Tails of Gila Monsters and Beaded Lizards

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INTRODUCTION

The beaded lizard *(Heloderma horridum)* has never reproduced successfully in captivity! The Gila Monster *(Heloderma suspectum)* has only been successfully bred in captivity once, at the Oklahoma City Zoo. Now that I have your attention, let me explain why the above are in fact true statements. One of the stated goals of captive propagation of reptiles and amphibians is the establishment of captive breeding colonies so that we will no longer have to remove specimens from the wild, or that species which are extinct in the wild may be successfully maintained and propagated in captivity. A term used by the U.S. Fish and Wildlife Services is "self-sustaining populations." With the Gila monsters and beaded lizards we have so far failed in this task. The Oklahoma City Zoo has made a start with some production of second generation Gilas, but not nearly enough to establish as self-sustaining colony. I offer you a definition of successful reproduction as establishing a self-sustaining colony or colonies of a species in captivity. A supply of animals from the wild is still required to maintain these two species in captivity, therefore I conclude that my lead statements are sadly true.

According to Slavens (1990), there are 127 beaded lizards in 43 collections,

however there was only one reported breeding (mine). Slavens also lists 357 Gila monsters in 82 collections and only 9 (mine included) reported breeding the species that previous year (1989). Because of the laws around the country, most privately held individuals of these venomous species are not reported. It is a shame how well-meaning, but inappropriate laws on most government levels prohibit most of the private sector from contributing much needed knowledge regarding these animals. On the other hand, there are too many long-term captive animals listed for sale on reptile dealer lists for them to all have been legally acquired before they were protected by the various states where they occur. Of course the CITES Appendix II listing regulates the Mexico imports. Many wild-caught animals are also sold as captive-hatched. I know of one instance where several Gilas were wild-caught, smuggled out of Arizona, and offered as captive-hatched animals. One animals had been found on the road with one damaged eye, obviously hit by an auto. The smuggler did not even charge the recipient for that one because the extent of injury was not known and the animal may die. That animal survived and was later sold as captive hatched. The bad eye was explained away as a result of someone accidentally stepping on the animal while it was loose on the floor!! I guess if you want to believe, you will, don't let facts confuse you. Gila monsters are still quite common in parts of their range. Arizona has taken the lead in trying to get some of these animals into proper hands. They have and urban salvage program where Gilas found in populated areas or displaced by development are distributed to those lucky enough, or attached well enough, to qualify as a recipient. Ask the Arizona Game and Fish Department if interested.

My personal involvement with the *Heloderma* dates back over 20 years when I was dealing in reptiles commercially and they were one of the commodities I bought and sold. When I heard that California planned to protect Gilas, I selected a few to use for my school lectures, obtained legal permits for them, and sold the rest. I had no interest in breeding them at that time. My current colony of beaded lizards were acquired in 1987 and

1988.

ENCLOSURES

Heloderma are easy to keep. My adults are in cages with a floor area measuring 1.5 x 3 ft, or 3 x 3 ft. The enclosures are either 1.5 or 2 ft high. Over the years I have tried almost every form of substrate, including sand, gravel, newspaper, ground corn cobs, indoor-outdoor carpet, wood shavings, and wood chips. They all work. *Heloderma* are messy animals, so keeping them dry and clean are the major objectives. You want enough substrate material to absorb the moisture of the feces until you can clean, but not so much that you cannot find the feces or any uneaten food item. I provide water bowls large enough to hold the cage occupants without over flowing. I always keep a water bowl in the cage with the adults, but except for this, I keep the cages as dry as possible. I have observed lizards soaking even at 10°C in the winter. I also provide a hide box, usually cardboard boxes which I discard when they are badly soiled.

The adult cages are on two levels, which make up the outer walls of my snake room in the garage of my house. The backs of these cages are glass and the doors open inside the room. The doors and tops are 1/8 inch mesh. Above the upper level are 8 ft fluorescent lights, and between the levels are 10 regular light sockets, spaced over 18 ft of cages to illuminate the lower level. These lower lights are wired into a thermostat and provide heat for the room, which also houses part of my colubrid snake colony. The temperature of the room is set for about 29°C, but the *Heloderma* can move against the outer glass wall to be cooler or warmer depending on the unregulated garage temperatures. When the lights are on for heat, animals on the upper level can lay on the warm spot above the light. There is no set light cycle, in fact almost the opposite with the lights tending to be on at night when it is cool, and off during the day. The cycle of the fluorescent lights is random, sometimes remaining off or on for days. There are windows in the garage (eastern exposure) so the lizards are

exposed to a natural light cycle. some morning sun hits the corner cages, and the lizards do sometimes bask where it hits. The sunlight, however, has passed through 2 panes of glass, so I do not believe there is any benefit except for a warm spot.

SEX DETERMINATION

Determining the sex of the animals is a major problem. I have tried probing, examining the anal scale differences, and observing behavioral differences. The only animals I was sure of were the ones that laid eggs. There are some subtle differences between the sexes with regard to head size and body configuration, but observing a large group together without any captive fattened individuals would increase the odds of determining the sexes correctly. Older males tend to have larger wider heads and narrower bodies than females. I recently became aware of the technique for sexing using the hypodermic injection of fluids into the lizard's tail, but was afraid to try it for fear of damaging my animals. In 1989, during the Northern California herpetological society conference, I had the opportunity to see pictures of how it was done, and talk to a veterinarian who had done it. The procedure was simple, but the fear of damaging valuable animals was still there. Shortly after this, I discussed the technique with my local veterinarian and friend, Dr. David Judy. He was familiar with the procedure and offered to help determine the sex of my specimens. For some reason he did not want 18-20 poisonous lizards in his office, so he came to my house. The technique is so simple it defies description (see Stewart, 1989 for details). Finally, after 18 years I know which ones are the girls! All but one of my original group were male!! Now I know why there were not more eggs.

The behavior of these lizards needs a lot of research before its meaning can be interpreted. I have had what turned out to be males behave aggressively (do not want to assume it was combat) toward each other with and without females present, females towards males, males towards

females, females with each other, and in one case a young female looked like she was trying to copulate with her mother! Remember, for 18 years I did not know which animals were what sex, so I tried to figure it out by observing their behavior. Passive animals would sometimes become extremely aggressive when exposed to direct sunlight, but the significance of this is unknown. When housing several males together, it appears that some sort of dominance hierarchy was established. Even when no aggression is observed, one individual would sometimes refuse to eat, regurgitate meals, or just loose weight and become listless. Removing this individual to an isolated cage usually corrected the problem and the animal would regain its vigor and weight. On both instances where I observed this, excess captive hatched males were put with older wild caught males and became the subordinates, loosing weight and vigor. After the subordinate animal was isolated and had resumed feeding, I sometimes had to give a small dose of Flagyl (100mg/kg) to stop regurgitation. I am unsure of what caused the onset of the regurgitation: Flagellate parasites from the wild caught males could have infected the intolerant captive bred males or the stress of constant contract with a dominant animal could have lowered the subordinate's immune system. Another mystery that needs research.

FEEDING

Wild caught *Heloderma* frequently will refuse to eat rodents regularly, or at all. Sometimes dipping a mouse in egg will entice feeding. Also a small rat may be preferred to a mouse. I had to force feed mice to one female from 1970 until 1989. She laid eggs regularly from 1974 until 1989 (probably a record of some type). The captive hatched babies usually start on pinkie mice, but sometimes a drop of egg on the head of the pinkie, or the split head pinkie technique is required for one or two feedings before they will switch to normal mice. All my captive hatched animals will take rodents from tongs. Captive hatched animals seem to be more aggressive than most of the wild caught *Heloderma*.

Heloderma can reach adult size in two or three years. I do not know what age they need to be for successful breeding because I have never hatched an egg from my captive hatched females, although some have laid eggs their third year.

REPRODUCTION

I turn the heat off November 1 and hibernate the room until March 1. My Gila colony had been producing eggs fairly regularly since 1974 (I did have a few from wild caught gravid females prior to that). I believe the cooling period is required to stimulate reproduction, because the years I kept the room warm for the boas and pythons were unproductive for the Gilas. Exposing the *Heloderma* to a winter brumation period like that used for colubrid snakes will increase your probability for reproductive success.

I mix the animals, introducing them into different cages from time to time to induce mating, but I have also observed many copulations between long term cage mates. Neitman (1986) reports 10 copulations between April 18 and May 14 with the resulting eggs laid from May 31 through June. Except for one clutch of 8 eggs laid on July 3, my data correlates well with his. My beaded lizards copulated May 21, with eggs following on June 13 (one bad), July 4 (1), July 10 (7), and July 11 (1). The two eggs that hatched were from the July 10 group and they hatched on January 29 of the following year. The same *Heloderma h. horridum* mated with a female *H. h. alvarezi* on July 28 with bad eggs following from October 16-31. The female *alvarezi* seemed to be out of sync with the others. It is possible that even after almost 20 years in captivity, she still had a different biological rhythm than the others because of her origin was further south. Unfortunately, she died that following winter, so I was never able to come to a conclusion. Taking sperm samples from *Heloderma* is much more hazardous than from colubrid snakes. Interestingly, *Heloderma* sperm looks more like a fat comma with a tail, instead of like the slimmer colubrid sperm. The movement of the sperm is not a smooth either.

I acquired a small colony of beaded lizards (1 male, 2 females) in late 1987. These animals had originally been purchased from Western Zoological (Monrovia, CA) in 1970. I estimated the age of the group at 20 years and was concerned about breeding older, sexually inactive animals. They were in excellent condition, so I hibernated them right away and brought them out in March of 1988. One female bred in May and died in late June. She was starting to look larger, but she died while I was away so I was unable to confirm the presence of eggs. The second female laid eggs in 1988 (2 hatched in 1989), again in 1989 (none hatched), and again in 1990 (3 hatched in 1991). In 1990, she laid the eggs on approximately July 24. Sadly, I was away again and can't be sure of the exact date. I had given up on her laying eggs and had taken her out of the egg laying cage and put her back in her regular cage before I left for a week of work. When I returned, I noticed a large 6-8 inch pile of wood shavings in the center of the cage. She advanced, hissed, and snapped at me as I investigated the pile (could be nest defense, but she is nasty anyway so I cannot be sure). When I got her away from the pile I found 9 eggs buried in the shavings. They had gone unnoticed in my absence and were partly desiccated. They all look as if they would have a chance, so I put them into my incubator, but only 3 survived to hatch between February 28 and March 10 in 1991.

Over the years I have had *Heloderma* eggs laid on newspaper, in a collecting bag, in water bowls, etc. If I was present during laying, or soon after, many of these eggs were hatched. However, I have lost many to desiccation, drowning, and being eaten by the adult animals in the cage. Determining when a female is ready to lay eggs is difficult. Usually a puffiness around the rear legs can be observed, but exactly when egg laying should occur is still a mystery. When I suspect the female is close to laying, I put her in a 15 gallon glass aquarium that is 75° full of damp sphagnum moss. Usually she will burrow down, lay her eggs, then surface without eating the eggs. The eggs stay damp in the moss. I check for eggs by lifting the aquarium up and looking through the glass bottom. Other nest I have provide have not worked as well because the female usually

digs all the material out of the container and scatters it about.

EGG INCUBATION

I put two to four eggs in a one pound plastic butter tub with about one inch of vermiculite under them. I push small indentations in the vermiculite to keep the eggs from rolling around. I add water to the vermiculite until the surface looks damp. I then place this tub inside a plastic sweater box with ventilation holes in all sides and one inch of water in it to float the egg container. Each sweater box will hold six or more tubs of eggs. I then stack these boxes inside my incubator (capacity 16 boxes), and set the temperature at 27.5°C. Once every second week I check the eggs, removing any obviously bad ones and adding water where necessary. This incubator is in the closet of my bedroom snake room, so the background temperatures are usually between 24° and 32°C. By November, when I begin to cool the room for the hibernation period, most of the colubrid eggs have hatched, and any Gila eggs are two or three weeks away. The beaded lizard eggs, however, stay in the incubator when the background temperatures drop down to between 10° and 15°C. The heat source inside the incubator cannot compensate for this external drop, so the beaded lizard eggs have dropped to 21°C on occasion. This gradual fluctuation does not seem to effect the eggs as those that are still good by November usually hatch. The incubator has accomplished the three important factors for hatching *Heloderma* eggs; maintaining high humidity (water evaporating all around the egg tubs) without having the eggs too wet, good ventilation (besides air circulation inside the incubator, each time I open it the air is changed), and relatively stable temperatures (the water holds temperature, and any changes are very gradual). I could increase the intensity of the heat source for the eggs that over winter, but the cooler temperatures to not seem to be a problem so I will not try to fix it.

Table 1 summarizes the hatch weight, sex, and incubation period for the eggs and subsequent offspring produced by my colony. The data I have

obtained does not vary significantly from that in previous publications. For further reading on *Heloderma,* I suggest the excellent paper on Gilas written by Howard Lawler and Warren Wintin in the 1987 NCHS Conference Proceedings. This paper has an extensive bibliography also.

JUVENILES

The baby lizards are individually housed in plastic shoe boxes, and are transferred into plastic sweater boxes as they grow. I keep the babies on newspaper and provide a small (not large enough so soak in) water bowl. When the bowl is provided they usually get the cage too wet, so one week they get water and the next week it is removed. There is a heat source under the back end of the shoe boxes so the lizard can thermoregulator. Cleaning is simple.

Table 1. incubation dates, sex, and hatch weights for *Heloderma* offspring.

Gila Monsters			
Oviposition Date	**Hatch Date**	**Sex**	**Hatch Weight (grams)**
June 19	November 5	o	35.1
June 19	November 13	o	33.5
June 19	November 8	n	34.3
June 30	November 14	n	28.6
June 24	November 18	n	36.4
July 3	October 25	n	16.0 (Still alive)
June 30	November 17	o	27.1
June 30	November 14	n	26.7
June 24	November 17	?	38.4
June 24	November 22	n	13.7 (Died at 3 months)
Beaded Lizards			

July 10	January 28	n	47.0
July 10	January 31	0	46.8
July 26	February 28	0	38.0
July 26	March 3	0	36.6
July 26	March 10	0	41.5

I offer a mouse on tongs, the lizard attaches itself to the mouse and hangs on while I lift it into a waiting bucket. I clean the cage while the lizard eats the mouse. Then I dump the lizard back into its clean cage. Juveniles and adults often will immediately defecate on the clean substrate.

CONCLUSION

As more of my young females grow to sexual maturity, I expect to produce a generation of captive reproduced animals. My entire 20+ years of experience with the *Heloderma* lizards has been one long learning experience. You can read volumes of material about raising these lizards, but this has little value since no one really knows the answers to the questions. We do not even know all the questions yet. All that I am sure I have learned is that we really don't know much about these lizards. Hopefully someone can use this material to enhance their ability to properly care for and reproduce these animals. That is not science, that is HERPETOCULTURE!!

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