning of *Barbus denisonii* took place at the company aqua-natura in Leun when bogwood was put in their tank to soak. Apparently the resulting gradual lowering of the pH over a period of days



provided the trigger for spawning. The water parameters on the day of spawning were: pH 5.7, conductivity 162 microsiemens, GH 2-3 °dGH. During the period prior to spawning four of the total of 15 individuals turned steel-blue (similar to a solid turquoise discus) above the red longitudinal band. Java moss was chosen as the spawning substrate. Fry were

TIP



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hatched, but as yet no details are available on the development of the spawn. No external sexual differences could be detected in the 12-15 cm long fishes that participated in the spawning. Our hearty thanks to Frau Landvogt of aqua-natura for these first details, provided by telephone.

AQUARIUM GLASER

Actual imports from all over the World

			
 <p>From Peru: <i>Ammocryptocharax</i> sp. A charming, hardly 4 cm long ground-tetra. The peaceful species prefers fine live food.</p>	 <p>From Singapore: <i>Uca annulipes</i>. A spectacular colorful fiddler crab. This species needs brackish water! Each individual shows a slightly different coloration.</p>	 <p>From Brazil: <i>Pseud-acanthicus</i> sp. „Titanic“, L273, Albino. An extremely rare - and expensive - beauty. So far only one specimen is known.</p>	 <p>From the USA: <i>Notropis lutrensis</i>. A wonderful fish that can be kept in garden ponds during the summer. It reaches a length of about 6 cm.</p>
			
 <p>From Paraguay: <i>Corydoras diphyes</i>. This species has been scientifically described just some months ago. Don't keep too warm, room-temperature is quite enough for it.</p>	 <p>From India: <i>Barbus sahyadrensis</i>. A wonderful species that reaches a length of about 8 cm. Males have black ventrals, the female's ventrals are hyaline.</p>	 <p>From Singapore: <i>Sesarma</i> sp. "Flower crab" Sadly it was impossible to get the correct name until now. A very nice crab, hardy and omnivorous.</p>	 <p>From Brazil: <i>Leporinus</i> sp. aff. <i>mormyrops</i> A very rare fish. Imported along with headstanders from the Rio Xingú.</p>

STICKER

The latest supplements

by Harro Hieronimus

Each of the extensive AQUALOG lexicons contains all the known species, subspecies, and variants of the relevant group at the time of going to press. But new species are constantly being discovered (not infrequently actually because of the AQUALOGs, without which the necessary detailed comparisons are virtually impossible). These new species are published as supplement sheets so that in the years to come your AQUALOG will remain a comprehensive and up-to-date work of reference. This time the supplements cover the following species:

What are AQUALOG supplements and how can you obtain them?
 Each supplement sheet (6 sheets are published every year) comprises 8 pre-perforated photos printed on self-adhesive material, which can be affixed to the spare pages provided for the purpose at the end of every AQUALOG lexicon. Subscribers to the News (See page 3 for subscription form) receive these sheets automatically with the News.

A13326-5 *Bedotia* spp. "Mahamora"
 8013 14871 Mahamora-Bedotia/Mahamora-Bedotia
 Mahamora River, NW-Hautesoa, W, 10 cm
 Photo: Akelot Saunders

9 783910 393102 74-9

A13327-5 *Bedotia* spp. "Nanavona"
 8013 14872 Nanavona-Bedotia/Nanavona-Bedotia
 Ranamafana National Park, SE-Madagascar, W, 11 cm
 Photo: Akelot Saunders

A13328-6 *Bedotia* spp. "Aksambony"
 8013 14873 Aksambony-Bedotia/Aksambony-Bedotia
 Aksambony, Spontafika I ermit, E-Madagascar, SE, 11 cm
 Photo: Akelot Saunders

A13329-6 *Bedotia* spp. aff. "Mondra"
 8013 14874 Mondra-Bedotia/Mondra-Bedotia
 Kasany River, E-Madagascar, SE, 11 cm
 Photo: Akelot Saunders

X40370-5 *Melanotaenia australis* (Common) 1875
 8013 14875 Australian-Bedotia/Bedotia
 Wollumbi River, NW-Northern Territory, W, 11 cm
 Photo: Günther Schmidt

X40371-8 *Melanotaenia australis* (Common) 1875
 8013 14876 Australian-Bedotia/Bedotia
 Sully River, NW-Northern Territory, W, 11 cm
 Photo: Günther Schmidt

X40382-4 *Oryzias latipes* (Common) 1912
 8013 14877 Murray-Bedotia/Bedotia
 South-east River South Wales, Australia, W, 7.8 cm
 Photo: Günther Schmidt

X40383-2 *Oryzias latipes* (Common) 1912
 8013 14878 Westlake-Bedotia/Bedotia
 Westlake-Australia, W, 7 cm
 Photo: Günther Schmidt

Ergänzungsbogen für /Supplement for AQUALOGnews NO 64 (3/2005) Art.No. 5013-3 ISBN 3-931027-74-9

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The order Atheriniformes comprises several families, three of which are represented on this page of supplements. We begin with the Madagascan rainbowfishes, the Bedotiidae. Despite the increasing environmental destruction numerous new species continue to be discovered there. The localities lie in the east and north-east of the island, where the Bedotiidae exhibit an as yet unmeasured species diversity. *Bedotia tricolor* is a possible rediscovery, but it is not yet certain whether the identification is correct, as comparison with the type material is difficult. Meanwhile more and more Madagascan rainbowfishes are also being kept in the aquarium. In Australia too new variants are continually being discovered. *Melanotaenia australis* is, of course, readily recognisable by the white band beneath the mid-line, but there are considerable differences between populations from different localities. In Australia numerous Atherinidae (siversides) occur in fresh water, otherwise they are almost all marine fishes. Once they have settled in they are easy to keep, but they are difficult to transport. The sexes are virtually impossible to distinguish, even in adult fishes.

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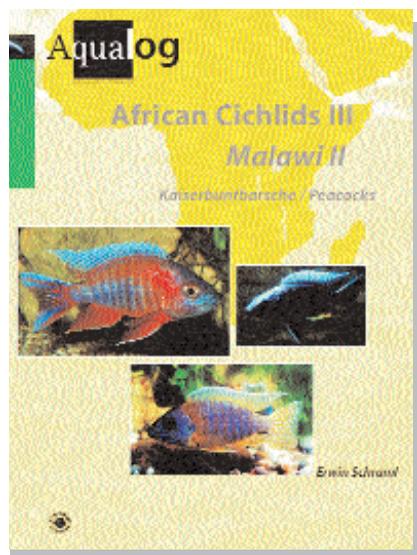
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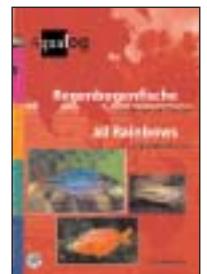
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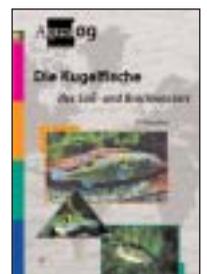


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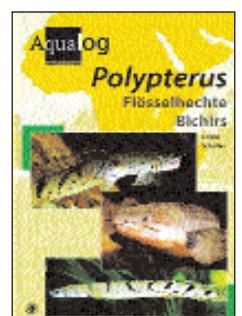
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