



Breeding mantellas

Joshua Ralph discusses the breeding and conservation of the fascinating frogs that form the *Mantella* genus, and how those keeping these frogs need to aid their survival.

There are severe pressures on the wild populations of these species, which are confined to the island of Madagascar, off the eastern coast of Africa. Loss of habitat and pollution represent the major threats, and only a small number of these frogs can be exported under quotas. This provides the opportunity to establish them in collections now, before it is too late.

The best-known member of the group is undoubtedly the golden mantella, which is now being bred regularly in vivarium surroundings, but the futures of others are far less certain, with some

species being virtually unknown in the hobby, as I outlined in the April issue. (If you missed this first part, back issue copies are available by calling 0845 873 9270 – Ed). Yet the demand for these frogs is continuing to rise, and for this reason alone, every effort should be made to persuade them to reproduce.

Restricted choice

This article concentrates on how to sex these beautiful anurans, how to condition them to spawn successfully and also how to rear their offspring. The starting point has to be to decide on the species that interest you, and to obtain suitable stock, setting them up with a view to breeding in the longer term.

This may not be as straightforward as it sounds, and you might well decide to start

with golden mantellas, partly because their breeding habits are best-documented and also because breeding stock is relatively easy to obtain. Out of the current 16 species within the genus, just six are represented in the hobby. The choice is important though, because the breeding habits of these frogs do differ significantly in some cases. The climbing mantella for example breeds in water-filled tree hollows off the ground.

Identifying the genders

Before you can breed a species, you obviously need to be able to have access to sexed specimens, in the ratios that are required, in order to have a chance of a successful outcome. There are a number of different methods that can be used to help to identify the correct gender of specimens, but it is important to bear in

Available mantella species

The species that can be found – and this may require some patience in some cases – are as highlighted in the following list.

- Golden mantella (*Mantella aurantiaca*) – Mocquard, 1900
- Harlequin mantella (*Mantella cowanii*) – Boulenger, 1882
- Climbing mantella (*Mantella laevigata*) – Methuen & Hewitt, 1913
- Brown leaf mantella (*Mantella betsileo*) – (Grandidier, 1872)
- Harald Meier's mantella (*Mantella haraldmeieri*) – Busse, 1981
- Baron's painted mantella (*Mantella baroni*) – Boulenger, 1888
- Bernhard's mantella (*Mantella bernhardi*) – Vences, Glaw, Peyrieras, Böhme & Busse, 1994
- Bronze mantella (*Mantella ebenau*) – Boettger, 1880
- Yellow mantella (*Mantella crocea*) – Pintak & Böhme, 1990
- Blue-legged mantella (*Mantella expectata*) – Busse & Böhme, 1992
- Malagasy painted mantella (*Mantella madagascariensis*) – Grandidier, 1872
- Marojejy mantella (*Mantella manery*) – Vences, Glaw & Böhme, 1999
- Black-eared mantella (*Mantella milotympanum*) – Staniszewski, 1996
- Guibe's mantella (*Mantella nigricans*) – Guibé, 1978
- Beautiful mantella (*Mantella pulchra*) – Parker, 1925
- Green mantella (*Mantella viridis*) – Pintak & Böhme, 1988

mind that none is completely accurate – although some methods will be much more reliable than others. Here is list of several that will help you to distinguish the sexes:

- Size differences
- Egg laying
- Colouration
- Calling

With some species within the genus, the signs of sexual difference can be quite obvious, as in the case of the golden mantella. This overcomes one of the major hurdles when buying stock – always assuming that you can be certain that the frogs in question are both adult. Mature golden mantellas display a tremendous difference in size between the sexes, with females being significantly larger in both girth and length, when compared with males that have a more slender and petite profile. However, other mantellas are virtually impossible to sex visually. These include the brown leaf mantella, which is more often than not incorrectly sexed in my experience.

Auditory behaviour in the form of calling is one of the most common methods people use to differentiate the sexes in the case of this group of frogs. Males use calling as a means of advertising their presence to females, but even this method has its drawbacks, as some species and individuals can be very shy, making them reluctant to call in the presence of people.

However, you may still have the ability

▼ A fully planted vivarium suitable for many members of the *Mantella* genus, that could easily hold a breeding colony of up to eight individuals.



to sex specimens using this method, by individually housing your individuals on a temporary basis and waiting for them to call, or by using CCTV cameras which are set to record, as this will allow you to playback and view the captured footage.

Required ratios

With most breeding projects involving amphibians, a rather overlooked factor that can determine their success or failure is the ratio between males and females. Having more males should, of course, increase the chances of a successful breeding dramatically. Nevertheless, it does not mean that a pairing cannot be successful if it involves just a single male, even though the chances will be reduced.

Ideally, you will have a higher likelihood of success with a ratio of four or more males per female, depending of course on the size of the vivarium where they are being housed. Remember that it will not always be a single male who may fertilise spawn; there could possibly be two or even more individuals involved following a single spawning.

Stimulating spawning behaviour

Like most amphibians, mantellas require certain reproductive triggers to encourage them to breed, and these factors are nearly always changes in seasonal conditions/patterns. However, not every species of amphibian responds to the same reproductive triggers before their breeding response kicks in.

When it comes to stimulating your specimens to breed, a lengthy process to cycle the individuals through a winter period for up to two or three months will be required. This not only provides a stimulus that encourages breeding, but also creates the natural climatic variation that they would be exposed to in the wild, as a result of the changing seasons.

Along with lowering the temperature, the amount of food provided and frequency of feeding, the amount of light that the specimens will receive and, of course, lowering the amount of humidity can all be significant factors in obtaining the required outcome.

Photo © Joshua Ralph



WARNING
Do ensure that all individuals are healthy and suited for conditioning, as this will be stressful for the frogs.

Conditions over the winter period

Humidity
The optimum humidity in the mantellas' quarters at this stage should be about 65-75%. This can be maintained by means of a light spray of their quarters every other day. These relatively dry conditions will provide the required triggers to mimic the build-up to the summer period of plentiful precipitation, when conditions will be more favourable for spawning. Spraying and access to water remains essential through this period though, in order to prevent the frogs becoming dehydrated. You can keep a check on the humidity with a hygrometer.

Temperature
The temperature for species such as the golden mantella and the green mantella should ideally be kept at around 15-17°C (59-63°F), which corresponds to that experienced in the wild, but it can rise to approximately 19-20°C (66-68°F) during the winter period.

Feeding
The dietary schedule should be altered completely for this period of breeding preparation, so as to mimic the lack of food that these frogs normally experience during their "rest" period. You should not only reduce the quantity that you offer to them, but you should also scale back on their frequency of feeding too, to just twice a week. (Please heed the warning above though, and do not attempt this if



▲ Above: When spawn is expected, the female golden mantella will swell, indicating the eggs developing in the female's body.

Left: Tiny isopods such as tropical springtails and tropical dwarf woodlice must be available to feed regularly to tiny mantella froglets. © Joshua Ralph.



◀ A green mantella (*Mantella viridis*) tadpole. This species is listed as Endangered on the IUCN Red List of Threatened Species. Captive breeding is vital. © Joshua Ralph.

individuals are in less than top condition). Then, once the time is right, you can slowly bring an end to the winter period and start to build up all the previously lowered environmental stimuli.

Corresponding summer conditions

Humidity
When the time is right, increase the humidity once again and increase it to the optimum figure of approximately 80-90% which can be established by a medium/heavy spray three times daily.

Temperature
With regards to the temperature for species such as the golden mantella and the green mantella, the temperature can be allowed to rise slowly back up to 18-22°C (15-17°F), effectively emphasising the difference, yet again, in climate and season. This should be done gradually though, over several weeks. Never do so immediately because this can create shock and stress for the individuals concerned.

Feeding
The feeding schedule of the frogs should be resumed as normal, with increased amounts of foods and variety being provided. This change should again be made gradually over the course of perhaps a fortnight.



Mantella spawn laid in the vivarium. © Joshua Ralph.

After a few weeks, you will begin to see a physical difference in the appearance of the individuals, especially the females who will start showing signs of becoming gravid, carrying eggs. The spawn in their bodies causes their abdominal area to swell, and in some species, such as the golden mantella, the spawn will become clearly visible through the abdominal skin as white spherical blotches.

Spawn
The spawn is normally deposited in secluded areas of the vivarium, in amongst foliage, underneath clumps of moss or beneath hides, and it is rarely found out in the open. If you find spawn within the first few weeks and the ova of the eggs are white in colour (as pictured), then it is more than likely to be freshly laid.

However, do not remove it straightaway and but leave in place for up to three days before transferring it elsewhere, because of the possibility that a male may not yet have fertilised the spawn. If, after a few days (even up to a week later), the ova then start to turn a brown/tan colour, they have not been fertilised and must be taken out immediately and discarded.

When it is time to remove fertilised spawn, this should be transferred into a previously prepared tadpole rearing enclosure. The most common set-up of this type simply involves placing the spawn onto a clump of moss (if it is not already attached to one in the vivarium). This then has to be placed into dechlorinated water, near the water's edge but making sure the spawn is not touching the water. When it is time for them to hatch, the tadpoles will then leave their egg sacs and fall directly into the water.

Tadpoles
For up to five days, the tadpoles will not

need to be fed at all, as they will absorb their yolk sacs, and more than likely, they will not feed if food was to be provided. The youngsters can be housed together and normally seem to prefer being kept communally, with cannibalism not being a significant threat with the species.

When providing an enclosure for rearing the tadpoles, I use an Exo Terra Faunarium, with a shallow water level of 2.5-7.5cm (1-3in). Plants such as pothos and also clumps of moss can be provided to allow the individuals to hide if they wish too; this also prevents the tadpoles from becoming too stressed.

The most important thing to monitor is the water quality, and ensure the tadpoles are not overcrowded. Tap water can be used, provided that it is treated with a suitable conditioner to remove chlorine, chloramines and heavy metals. or you



▲ All young mantellas appear very dull in colouration compared with adults, generally as a way of blending in with their surroundings in the hope that they can evade predators. © Joshua Ralph.

▼ The skin of golden mantellas becomes more transparent as it is stretched, so you can see the developing eggs within the female's swollen body.

could simply leave it to mature and stand for approximately 48 hours. There are other forms of water that can be used such as rainwater (if suitable), bottled spring water and also reverse osmosis (RO) water. You must check the quality of the rainwater to make sure it is safe, and this can be carried out with water-test kits; it may be polluted.

Water changes
Care must be taken to make sure water quality is maintained at all times, and small partial water changes, plus water monitoring, will need to be carried out at least every other day. Aquatic filters can be used, but the strong currents produced by these devices may actually result in health issues and even fatalities, especially during the first couple of weeks after the tadpoles have hatched. Never use a power filter – only a sponge filter as used in aquariums housing fish fry.

Water temperature
The water temperature must also be controlled and monitored closely, and should remain within the 18-25°C (65-77°F) temperature range. You also need to make sure that it does not fluctuate too much and remains at a constant ideal temperature.

Feeding tadpoles
You can offer such feeding products as used for rearing tropical fish such as TetraMin – Baby, as well as TetraPro Algae, which can be mixed together into a pulp and made into smaller pellets. Other foods can be also used though, such as bloodworm, daphnia and shrimp pellets, to give variety. It is crucial to feed the tadpoles a little and often, so there should be no uneaten food left over polluting the water.





Tadpole growth rate

Regardless of being from the same clutch, the tadpoles will actually develop at various rates. This seems to be a natural survival mechanism, so they will not all leave the water at the same time. At about the 7-8 week mark, the first of the offspring will have grown their front legs and hind legs, and then slowly start to take their first steps out of the water.

Once this stage is reached, they should be moved over to a separate rearing enclosure that has either a very low water depth of less than 2.5cm (1in) or perhaps a container placed on a tilt which has a water section (again, this needs to be correspondingly very shallow) along with a land section. This arrangement then allows the young froglets to choose when the time is right for them finally to leave the water. You must ensure that a lid is now provided over the rearing container (if one was not used before), so as to prevent the young mantellas from escaping.

Rearing froglets

Soon after the tail has been absorbed, the metamorphosis process is complete, and the young frogs will resemble miniature adults. They are still tiny at this stage, measuring only approximately 7-10mm (0.27-0.39in) long, and they will require regular feeding on a daily basis. Suitable foods that can be offered include the following, but initially, it will be necessary to focus on providing the smallest live foods on this list, such as tropical



▲ As in other cases, female green mantellas will swell noticeably when they are carrying spawn. © Joshua Ralph.



When trying to determine a sex of an individual, experienced breeders often look underneath the body to ascertain their gender through the skin.

© Joshua Ralph.

springtails. Build up cultures as necessary in advance.

- Flightless fruitflies (*Drosophila melanogaster*)
- Tropical springtails (*Folsomia candida*)
- Tropical dwarf woodlice (*Trichorina tomentosa*)
- Pea aphids (*Acyrtosiphon pisum*)
- Hatchling black crickets (*Gryllus assimilis*)
- Hatchling banded crickets (*Gryllodes sigillatus*)

In conclusion

Mantellas overall as a group have yet to be established either in public or private collections. This step needs to be achieved without delay, and every mantella keeper can play a part. It would be a great shame to lose such fascinating, intriguing and beautiful amphibians from the world. ❖

Making contacts



If you would like to get in contact with fellow breeders and keepers of mantellas, then please join the new, highly anticipated forum known as the Amphibian Keepers Forum and also the mantella conservation project at <http://mantella-conservation.org/>