

KEEPING AND BREEDING THE MIDWIFE TOAD (*ALYTES OBSTETRICANS*) IN CAPTIVITY

DAVID BILLINGS

Red House Farm, Brakefield Green, Yaxham,
Dereham, Norfolk, NR19 1SB

INTRODUCTION

The Midwife Toad (*Alytes obstetricans*) is a small, inconspicuous, nocturnal member of the family Discoglossidae which despite its unspectacular appearance is well worth keeping for its unusual breeding habits and musical mating call.

Surprisingly this little creature was at the centre of a scandal which caused bitter acrimony within the scientific establishment early this century. The then eminent Austrian biologist Paul Kammerer, a disciple of the Lamarckian principle of the inheritance of acquired characteristics in living organisms, initiated the controversy by claiming to have bred Midwife Toads in water which over successive generations developed nuptial pads. (This species normally mates on land and does not have nuptial pads). These traits were allegedly inherited by their ensuing progeny. The breeding experiment was summarised by Koestler (1971).

"By keeping the toads in an abnormally high temperature (25-30° C) and providing them with a basin of cool water, the animals were made to spend more and more time in the basin and eventually took to copulating in the water, but the eggs which the female ejected in the water swelled up at once and did not stick to the male's legs; they sank to the bottom of the basin where most of them perished. A few of these "water eggs" were saved and water-begotten *alytes* bred from them".

The veracity of these experiments was hotly contested by members of the Neo-Darwinian School of Biologists. The two most vociferous sceptics of Kammerer's claims, Bateson and G.A. Boulenger, attempted the experiment themselves. Both fell at the first hurdle: neither were able to breed their specimens at all in captivity! The scandal was complete when the sole remaining preserved specimen with alleged nuptial pads was exposed as a fake. Kammerer subsequently committed suicide in 1926 although the evidence submitted by Koestler points to him being the victim of the fraud rather than its perpetrator. Whatever else he did, Kammerer certainly achieved phenomenal successes in amphibian breeding, producing Midwife Toads to the seventh generation, a remarkable feat by any standards.

DISTRIBUTION AND HABITAT

The Midwife Toad occurs in south-west Europe from Portugal and Spain to France and Belgium, also in Switzerland and parts of Western Germany as far south as the southern slopes of the Black Forest. It favours hilly country and in the southernmost parts of its range can be found at altitudes of up to 2000 metres. Woods, gardens, dry-stone walls, quarries and rockslides are chosen habitats. It is particularly numerous on the extensive dune systems along the coastlines of northern France and Brittany.

There have been several attempts at establishing Midwife Toad colonies in Britain, most of which have been moderately successful: the first recorded introduction was at a nursery garden in Bedfordshire about the turn of this century. Two more colonies were established in Bedfordshire and from one of these colonies some individuals were transferred to a garden in York in 1933 and further individuals to another garden in Worksop (Nottinghamshire) in 1947. According to Lever (1977) the above colonies were still extant in the late 1970's.

A further colony was rediscovered in Northamptonshire in 1985 comprising survivors from a 1965 introduction (Blackwell, 1985).

CARE IN CAPTIVITY AND ACCOMMODATION

My Midwife Toads are kept outdoors all the year round in a cold-frame measuring 120 cm x 75 cm. The base has a layer of sandy soil to a depth of 30 cm. Several rotting Hawthorn branches obtained from a nearby hedgerow have been half-buried in the soil to provide hiding places for the toads and also for the woodlice, slugs and other invertebrates introduced as prey. There are also pieces of bark and large stones arranged in such a way that the toads can retreat underneath them. In one corner I have provided a small pond of butyl rubber 45 cm x 30 cm x 15 cm deep.

Midwife Toads like plenty of plant cover. Low growing vegetation also helps to keep the environment damp when watered daily. I recommend the following two plants which are excellent for vivarium ground cover:- *Sagina* (Pearlwort) and *Soleirolia* (mind-your-own-business). Pearlwort is a hardy perennial which grows to a maximum height of 4 cm. and forms a pleasing carpet of tiny moss-like foliage. During the early summer months it produces small white flowers. The golden variety, *S. subulata aurea*, is especially attractive. Mind-your-own-business is a half-hardy evergreen perennial which grows no taller than 5-6 cm, quickly forming dense mats of tiny leaves on stems which clamber over the bark and stones, thereby assisting the toads to enter and leave the water. Both the above plants are readily available from garden centres.

During the summer I completely remove the sliding-glass roof of the cold-frame to prevent the interior from overheating; fine wire-mesh netting is then used to cover the top to stop the depredations of cats and birds.

Midwife Toads are very hardy, well able to survive the coldest British winter. They will burrow down into the soil or under the rotting wood in November to reappear the following February. During the mild spells in winter they will emerge from hibernation, particularly after rain.

FEEDING

Hunting for food usually occurs just before dusk and continues until after nightfall. However, Midwife Toads will venture out during the day when it is raining, particularly after a dry spell, feeding on invertebrates which have also been induced out by the rain. Juveniles appear to be more diurnal than adults, at least in captivity, and are often seen abroad during the daylight hours even in dry weather. The adults spend most of the day hiding beneath the bark or under the soil. They resent being disturbed, quickly making for cover when exposed to daylight. Conversely they do not appear unduly concerned at being caught in torchlight at night, readily accepting mealworms or earthworms placed in front of them whilst in the full glare of the torch-beam. Boulenger (1912) relates how he witnessed their entire courtship and subsequent egg-laying procedure in the wild by the light of his electric lantern!

Their method of capturing prey is similar to that of other Discoglossids. Once they have spotted their intended victim they lunge at it, half jumping, half running. Small creatures such as spiders or woodlice are swallowed immediately. Midwife Toads can leap to a surprising height to catch an insect escaping up the side of their vivarium. The forelegs are used to control the struggles of larger prey such as earthworms and to force them into their mouth. A large variety of invertebrates will be taken by Midwife Toads; in addition to those mentioned above, beetles, non-hairy caterpillars, crane-fly larvae (leatherjackets), slugs and crickets are all readily eaten.

BREEDING

The first specimens I obtained were three newly metamorphosed juveniles given to me by Charles Snell in 1982. All three specimens proved to be males. They became sexually mature the following year, commencing their musical call in late March and continuing all Spring and Summer until late August. The note produced is a very pleasant single "Poo" repeated

every 2 or 3 seconds; it sounds rather like a tiny bell (hence the alternate name of Bell-Toad). Calling occurs most frequently from dusk to midnight but will also take place during the daytime in wet or overcast conditions. Although the sound produced is not loud or raucous it is high-pitched and can be heard from a considerable distance away. It is difficult to locate a calling male because the voice is "thrown"; this ventriloquial capability is presumably a defence strategy to confuse potential predators.

During 1985, 1986 and 1987 several BHS members kindly loaned or gave me more Midwife Toads for anticipated breeding but incredibly all the specimens received were males! In 1988 Simon Hartley loaned me his sole adult which arrived on 15th July. I immediately placed it in the cold-frame where nothing unusual happened until two nights later when the males began frenziedly calling about an hour before dusk. I went to investigate and observed all the males sitting in a circle with Simon's specimen in their midst. The largest male, while I watched, began to attempt amplexus with it, having to fight off the other males which were trying to dislodge him. All were in a very excited state. It was apparent by then that the new introduction was indeed a female!

I did not wish to disturb them unduly (disregarding Boulenger's experience) lest I should frighten them out of the courtship mood. However, I could not resist a further peep at them about an hour later when I saw the largest male in amplexus with the female. The unsuccessful males had all scattered and ceased calling. I noticed that amplexus was axillary and that the pair were some distance away from the pond during the procedure.

The following morning I found the male under a piece of bark with a string of pearly-white, moist, glistening eggs wound around his rear legs. There were about 15 or 16 eggs each approximately 3mm in diameter. From the nine spawnings I have obtained with this species, I have observed the average number of eggs per batch to be 22, but actual numbers have varied from 14 to 32.

Snell (1983) stated that after his Midwife Toads spawned the unsuccessful males became restless, wandering about their vivarium and attempting to climb up the sides. So far I have not observed such behaviour in my own males.

After a few days the eggs became a dirty off-white while gradually appearing leathery in texture.

TABLE SHOWING MIDWIFE TOAD SPAWNINGS 1988 AND 1990

Egg String First Observed	Number of Days Carried by Male	Tadpoles First Seen in Pond	Toadlets Observed Leaving the Water
1988			
17th July	37	23rd August	May 1989
10th August	29	8th September	May-June 1989
24th August	53	16th October	June 1989
1990			
14th May	29	12th June	July-August
3rd June	20	23rd June	August
7th July	38	14th August	Overwintering as tadpoles
*30th July	25	24th August	" " "
5th August	23	28th August	" " "
*24th August	36	29th September	" " "

* Produced by a second female which became sexually mature in July 1990. All other 1990 spawnings from Terry Thatcher's on-loan female.

They eventually became a rather murky brown colour; within 14 days the larvae were visible inside the eggs; their eyes could be clearly discerned. While the male was carrying the eggs he occasionally returned to the pond to moisten them in the water.

Male Midwife Toads know instinctively how to maintain optimum conditions for the eggs with regard to moisture and humidity. If they are taken away from the male they will almost certainly perish in a very short time.

In a normal batch of eggs there appear to be very few infertile ones or any that fail to develop for other reasons. There were never more than 3 per batch of my own that did not develop.

After a fairly variable period of time (see Table) the eggs are released in the water where the tadpoles break out to complete their development. By retrieving the discarded remainders of the eggs I was able to count exactly how many the male had been carrying and which (if any) had not produced larvae. The average overall length of the newly released tadpoles was 15-16 mm. An unusual feature of Midwife tadpoles is the position of the spiracle; on the ventral side towards the front of the body.

CARE OF THE TADPOLES AND JUVENILE TOADS

I removed the tadpoles to an aquarium tank where they were fed on goldfish-flakes and freeze-dried tubifex worms. By late October I had in excess of 70 tadpoles from three separate spawnings (as shown in the accompanying table). The largest individuals from the first spawning had reached an average overall length of 40 mm. I transferred their aquarium to an unheated spare room indoors during November where they spent the winter months.

They fed and grew well throughout the Winter but development was arrested when their rear legs began to "bud". Average length in April 1989 was 55 mm; when they were put out in a large shallow pond (180 cm x 95 cm x 6 cm) in a greenhouse to complete their development. They were 65 mm in overall length with a body length of 22 mm before their tails started absorbing. The youngsters averaged 20 mm when metamorphosing, proportionately very large considering the diminutive size of the adults. This meant they were quite easy to feed, accepting small mealworms, half-grown crickets and invertebrates collected by grass-sweeping with a bucket and net.

Up to this time I had not lost a single specimen: all had metamorphosed without mishap, but then disaster struck. One morning about two weeks after they had all metamorphosed (mid June 1989) I discovered several corpses in the pond. Assuming they had entered the water and being unable to get out had subsequently drowned, I searched the greenhouse for the remaining toadlets for transfer to a pond-free vivarium. To my horror I discovered several more corpses amongst the undergrowth and under the pieces of bark with which the floor of the greenhouse was decorated. However, many were still alive and well, these were all removed to the above-mentioned vivarium or sent out to various B.H.S. members. Of those transferred to the vivarium all except 2 were dead within another month. In all cases death was swift and symptomless, one day fit and well, the next day dead. Most were still in a sitting position when found dead, with their front legs still appearing to be taking their weight! Almost all of the toadlets I sent to other people suffered a similar fate too.

As if this were not enough of a catastrophe Simon Hartley's on-loan female failed to emerge from hibernation in 1989. Fortunately I had been given a few larvae in May 1988, which all metamorphosed successfully during August and September that same year, hibernating without mishap in a vivarium kept in an unheated outbuilding. These toadlets grew well but did not reach sexual maturity during 1989 so no breeding occurred, as no other female could be procured.

Terry Thatcher came to the rescue in 1990 when he informed me he had a Midwife Toad of indeterminate sex in his possession. He kindly sent me this specimen which was duly received in late March and introduced to my males. I was in luck again as it turned out to be a

female but actual spawning did not occur until 14th May, when the first string of eggs was observed.

As soon as the tadpoles were released in the pond they were removed to the same greenhouse pond as in 1988 to complete their development. Toadlets from this first spawning were metamorphosing by late July but were on average 12-15 mm long, somewhat smaller than their 1988 predecessors. I often caught sight of them sitting by the pondside or among the terrestrial vegetation during the daytime and when approached they would leap into the water, diving to the bottom in true Edible Frog style!

These 1990 youngsters have so far remained healthy and disease free. The largest had reached about 22 mm by late October when they commenced hibernation. I have kept a dozen for myself with the remainder given to various B.H.S. members.

The tadpoles from the last four spawnings will have to be overwintered indoors; at the time of writing this article (December 1990) I have lost just one tadpole which was found dead in early December. Those remaining are of varying sizes, the largest 50 mm and the smallest 25 mm in overall length.

CONCLUSION

Midwife Toads are undemanding, hardy little creatures which thrive in captivity, breeding regularly if conditions are favourable. Their life-history is unique among European Anurans as no others engage in parental care of their offspring. Because of this the larvae receive a "Head Start" which ensures a high survival rate.

In captivity they will happily co-exist with other small amphibians such as *Bombina variegata* and *B. bombina*. Mine share their enclosure with *Lacerta vivipara* and *Anguis fragilis* in addition to the above two species.

I am hopeful that many more captive colonies can be established in Britain.

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