

## The Art of Armadillo Lizards (*Cordylus cataphractus*): Fifteen Years of Captive Observations

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This article is a look back at my personal experiences over the past fifteen years during which I have been keeping and breeding armadillo lizards, *Cordylus cataphractus*. For you scientific types, I'm afraid this will all be hearsay and anecdotal. Written reports on these little beasts are few and far between. As far as the general population is concerned, many people might not even know that armadillo lizards exist. Even in this day and age of Internet knowledge, no one in America seems to have written any definitive article on the armadillo lizard. After years of waiting for someone else to do it, I have finally decided to do it myself. Here within these pages should be everything you ever wanted to know about *Cordylus cataphractus*, as my life and theirs have been forever intertwined into one. Let's start back at the beginning, shall we?

For me, the odyssey began back in 1985, in the pages of a small book called *Lizards in Captivity* by Richard H. Wynne, under the chapter for Cordylidae. There on pages 104–105 was a short paragraph describing the armadillo lizard and its basic needs in captivity. Of course there were no photographs, just the printed word, leaving the rest to one's imagination.

In August 1985, the Chicago Herpetological Society, which I had just joined that June, would have a speaker who would shed some light on this subject. This was John Visser, a South African wildlife biologist, whose topic was the herpetology of South Africa. His slides at this meeting gave me my first glimpse of an armadillo lizard. To me they looked almost wooden in appearance, their scales hand-carved out of some brown balsa wood, with a triangular shaped head, heavily armored from head to toe. After seeing what these clumsy, comical fellows looked like, I knew I had to obtain a few for my collection.

At this point in the herpetocultural timeline, we had no monthly reptile magazines to look through for animal ads, no monthly reptile shows to buy animals from, and the Internet and personal computers were still in their infancy. We had animal lists, which were mailed out by various dealers throughout the U.S. (less than half a dozen) which, from time to time, might have an animal you might be interested in. One such list from California did offer the aforementioned armadillo lizards for sale. After some hesitance, I called and purchased two. I was keeping primarily geckos at the time, so these were a departure for me into uncharted territory. It was a decision that I have never regretted.

Armadillo lizards occur naturally in South Africa. They are diurnal creatures, reaching an adult size of somewhere between seven to nine inches in length. They live in social groups amongst rocky outcrops, wedging themselves between the cracks and crevices of the rocks, much like a North American chuckwalla does for protection from predators and the elements. These lizards have a long life span—twenty-five years or more. The surrounding temperatures can get very hot in the summer and cold in the winter, when armadillo lizards will naturally

hibernate. They can be a light brown to dark brown in coloration and are sometimes referred to with the common name of golden armadillo lizard. The underbelly is yellow with a blackish pattern, especially under the chin. They are one of comparatively few live-bearing lizards—they do not lay eggs like most other lizard species. They are insect eaters and have an interesting defense, in that if frightened, they will grab their tail in their mouth and roll into a ball (Figure 1). This behavior is remarkably like that of the mammalian armadillo, which explains the common English name for these lizards. And just as it does for the mammal, this defensive posture enables the lizard to protect its soft underbelly from predators, exposing only its armored back.

Such was the basic information I had to go on before obtaining my two. When they did arrive, they looked identical in size and shape and I found out that sexing them was somewhat of a mystery.

I housed them in a 30-gallon aquarium with a water dish, hot rock and flat pieces of shale with small rocks glued to the bottom, like little legs, to raise the rock up about one inch from



Figure 1. Armadillo lizards showing typical defense postures. Top photograph by Carlos Sanchez; bottom photograph by the author.

the floor for them to hide under. I used Astroturf on the floor with more pieces of flat shale, which they would utilize for waste elimination. The two animals were fed crickets and given a reptile multi-vitamin powder. During this time I had yet to start using any fluorescent-type lighting, for fear of burning down the house, so they had only natural light from the windows. I kept them like this for over a year with no ill effects. I tried to find a few more to buy after that, but even then they were scarce. South Africa, it seems, was not commercially exporting reptiles into the pet trade anymore; so except for shipments rerouted to be exported from a different country, you didn't see a lot of these animals offered for sale. It wasn't until 1987 that I located three more from a place in Minnesota. When these animals arrived, I placed them in the 30-gallon aquarium with my original two from 1985. After a few days of observation, I learned that my two original lizards were males, something I had suspected all along, since they were identical in body shape and size.

It seems the introduction of the three new lizards caused the two males not to be best buddies anymore and to now look upon each other as rivals. I would notice that one would chase the other inside the aquarium, while the three new ones got along with each other. The new armadillo lizards were also smaller in body weight and had narrower triangular heads than the two larger males. Could it be that these three were all females? Well, that was exactly the situation, as I later found out. I separated the two males, leaving one in the 30-gallon tank with one of the smaller ones and put the other male into a 50-gallon tank with the remaining two. At this time I started using fluorescent lighting, which I would manually turn on and off daily. No further aggression was noted between any of the armadillo lizards. Since no dealers had any *Cordylus cataphractus* to sell, it was at this point that I started placing ads in various regional herpetological society monthly newsletters requesting them. This is how I started obtaining my main collection.

As people responded to my ads, I would buy them one or two at a time, never knowing what sex I was getting, because



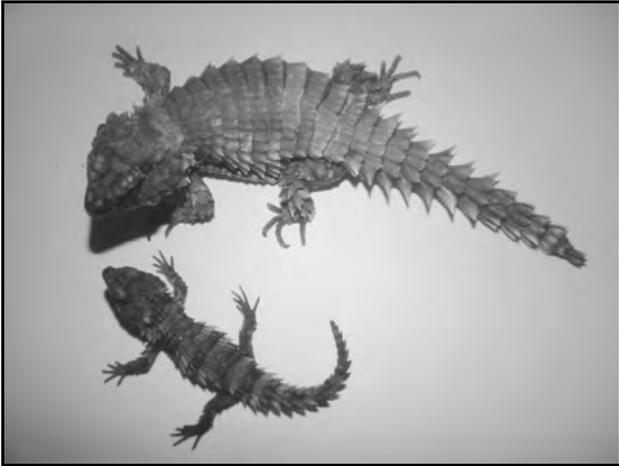
**Figure 2.** The armadillo lizard on the left is a male; the other two are females. Note the larger triangular head of the male in comparison to both female heads. This is a reliable way to sex these lizards. Photograph by Carlos Sanchez.

no one could sex these lizards with any certainty. I'm sure this was part of the reason people were willing to part with them; breeding lizards commercially was just beginning to take off, and people didn't want to deal with an animal they couldn't breed. After seeing a few more armadillo lizards, I determined that females do have smaller, less markedly triangular heads than their male counterparts (Figure 2). Both sexes, however, had femoral pores on the hind legs, thereby confusing a lot of folks who thought they had males because of this feature. They both produce a waxy secretion although it's more prominent in males (Figure 3). I was never one to probe or pop a lizard's hemipenes to determine the sex, as I have heard of too many cases where the final outcome was incorrect. I would then house these animals in groups of one male and two or three females, to the best of my sexing abilities. Extra males would be housed alone, although I have housed a few males together without any ill effect. It all depends on the personality of an individual lizard.

Breeding armadillo lizards, I'd been told, was a daunting task—difficult at best. I decided not to handle them excessively and to keep them as wild as possible. My enclosures were in the living room/dining room area of my house and not in a separate animal room. Soon we tolerated each other's movements. Mine, as I moved through the room so as not to startle them, and theirs, as they made intermittent scuffles that I had to investigate. It took a few months until they felt secure enough to come out from under the rocks to bask under the fluorescent lights. Even then if I walked briskly past, they would all scurry for cover and hide—a domino effect from one cage to the next. It was in 1989 that I experienced my first live birth. It was December and I remember looking into the aquarium and seeing a smaller version of a head peeking out from under a rock. I did not know that the female was even gravid at the time, so it was a complete surprise! To this day after achieving dozens of live births, I still get an adrenaline rush when I look into an enclosure and see a smaller version of an adult basking or looking out from under a rock. The young are identical to the adults, except smaller in size. They are quite large when first born; total length up to 2.5 inches (Figure 4). Although most



**Figure 3.** Both male and female armadillo lizards have femoral pores on the hind legs. These are roughly equal between the sexes in size and number. The male is on the left, female on the right. Photograph by Carlos Sanchez.



**Figure 4.** Note an adult female armadillo lizard (7 inches total length) in comparison with a day-old baby. These babies are rather large, compared to other lizards, when first born. Photograph by the author.

literature states it can be one or two young, I have never had a female give birth to more than one lizard at a time. And the scientific literature has recently caught up to this fact (see Flemming and Mouton, 2002).

Only once have I actually been able to witness this occurrence of live birth. I was able to photograph the process, but not very well, as it was over in a matter of minutes. I had eight photos left on my roll of film and just enough time to focus and shoot, so of course the photos were over-exposed, but at least I caught the birthing process on film, perhaps for the first time ever for this species. The female came out from under her rocky hiding place into an open area of the enclosure. I knew she was gravid, as she was somewhat swollen on her sides. She just lay there as her sides undulated a bit. She then raised her tail and hind portion and proceeded to give birth. During this time, the lizard would open her mouth as if to utter a silent scream (Figure 5). The baby came out in a thinly membraned embryonic sac. The baby's body was folded in half inside of this, tip of nose to tip of tail, much like a



**Figure 5.** Female *Cordylus cataphractus* giving birth. The baby is folded in half within an embryonic sac. The whole process took less than two minutes. Photograph by the author.



**Figure 6.** An adult pair of armadillo lizards in mating position during the breeding season. Copulation can take up to a few minutes at most. Photograph by the author.

lizard positioned in an egg would be, except flatter. It then broke the sac and stretched its jaws wide open to get its first breath. The female, having finished the birthing process, scurried off under a rock, and the baby did the same. I was very surprised that the lizard came out into the open to give birth, rather than do so under the cover of a hiding area.

Once a female has given birth, her job is over and the juvenile is on its own. Since 1989, I've produced as few as two to as many as six babies every year. Not every female lizard will always breed from year to year. I've had certain groups stop breeding for as long as a five-year period, then start producing young again after this absence. Breeding season for my captive lizards usually runs from the end of January through March. This is the time that I have noticed the most activity between the sexes, with males actively pursuing females in their attempt to copulate (Figure 6). I have determined that gestation for these lizards must be at least four to six months, since most young are born between September through December.

I have read that these lizards can be cannibalistic towards the young, but I have never seen this to be the case in captivity. There have been many instances where I've found the babies and adults alike, basking on top of one another in harmony. During feeding time when crickets are tossed into the cage, an unforeseen baby lizard will dart out from under a rock, past an adult lizard, to chase down a food item almost as big as he is, in an effort to subdue his prey. Once I find the captive-born baby lizards, I place them in a separate enclosure. Sometimes a baby lizard will not readily eat on its own. If small crickets are ignored, I've found that waxworms will usually be eaten without problems. The advantage of feeding baby armadillo lizards in a group is that when food is offered, a feeding response kicks in and when one lizard begins feeding the others usually will follow suit. Care should be taken to insure that all the lizards are equally fed, so that one individual does not eat most of the food, leaving the others still hungry. I've found that one or two feedings per week is sufficient to ensure good health for adults, perhaps more for the baby lizards. I also

have noticed that these lizards are scavengers, searching the ground for items to consume. This was discovered when I placed a small rubber piece under a rock to help keep it level. One day it disappeared, only to turn up a few days later, partially digested, on the floor of the cage. Some of the lizards were nibbling at the Astroturf also, leading me to believe that they might eat plant material. I experimented with throwing small pieces of kale into the enclosures. The result was that some of the lizards did indeed eat the plant matter. Some, of course, choose to ignore the kale and stick to their insectivorous diet. So some armadillo lizards will accept plants as well as insects for their dietary needs, although I would never recommend a diet of just vegetables for these lizards. Armadillo lizards will also accept small pinkie mice, but I worry that an exclusive diet of these would result in too much dietary protein for the animal. One interesting behavior I have witnessed on more than one occasion, is that of armadillo lizards gnawing on large rocks. They would just try to take a bite out of one, attempting this behavior for a minute or so. Perhaps they are trying to consume rock material to aid in digestion, as some lizards are apt to do. Maybe they are trying to consume rocks for mineral supplement needs, or as part of their daily scavenging routine. I have never witnessed this behavior with any other type of lizard I have kept in captivity.

Armadillo lizards are extremely social animals, living in large groups in the wild. For this reason I raise up each year's babies in a family group, so to speak. Males seem to become sexually active around the third year of maturity. Since I usually house all previous offspring together from each year, they grow up and get along without incidents, usually until this third year. This is when you will notice if more than one male is present in a group, as one will become the dominant alpha-male. Although they live in social groups in the wild, introducing a new lizard into an existing group in captivity may have negative consequences. If a few days after the introduction an animal is constantly chased and harassed, it is best to remove this animal; otherwise it will be bullied to death (Figure 7). I've had instances where I tried to introduce a new female to an existing pair of armadillo lizards, only to have the



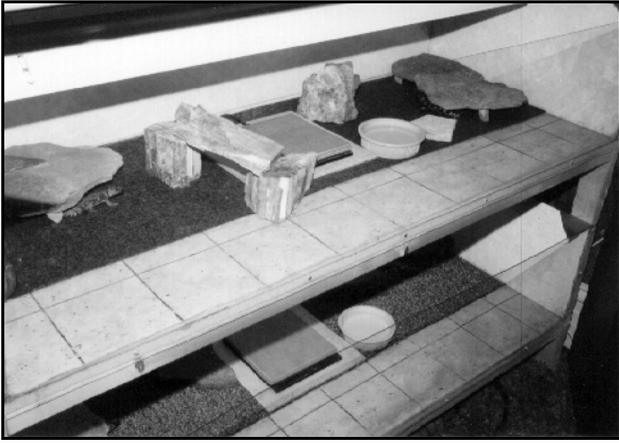
**Figure 7.** An adult male armadillo lizard showing aggression towards another male. Note the open mouth ready to bite, as the other male arches his body in a defensive position. Photograph by the author.

male constantly pick on the new female. I then tried a different pair only to find that, this time the existing female was the aggressor towards the new female and not the existing male.

Another example shows that males aren't the only ones who can display aggressive behavior towards a newly introduced animal. I had a group of three females whose male had died, so I wanted to introduce a new male. In the meantime, one of these females had claimed the alpha spot and she would chase the existing females around. The day I introduced a new male, she came charging out to confront him, but he held his ground against her and eventually she went back to submissive from dominant behavior.

Armadillo lizards display the typical lizard communicating skills of head-bobbing, tail-wagging and tongue-flicking, when confronting cagemates or another unfamiliar armadillo lizard. These lizards have very powerful jaws, which can be very hard to open. When they do fight, they can clamp down on legs and toes, biting them off and definitely drawing blood. They can bite down on the sides of the body and start rolling or twisting their opponent's torso. This can cause internal damage to the animal. Although they do not readily bite in captivity, they will sometimes open their mouths to try to bite their tail. I did not witness this behavior until about a year after I had obtained my first two armadillo lizards. I had them both at an educational show, when all of a sudden one just curled up into a ball! Once they do this it is almost impossible to make them let go, until they are good and ready. I have seen them hold this position for almost up to an hour. When it happened the first time, I removed the lizard and placed him into a bag to make him feel secure until he finally let go of his tail. Because of this behavior, armadillo lizards are more reluctant than many other lizard species to dispense with their tails. This is one of the features that drew me to these lizards initially, as most of the geckos I had been keeping previously would drop their tails quite readily. If a portion of an armadillo lizard's tail is lost, the regeneration will occur in segments, much like the original tail. I have individuals who almost never bite their tails, and others who will perform this behavior on cue, should I desire to demonstrate this ability to someone. This is an instinctual behavior, but you certainly do not want to stress out an animal by forcing him to perform this defense over and over.

In the course of keeping armadillo lizards I have gone through various cage incarnations, from aquariums to hand constructed units, which resemble bookcases. Since these lizards are rather clumsy at climbing, my enclosures are all open at the top. The three sides are 12 inches tall laminate board and the front is Plexiglas (Figure 8). As long as no large rocks are placed along the edges, there is no possibility of escapes. Armadillo lizards do like to climb rocks, on top of which they will bask under the lights. My units are five feet long by two feet wide. I use a four-foot fluorescent lighting fixture for each enclosure with one full-spectrum bulb and one blacklight bulb. These fixtures hang twelve inches from the floor of the cage. After years of using these bulbs, I've wondered as to the validity of such lights, since I don't replace them every year. Because the UVB output has surely declined with the aging of the bulbs, my theory is that these types of



**Figure 8.** A typical cage enclosure, five feet long by two feet wide, with a Plexiglas front. Photograph by the author.

lights are more beneficial in triggering a breeding response than with aiding calcium absorption. As long as a vitamin-mineral powder is used and the food items are fed a high calcium diet, I believe that full-spectrum lighting over regular fluorescent lighting does not make a big difference. I have never used a heat lamp since in the summer months it would get too hot, and in the winter months, I prefer to keep these lizards cool, to mimic their natural seasonal change. I utilize a heating pad in each cage, which is turned off during the spring and summer months. I also shorten the timers on the lighting cycle to mimic the natural lighting outside.

I like to keep my cage furnishings simple for cleaning purposes, yet esthetically pleasing. I include several flat rocks for hiding places and various larger rocks for climbing. An Astroturf rug covers most of the floor, except for the front of the enclosure. This whole area I leave exposed for a six-inch width, and this is where the lizards defecate. Since it is right in front for the length of the enclosure, it makes cleaning up on a daily basis extremely easy. I want each enclosure to look the same; I feel that this reduces stress levels should I have to move any animals around. This type of cage design seems to work best for the lizards, as well as my needs. I use a very low, flat, water dish, about an inch in height. This makes it easy for armadillo lizards to drink out of it. If it were much higher, the lizards might not even know it was there. Before I switched to the lower type bowls, I had one lizard that used to lick the side of the water bowl, sensing that water was there, but not possessing the brainpower to approach the dish from the top of the bowl. I have had only one bad experience using a low-sided water bowl. One morning I noticed an object in the water, only to discover that during the evening, a baby armadillo lizard must have been born and wandered into the water by accident and drowned. I had placed a small rock right next to and level to the top of the bowl a few weeks earlier, to aid the lizards in drinking more easily. The end result for me was an accidental death. I hope that such an unfortunate occurrence will never happen to anyone else. Always leave the area around a water dish clear of any objects.

Medical problems have been minimal, but there have been a few that I've encountered throughout the years. Loss of digits

is common, as the toes are very small and delicate, and a single bite during mating or fighting can easily amputate one or more. I have several lizards missing various digits, but with no ill effect to the animal. Mouth infections are the most aggravating problem to treat. You can tell if an armadillo lizard has this if, during routine feeding, the animal runs around chasing its prey, but then does not try to bite it. If you look into this animal's mouth and see a white pus-like area, it has a mouth infection. If left untreated, the infection usually spreads to the eyes and ears, resulting in an oozing swollen eye or tympanum, as the infection works its way throughout the head area. Treatment consists of cleaning the infected area together with the use of an injectable antibiotic until the symptoms have subsided. My most severe case of this involved a female who just would not open her mouth no matter how hard I tried to make her. Eventually I had the idea to stick the eraser end of a pencil in between her jaws so she could not keep closing her mouth. Upon doing this, she clamped down so hard on the eraser that she cracked her bottom front jawbone in half! These lizards have very powerful jaws and this proves it. That is why injections are my preferred choice over any oral medication. Not only did I have to treat the mouth infection, now I had to treat a broken jaw as well. I also determined that she was gravid at this time. To help speed the healing process, I decided to house her in a screened aquarium and stick it halfway out the window like an air-conditioning unit, to expose her to natural sunlight. The part of the aquarium inside the house provided the hide area and the shade, so she could venture out into the sun when she felt the need to. When all the medication was done, her jaw mended, although a bit crooked, and she eventually gave birth. I still have her in my collection to this day. This is just an example of how tough and hardy these little lizards can be.

The second medical problem I have encountered is a femoral pore infection. This causes the rear legs to swell up and accumulate pus behind the femoral pores. The lizard will continue to be alert and eat regularly as if nothing is wrong, but if no medication is administered, the back legs will continue to swell until the lizard has trouble walking. To treat this type of infection, injections must be given and the pores cleaned out by gently squeezing out the pus and bacteria until the infection subsides and heals. I'm not sure what causes this, but it may have something to do with not enough rough substrate to continually rub up against, thereby keeping the femoral pores cleaned out naturally. These pores do secrete a waxy substance in both males and females that could build up and clog the pores. Since encountering this type of infection, I've included rougher climbing rocks to help scrape off these pores on a periodic basis. I have not had any recurrences since this was done.

The last medical problem is a common one of the occurrence of parasites. This again involves a lizard that is not eating, but shows no interest in food, whatsoever. If this happens, first I'd check the mouth to make sure it is not a mouth infection. If that looks all clear, then a stool sample is taken to determine what parasite is present and what treatment is in order. After a week or two the lizard is usually back to normal and eating regularly. Sometimes in the colder months

armadillo lizards will go off feed for a few weeks, as they would be hibernating in the wild at this time. If this happens, just keep an eye on the animal to make sure it's not losing any weight and that it is still healthy. Eventually it should begin eating again when it feels ready. Make sure to check on a lizard if it is hiding all the time and never comes out. It could have an infection or be stressed out. This has occasionally happened to me. By the time I had noticed there was a problem, it was too late to save the lizard in question. The key to good husbandry is to always observe these lizards. You become aware of their habits and movements so if something doesn't seem quite normal it can be taken care of immediately.

Armadillo lizards are not as common in the U.S. as many other types of exotic lizards. This is due to the fact that they are not offered commercially through the pet trade with any regularity, nor have they been since 1989. Another reason is that these lizards are not a moneymaking commodity for a lot of reptile breeders. They are slow to reproduce and only net one offspring each year, per female, if you're lucky. Compare that to your more acceptable, double clutching lizards, who lay dozens of eggs each year, and you can see why most breeders will not bother with a lizard that is not going to contribute substantially to profits. People do keep them in this country, but not in any great numbers. Few American zoos, even, have bred them in captivity. You normally will not see them at any of the reptile shows held around the country, because nobody is really captive breeding them, at least for general sale to the public. Your best bet in obtaining this type of lizard, is the same way I purchased mine years ago—by placing various ads and hoping someone responds. You can also network through the Internet to see if there are any available. Once you do find one, there is no guarantee as to how old it is going to be or what sex. Remember, I still have my first two male armadillo lizards from 1985, and they were adults then, so who knows how old they really are at this point? Also, they are still viable in the reproductive department, mating and breeding to this day. In this day and age of instant gratification you may have to be patient in obtaining these lizards. I had to wait two years before I found a few more to add to my original two.

Let's now review the basics in keeping these lizards in a captive environment.

#### *Cage enclosure:*

A large aquarium will do for two or three of these lizards, although I like to give them as much room as possible so that they can behave in a more natural manner. It's always more fun to see them run around—something that they can't do in a small aquarium. I've found in a few of my large enclosures, males will usually stay to one end of the cage, with females grouping on the other. It is very important to include several hiding areas throughout the cage and let the animals choose which one is best for them. Flat rocks, propped up an inch off the ground work best. Armadillo lizards like to be able to wedge in between rocks naturally, so they like to be able to feel that roof of rock on their backs. If you were lift up one of these rocks, you would notice that the lizards arch up their backs in order to feel where the top of their hiding place is. Avoid a hide area with too high a ceiling, as the lizard may get



**Figure 9.** A group of juvenile armadillo lizards warming themselves on a heating pad inside the enclosure. Photograph by the author.

stressed if not able to hide properly.

The drinking area should be shallow—one inch or so high—so they can find water without a problem. Large rocks should be included for climbing and basking purposes. You can use a rock or sand substrate, but they will probably eat it, which may lead to medical problems. Astroturf works for me, although a few have tried to eat that too. I recommend full-spectrum lighting in combination with blacklight lighting, kept as close to the lizard as possible (12–15 inches is best). You can start out with this lighting and judge for yourself how beneficial, or not, it is. Some sort of heated area (heating pad, hot rock) (Figure 9) is needed in the autumn and winter months, especially in the colder states in the U.S. Use common sense with these items. If the area gets too hot, it may be necessary to diffuse the heat with ceramic tiles on top and underneath. I use a twelve-inch heating pad on top of which I put a twelve-inch ceramic tile. I have never yet had an armadillo lizard burn its underbelly lying on one of these.

#### *Temperature:*

A room temperature of 70–85°F is fine, perhaps a bit cooler in the winter, as they can certainly tolerate it. I have always worried about my lizards getting too hot, rather than too cold. The room that they are now in can get up to 100°F in the summer. I keep a small air conditioner in one of the windows to keep the temperature down when this happens. A fan of some sort to circulate the air is also desirable. Although they can tolerate high temperatures, too much might stress them out. In the winter they are still active with the cooler room temperatures, (65 to 70°F) as they utilize the heating pads during the day at this time of year.

#### *Food:*

The basic staple diet consists of crickets, superworms, butterworms and waxworms; the latter two have a higher fat content so I use them sparingly. I actually have two groups who would rather eat superworms than crickets. They will only eat crickets if they get good and hungry enough. I feed my lizards once a week, making sure that everyone gets fed. When they are in groupings of four to six, you have to see to it that certain lizards aren't hogging the food items. Always put

in only enough food items that all will be eaten, and watch to make sure this is happening. This is especially true for superworms, for if they crawl away somewhere; they will morph into a large black beetle that the lizards do not like to eat. You will probably find one somewhere outside the cage enclosure, perhaps running across your carpeting at the most inopportune time. Always use a vitamin-mineral powder on your food items. The smell of this helps the lizards to better locate the crickets and it gives the lizards the essential vitamins they may otherwise be missing in an indoor, captive environment. Also, feed the insects you intend to use as food items twenty-four hours before you give them to the lizards. Kale, collard, turnip, and mustard greens work well because they have a high

calcium content. By feeding your insects, you'll find that they will live longer and you won't have to keep getting them so frequently.

Armadillo lizards are one of the most easily kept lizard species. Their longevity in captivity and relatively few special requirements make them an excellent choice as a captive lizard pet. Unfortunately, they are scarce in the pet trade and command a high price as a result.

I hope this information is beneficial to anyone who currently keeps armadillo lizards or who may just want to learn more about them. They are an overlooked, little known species who, I think, are one of nature's most interesting lizards. May they never go extinct!

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