

Below are excerpts on egg laying and incubation in bearded dragons (BD or beardies) that I (Kathryn Tosney; ktosney@umich.edu) and others have written on the [Pogona list](#), an internet discussion list dedicated to the topic of bearded dragons (*Pogona vitticeps*). You will find some redundancy, and I have slightly edited some posts to make them fit this context. I chose entries to give a variety of views and information, rather than to recall everyone's opinion encyclopedically. I kind of like having all these different voices and opinions.

Joanne on: after copulation, how long until the female lays her eggs?

It's supposed to be 3-4 weeks; mine took 5 weeks.

period between clutches:

Pam Hanratty: Last year, Lucy laid her 3 clutches exactly 2 months apart. She was so regular that you didn't need to check a calendar! **Kathryn:** "The Babe" varies between three and four weeks between clutches, usually three.

Kathryn, about stored sperm

Yes, BDs store sperm. I found that out a couple of years ago, when my female, "The Babe" laid her first clutches. I mated her with Fluffy, and she laid a clutch. I mated her with Fratchet and she laid a clutch. I mated her with no-one else, thinking that she was young and I didn't want to wear her out. She proceeded to lay four more clutches, at three-week intervals, all by herself (with stored memories....). A corollary of stored sperm is that, after the first mating, there is no guaranteed paternity....

On symptoms indicating incipient laying

1) **Anna** Your female may be wanting to "oviposit". I just went through that with mine. The symptoms were:
1) Ever-increasing belly - could feel "marbles" in her lower abdomen in the last week
2) No interest in food
3) DIGGING-DIGGING-DIGGING and more frantic DIGGING
4) Pacing the cage, the living room, everywhere. I started by mixing coconut shell and moist sand in the main cage. She just dug it all up and disturbed Harry, the male. I finally put her in a 10 gallon half-full of moist peat moss. She musta liked that because she laid 26 eggs in a pit she made, and carefully buried them and camouflaged the surface. Now she is svelte, calm and eating like the little piggy she was before.

2) **Pam** As far as the question of whether your female is gravid, that's hard to say without seeing her. When Lucy is gravid, she looks like a sack of marbles by the time she is ready to lay. There is no question about it! Not all animals may be quite as obvious, however. When Lucy is ready to lay eggs, she begins to dig frantically and incessantly.

3) **Ronnie** A few signs of gravid females that don't always hold true, because not all females know they are supposed to warn us of these things before hand =0l. restlessness - a lot of pacing back and forth. wanting out of the cage, wanting into the cage, going over here, then running back over there. digging - spends a lot of time on the substrate instead of on basking branches. dig, dig, dig, dig. body shape - the guts get pushed forward to make room for the eggs, which can give them the appearance of looking more tear drop as opposed to round. lumps - usually be gently massaging the flanks, you can feel or see the lumps from the eggs. within a few days of laying, usually you will see one lump centered on the belly, just in front of the vent. When mine get to this stage, the eggs are right around the corner. weight gain - obviously they put on weight, and on a dragon your size, it should be noticeable.

Pam Hanratty, prepping a laying box

If your female is digging like crazy, she is ready to dig the eggs *NOW*, today...even as we speak! Have you separated her from her mate? What type of egg-laying box are you using? Here's what I do: Fill an 18 gallon rubbermaid storage container with about 8-10 inches of *new* vermiculite that has been moistened with water until it is just moist enough to hold its shape when you squeeze it between your hands into a ball. Should *not* be dripping water! Add water a little at a time. Put gravid female into the box. Place the lid over one end of the box for some privacy in case she doesn't like being observed. Leave her in the box until she has laid the eggs and has completely covered them...she will be pretty tired at that point. Offer her some water and food after she is finished. Don't remove the eggs while she is watching. (Note from **Kathryn**; I find that The Babe doesn't mind if I remove them while she is laying; but if I remove them while she is looking at them, she will hiss!!! So take Pam literally; don't remove the eggs, WHILE SHE IS LOOKING!)

Pam, why you should supply a separate laying container

The amount of time between digging and laying can vary quite a bit, especially with the first clutch. It could be minutes...or it could be a couple of days. Just be patient and leave her there, undisturbed, until she does lay. If it goes on for more than a couple of days, or if she seems to be growing very weak, that would be the time to reevaluate. Lucy was fortunate to lay her eggs pretty quickly...but not all dragons do so. I have had much better experience having her lay eggs in a separate laying box. On the one occasion when she laid eggs while I was at work (3rd clutch)...this time in the normal enclosure. Some of the eggs were trampled by the male. All of the others became moldy very quickly with an especially nasty mold. I suspect this may have been because the substrate in the regular enclosure contains remnants of fecal material, etc. The vermiculite that you purchase at the store is not completely sterile, but is extremely clean in contrast.

Beardies do lay their eggs in the soil outdoors, but a female would not lay her eggs in the same place that she normally defecates.

Pam Hanratty re vermiculite and incubation

I know that some of the folks on the list have a formula for the ratio of vermiculite to water. However, I discovered as I searched the garden center for vermiculite that all vermiculite is not created equal (or at least not packaged in an identical state of hydration.) So.....I poured an appropriate volume of vermiculite into the egg-laying box to give me a depth of about 10 inches. Then I started adding pre-boiled water (cooled down) to the vermiculite, kneaded the vermiculite/water mix, added more water, and kept mixing and adding until I'd added just enough water that the vermiculite would hold its shape when squeezed into a ball.

I discovered that some vermiculite in the K-mart garden center was already moistened, but also smelled a little nasty (so I didn't buy it). The stuff I used was purchased from Wal-Mart, Schultz brand, and was sold in sealed bags. Very clean and worked well. It was also completely dry.

Do you need to use boiled water to moisten the vermiculite? Probably not.....clean tap water should be fine, but I wanted to cut down on contamination as much as possible. It seemed to work.....I didn't have any eggs from the first two clutches become moldy.

I use plastic food storage containers for incubation....either square or rectangular...about 4" wide x 6" long x 2-2 1/2" deep. I fill the box about half full of the moistened vermiculite. Before placing the eggs in the box, I dig a shallow depression for each egg (using a rubber-gloved finger), then transfer each egg to the box, using rubber gloves. I candle my eggs with a small flashlight before putting them in the box so that I can position the clear side up. (The eggs will be positioned on their sides.) Before covering the box with its lid, I drill 5-8 small holes in the lid to allow air circulation. The holes are probably 1/16"-1/8" in diameter. Then I put the containers in the incubator.....and wait.

Make sure that you allow at least 24 hours for the temperatures to stabilize before you transfer the eggs. Also, make sure you are using an accurate thermometer. The one I received with my hovabator was not accurate! I use a digital thermometer/humidity gauge from Radio Shack (about \$24 US).

Julie M. Bergman, on vermiculite, forwarded by Barbara Neilson-Belman

I had the pleasure of seeing a new slide show by Dr. Marney Lamm, a new non-domestic reptile vet at UC Davis, which focused on *Uroplatus husbandry*. The zoo she worked at had a lot of deaths, so she sent out surveys to zoos and accumulated a wealth of information. The most amazing thing I got out of her talk was this trick incubation technique: Put moist vermiculite inside PANTY HOSE! Then put eggs on top in incubation container. Little *Uros* hatch out and don't ingest the vermiculite, which is a common cause of neonate death. Trick, trick trick!

Kathryn on egg laying

My oldest female, "The Babe", has laid many clutches over the last three years. Sometimes she will produce eggs quickly, but more often she will dig more extensively. Often she will dig for 3-4 days running, diligently digging a 30-foot long tunnel--in her mind at least, all within the 18 inches long container.... The Babe will bury her eggs quite assiduously, breaking for rests and staring off into space as she does so. I have successfully removed the eggs during the laying process and even during burying without her being disturbed by it. Indeed, a few times she has happily buried her egg-laying SITE, despite the fact that I had removed the eggs entirely.

I try to keep track of her while she is laying, since occasionally she has trouble with an egg. You know there is trouble if your female has assumed the egg-laying position-- posterior down into the hole --but has produced nothing for half an hour or so. (If she is just digging, she is still fine.) If The Babe is experiencing difficulties, I put her in warm water--just as though she were impacted. Indeed, we have had a few under-water "deliveries". I don't worry about the female being egg-bound, while she is still happily digging. If she backs up and tries to lay, but doesn't, then something needs to be done, starting with warm soaks, and in extreme cases ending in a vet visit.

Avid digging behavior is typical of a gravid female. When one of my females has been digging, I will remove her to a laying site: a Rubbermaid container about 18" on a side and 10-12 inches deep, 2/3 full of damp vermiculite. (Don't use dirt--it contains fungus which will grow on the eggs, killing the embryo. Also, don't use Perlite, the white stuff--the dragon will eat some, and it is bad for them). The vermiculite should not be soggy. If it has just the right amount, then some squeezed in your hand should retain its shape, like a snowball. Partially cover (or totally cover) the container loosely with a lid or piece of cardboard. When you put your female in, first there will be silence. Then there will be digging. Often, a nose will appear, as she rests; and sometimes after a short period of digging, she will decide to look for someplace better to dig--she will escape the laying box and run around frenetically. Put her back in. If she continually escapes, she isn't ready to lay, and can be returned to her cage.

The females often dig for several hours, often on succeeding days. I monitor the digging; the container is right by the chair where I sit to work at night. If the digging stops, take a look. If she has dug out a hole and is backed into it, she is likely laying. She should not be disturbed greatly during laying, although I have taken the eggs out successfully as The Babe lays them. She is most sensitive to disturbance when she is done, and has turned to bury the eggs. Your female could hiss at you if you disturb her then. She will bury the eggs assiduously, even if you have removed them. Indeed, the

behavior seems very innate--if you put her back in her cage, she will be very frustrated and will continue to try to bury something. Best to let her continue her burying behavior in the container.

If you are going to incubate the eggs, before removing them from the laying bin, get a penlight type of flashlight, some plastic gloves, a container with warm (not hot) water, and the incubating container (e.g., a Tupperware sandwich container, 1/2 filled with moist vermiculite. With your gloved finger, make a series of shallow depressions in the vermiculite to hold the eggs. Lift an egg, rinse the vermiculite off, shine the light on the egg so you can see the little pinkish oval where the embryo lies. (The embryo is actually only a tiny streak at this stage, without a brain or nerves yet; the pink is present is blood vessels growing out to cover the egg yolk. These blood vessels develop first, to keep the embryo alive.) Place the egg in the depression in the vermiculite, with the oval up. Incubate in a Hovobator incubator (available by mail order from Big Apple; check the web sites for their web address).

It is important to give your female a good spot to lay her eggs, to prevent her from becoming egg-bound, which could be very detrimental, even fatal. My females will hold their eggs until they are given a laying box. Since the process of laying can take a while, I would give her the box first on Friday after work (assuming you have the weekend free), so you can monitor her. Alternatively, if you have to leave her, you could put her in the laying box and shut her in the bathroom or an empty closet (come to think of it, I have never had a closet that is EMPTY...), so that she can't run into trouble if she decides to roam about looking for a better laying box. Your female will look incredibly skinny once she lays. Feed her lots. Give her fluids. Give her calcium powder. Let her rinse off in a nice warm bath. Pamper her.

Dustin, on first clutches

Many female beardedies will lay their first clutch as infertile..... A couple days ago, I had a female lay the smallest clutch of eggs I've ever heard of, 5 eggs, all infertile, except one may be fertile, but I doubt it. This was her first clutch and I gave her a nesting box to lay in, nesting box is necessary. I use a big Rubbermaid container with a little over a foot of soil/sand mixture, moistened. I also will start the hole for the female and they always prefer it to starting their own hole for themselves. And, they may mate this year, as almost all beardedies lay multiple clutches per year.

I helped her bury her nest b/c i thought she must be pretty tired. The funniest part was when she'd pack the dirt in with her head!

Alta on egg binding

Egg-binding is diagnosed by behavior, not by time a female harbors the eggs. As long as a female is still acting fine, she's fine. The symptoms of egg-binding include lethargy, depression, and non-responsiveness. Egg-binding seems to be quite rare in BDs. You may find Melissa's article on egg-binding useful. It's at:
<http://www.sonic.net/melissk/dystocia.html>

Kathryn on unbred females

Yes, unbred females do lay eggs--it is not BREED OR DIE!! as it is in some species. Any female can become egg-bound, but the usual cause of becoming egg bound seems to be the lack of an appropriate place to lay eggs. Normally, the female can retain the eggs for a period while she searches for an appropriate place and digs; but if retained too long, they become a problem, that can be lethal. There are other causes as well, some possibly physiological, that we can do nothing about--so no need for guilt feelings, if you had a BD demise from this problem.

I've run into an additional occasion of egg retention, that was not due to dissatisfaction with the available egg-laying site. Once "The Babe" lets me know she is ready to lay (by incessant digging in her cage, etc.) and I take her out and put her in the egg-laying container, she usually digs for a few hours, occasionally over two days, but then lays her eggs fairly promptly. However, twice, she showed an unusual behavior: as usual, she stopped digging and backed up ready to lay eggs, but then, she failed to produce. I consider this (not producing eggs even though she had dug her burrow and assumed the position) to be a sign of egg-binding, some difficulty in laying. The symptom wasn't the amount of digging, but the long delay in producing the first egg, after she had stopped digging. I treated her with warm water baths and some very very gentle message of the tummy area. The first time, she produced a "bad" egg, hardish and irregular in shape, and then produced a few more, under water. I then put her in her laying box, and all proceeded as normal. This last week, after she showed some reluctance to lay as normal, I soaked her over two days running, and she then proceeded to lay normally.

Kathryn on incubation:

Mix the vermiculite and water in a ratio of 5:1 by volume (i.e. 5 cups vermiculite to 1 cup water) or 2:1 by weight, before introducing the eggs; better to do so even before the eggs are laid to let the vermiculite reach the correct temperature. The vermiculite should be damp but not soggy. It should just hold its shape if you squeeze it in your hand, and shouldn't then drip water.

I use a Hovobator with a fan--I've had very poor luck with other devices, such as jury-rigged aquaria, although some people seem more adept at such things than I am. Note that any incubator will only heat the eggs; it won't cool the eggs, and if the room temperature gets high, your eggs can cook. In addition, the incubation temperature will vary with room temperature (and lid opening, etc.); some variation is natural. However, given the variation, I keep the incubator temperature at 81 degrees; it can go up to 84 without damage to the eggs. In my experience, even brief periods at higher

temperatures have been lethal, although I've heard some anecdotal reports of successful incubation at higher temps (e.g., below). I tend to the more conservative approach. In addition, to keep the eggs within the desired range in the hot Michigan summers, I keep the Hovobator in the only air-conditioned room in the house. After all, I do have my priorities.

If you look closely at the eggs, the fertile eggs will have a round spot, about 1 centimeter (ca 3/8 inch) wide, usually visible through the shell, where the embryo lies. The spot will look like a more translucent portion. In the next couple of days, you may see blood vessels developing in that region. Then you will see a red spot (an oval area right under the shell) is the embryo and its associated membranes, which have lots of blood vessels running through them already. If you have difficulty seeing the spot, darken the room and use a pen-light (this is called "candling" the egg, since the candle predates flashlight, as do eggs...). Turn the penlight on and put its bulb end right up against one end of the egg (i.e., the somewhat more rounded end, or even the somewhat more pointy end) and rotate the egg until you see the spot.

This spot indicating the embryo should be placed UP in the incubator. If you are placing it down, it would explain early lethality. Eggs can be fertile without showing an obvious red spot--if the embryo is just a bit younger when laid, the spot will look oval but translucent or clear, with maybe a short red streak down the middle of the long axis of the oval. The red streak is the embryo; the rest is translucent because the blood vessels are just beginning to grow out from the embryo. Candling can help you see these features more easily, although often you can see them without candling.

The eggs do take up water as they develop. A healthy egg looks plump when laid, rather than dented or partially collapsed. A few dented eggs are often seen in first matings, and are not a sign of trouble. Some eggs will not have an embryo in them--these often look dented, or will soon become so (and often grow mold) or remain dented in the incubator. Remove them. I put all hatched eggs in the incubator, embryo side up when I can see it by candling, and remove those that remain or become dented after a few days; always remove the eggs that are yellow and smelly or moldy. Note that as hatching nears, eggs will begin to dent. Don't throw these away. This denting is a sign of incipient hatching.

My eggs have generally hatched between 65 and 76 days of incubation at 81 degrees F, although they can take longer. A cooler period before you begin incubating--or even a relatively cool interlude during incubation--doesn't hurt them (don't, of course, refrigerate them....), but even brief periods at too warm a tissue are potentially lethal.

Kathryn, about egg wrinkling: it could be:

1) low humidity in the incubator. Humidity should be between 70-90%. Buy one of the cheap "humidistats" at a hardware store. I got one with a temperature gauge for around \$12 at a discount store. If the shriveling is due to low humidity, adding water NOW can save the eggs.

2) eggs were infertile, or the embryos failed to develop, due to birth defects, inbreeding, or mere youth of the parents. High temperatures can cause lethality, even when very transient--one reason I incubate at 81 degrees, rather than the more common 84 degrees. It gives me some latitude. Also, remember that if the room temperature raises above 84 degrees, so will the incubator--it has no cooling circuits. The only room in my house with an air conditioner is the room I where I put the Hovobator. BDS first!! 3) eggs get a little dent in them and may appear to be collapsing just a day or two before hatching.

JillyRN regarding humidity

85% humidity in the incubator seems a little on the high side. If the temperature is about 84 degrees and humidity 85%, and the eggs are still collapsing, than I would say that the eggs are probably infertile. Too much humidity can make the eggs absorb too much water and mold, too high temperature will "cook" the eggs and too low temperature will prolong hatching.

I have been told that the humidity should be as high as 70-80%, but they will still hatch at even lower percentages. My first clutch hatched in 56 days with humidity around 50% using a homemade incubator. I had a hard time getting the humidity any higher than that. Currently, I am incubating 2 more clutches and have been unable to keep the humidity higher than about 40-50%... I mist them every other day to add extra humidity, but still am unable to raise it much. These are incubating in a "Hovabator". All the eggs look fine at 40-50% humidity and the first group should be hatching in about 7-8 days. I hope this helps.

on incubation periods , temperatures and "natural incubation":

1) **Steve Grenard** A ninety day incubation period is not unusual either. After a breakdown of an incubator, a breeder friend near me incubated a clutch of vitticeps eggs for 5 months at room temperature (around mid 70s on avg) and all but one hatched.

2) **Randy Gray** As an interesting note, when I use to breed dragons and chucks, I put all the eggs in the same incubator with my Uromastix (about 88-89F). It worked for all the species.

3) **Pete** I would be careful using elevated temps. I am on three herp lists and there is always a lot of talk about eggs. This is my opinion only so FWIW: I believe that elevated temps cause an increase in respiration inside the egg. If you increase respiration too much, you exceed the shells capability to transfer gases quickly enough and the embryo smothers. Now maybe chameleon eggs are more sensitive to this but I have seen stories of eggs going full term and babies stillborn, but perfectly formed. Even tho it takes longer, I will opt for lower temps. Also, there has been some discussion on this list not too long ago about high incubation temps causing weak hatchlings. This is just my opinion YMMV

4) Kathryn The gestation time is variable, depending on temperature and other factors. Often the eggs from the same clutch hatch over the period of a week. Pam Hanratty said that Lucy's first clutch (incubated at 82 degrees F) hatched in 82-89 days, while her second clutch (incubated at 84 degrees F) hatched in 68 days. Pete's have hatched in 54 days at 84 degs. Mine usually take about 63 days at 84 degrees. Steve Grenard reported that some incubated by a friend of his at room temperature hatched at five months.

5) Damien Well, in the wild, they don't get a 100% hatch rate. Very far from it. Probably more like a 30% or less. Some clutches remain unhatched completely. There isn't a very high success rate in the wild. In captivity, we want as many as possible to hatch don't we? That's the main reason for incubation I'd say.

Kathryn on inbreeding

If your male and female dragons are siblings, it may be best to simply not incubate the eggs, even if they are fertile. (You can freeze the eggs to assure development ceases.) Generally with this degree of inbreeding, some eggs will be infertile, some embryos will die during incubation or during hatching, and only about half are likely to hatch. A few of those may have birth defects, but others would be perfectly healthy. If you do let them hatch and sell them at a swap, you should ask the going price but you will need to warn people that they are siblings, and that if they want two BDs, they should get only one from you, since if THESE siblings were bred together, the incidence of severe birth defects is a near certainty.

Kathryn on calcium supplementation for Mom

Poorly-formed shells need not indicate insufficient calcium. Actually, most of the calcium demand in building eggs is not putting calcium into the shell, but putting calcium into the YOLK. The yolk provides the nutrients for building that big embryo, including all the calcium for its bones. The shell has some calcium, but the shell does not become noticeably thinner with incubation age, as little material is withdrawn from it. However, egg building IS a huge drain on the dragon metabolism. All females laying eggs--whether the eggs are fertile or not--need more supplemental calcium, and more nutrients generally. Exposure of the yolk at the ends of the shells is somewhat unusual, but not that unusual. The first eggs seem to be laid in dragons when their reproductive system is still maturing.

On preventing hatching:

1) Cindy Lynn If you feel you have too many eggs...put them in a zip lock bag in your freezer....Leave them in there for a few days before disposing of them...Otherwise if you throw them out there is always the chance of them being warm enough and hatching in a land fill somewhere :*((Make sure when your female is done laying to keep her well fed, calcium supplemented and hydrated.. She should bounce back within a few weeks.. Just because you keep beardies doesn't mean you need to breed them!!! That's why I sold my pair and just have my one pogona pal now...Not intended as a flame...But separating the male and female will prevent further worries-Remember they can retain sperm for up to six months or more!!..

2) Kathryn In my lab we work on chicken eggs; the medically accepted way to assure that fertilized eggs don't hatch is to freeze them. People sometimes worry that such euthanasia can cause pain, but it doesn't, for two reasons. First, when they are laid, the embryos are at a stages when the nervous system has yet to develop, so they can feel nothing by definition--no nerves, no pain. Second, even if the eggs were really quite old and the nerves were formed, the cold itself isn't painful--remember how your fingers get numb when they get very cold. They only hurt when you try to warm them up again. The cold prevents nerve transmission, as well as causing death; the embryos are dead by freezing overnight and dead things feel no pain even when you warm them up...

fungus on eggs

1) Kathryn and Ronnie. One possible preventative is the powder used to treat athlete foot fungus. I used it one year, but think it is best not to put it directly on eggs, as it can impede the gas exchange through the shell if laid on heavily, as any fine powder would do. Also, some chemicals can be taken up through the shell and the anti-fungicides are fairly toxic if taken internally. When I do use it, I spread some on the bottom of the plastic container, and put in clean damp vermiculite, and then the eggs in little depressions. Another thing--don't use the convenient "spray" version of the powder directly on eggs. It comes out very very cold, and immediately kills the embryo (voice of sad experience).

In my experience, healthy eggs don't grow mold. I've had dead eggs, covered with mold, touching healthy eggs that do fine. It is best to just dispose of an egg that has mold on it, and increase the air circulation and perhaps change the vermiculite, if mold is growing anywhere in the incubator. Others have found that eggs will hatch, even with fungus.

2) Pam Hanratty The eggs that went moldy while incubating two years ago were either non-fertile, died during incubation, or were laid by Lucy in her cage, rather than in the laying box. Here's my half-baked theory..... Ordinarily, I used new Schultz's vermiculite, which had been moistened with boiling water and allowed to cool. The egg-laying box itself was disinfected prior to adding the vermiculite. Lucy only remained in the box long enough to lay her eggs and bury them, then she was returned to her cage. Consequently, the number of mold spores to which the eggs were exposed was relatively low. I always handled the eggs with new disposable latex exam gloves, and I incubated them in fresh

vermiculite which had also been pre-moistened with boiling water. The eggs were placed in sterilized rubbermaid food storage boxes, which had about 5-7 small holes drilled into the lids.

I had very few eggs become moldy when using this technique. The one time I did have significant problems with mold, Lucy laid her eggs earlier than expected, and laid them in the substrate in her cage. I attribute the molding to the fact that the substrate was not sterile, and the eggs were probably contaminated to a significant extent when they were laid. It also didn't help that Bruce walked all over them! These eggs were also fertile (as indicated by initial pink color and presence of blood spots), but became moldy within a week or less. I was really disappointed....

Kathryn on variations in survival

Based on my experience, dragons can breed from at least 10 months old. However, the first matings often produce unfertile eggs, or embryos that don't survive until term. The second year is much more productive, but fertile eggs can be produced earlier. For instance, a new female in my group who is about 1 year old ("Thistle") laid 18 eggs in her first clutch and half survived to hatch. The genetics of the individual can affect embryo survival. For instance, in contrast to Thistle, "The Babe" has consistently had high viability, except for her first clutch at 11 months which I did not incubate, since it was totally unexpected. She has laid 18 clutches since then. I have also heard anecdotal evidence that the gold lines are less fertile than many others; they may be more inbred, or the gold may be a partial lethal. Dwarfism is certainly a partial lethal. Mortality can also certainly be non-genetic, since eggs can die during incubation, for a variety of reasons. For instance, in my hands, temperatures higher than 85 degrees F are often lethal, even if relatively brief. Humidity levels that are too low can also reduce viability.

Where do they get the air?

1) **Bill Mears** A question:- after Dulcie had laid the eggs, they were covered and the hole tamped down really hard-very hard and I had to be really careful digging them up. Assuming this is a repeat of what happens in the wild, the hatchlings must be pretty darned strong to get out- especially if the climate changes and the soil firms up even more. What does all of you think? Which leads to.....if they are laid underground and packed in tight, why do we leave them uncovered in the top of an incubator? Wouldn't they have a more stable temperature if they were covered- even by loose vermiculite? Anyone tried that method?

2) **Todd** Any ideas where the "fresh air" would come from when Mom buries them in the dirt? :-) For me I simply made depressions that allowed the eggs to sit at a depth of about 1/3-1/2 the egg. I would not toss out any until they are obviously dead (sunken in, extreme discoloration, hard) as the indication of the fungus does not in itself mean they are bad. You do want to control it though as I mention above. I check on my eggs once a week. If you pull them out to candle them, be sure to be VERY gentle and not rotate the egg. Once the embryo has started to develop, it must be placed back as it was taken out or the chances of killing the egg are quite good.

3) **Kathryn** Darned if I know. Seems like the way my females pack them down, that they would be lucky to dig out at all. I'd bet that one element of the generally immense lethality BDs experience would be due to inability to dig out; that eventuality is probably balanced by the certainty of some predator sniffing them out and eating them if they were laid nearer the surface. Sounds like a good subject for a field study--follow a female BD around, see where she lays her eggs, set up a little camera and check their fate.... In regard to our standard method of incubating eggs half-exposed, the only thing I can say that seems halfway reasonable is that--it seems to work (as long as you don't candle them when development is advanced. They have developed a "startle response" and can actually damage their exterior blood vessels and die. Some of us lightly cover the eggs near the end). And given that it is working I feel awkward in changing it. It may be that, in trying for 100% hatch rates, we are doing things that simply wouldn't work in the wild. E.g., we can optimize the humidity without drowning the eggs by placing them ON but not buried IN damp vermiculite. Our solution wouldn't have worked in the wild, since any wandering predator would scarf up a half-exposed egg, but we have the nice incubator cover to take care of that problem (Bill's marauding cat aside). We can separate the eggs so that if one goes bad, its decay doesn't infect an egg that is touching it, and moreover we can see it is bad and remove it. We can supply good air circulation, so the embryo doesn't suffocate in the egg, and so fungus doesn't get an advantage. We can candle them and put them embryo-side up, to further increase the embryos chances. Our selection is a lot kinder than the natural kind...

Pam Hanratty on what to do with all those babies!

Better find a good, reliable supplier for tiny crickets! The going price for baby beardies? Well, that depends upon color phase and supply in your area. If you sell them yourself, and if they are normal phase, you might be able to sell them for \$40-45, selling directly to your customers. That is a really optimistic figure, however. I have been able to sell to our local pet store for \$20-25. At reptile shows during the peak of hatching season, people have practically been giving them away....I saw them selling for as little as \$20, and some larger dealers were offering folks as little as \$3-5 per baby for entire clutches. Before you start planning your vacation in the Bahamas, don't forget that these little guys will be eating immense quantities of crickets for at least 8 weeks, until they are ready to move on to a new home. I didn't sell mine until they were even older and better established. I didn't even cover cricket costs when I finally sold the babies.