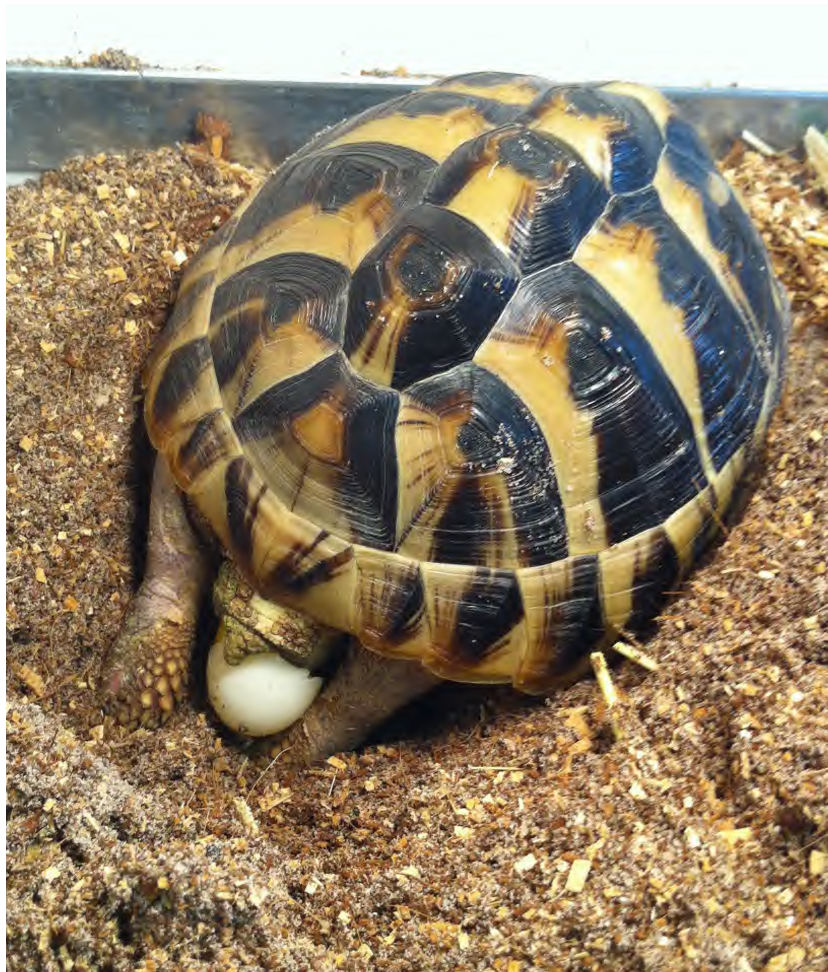

Tortoise Breeding & Incubation

A Guide to understanding reproduction of Mediterranean tortoises

SNSTortoises - April 21, 2015



Mediterranean Tortoises: Breeding & Incubation

Courtship

Tortoises in the wild usually mate during the spring, after hibernation, through until mid-summer. In captivity, this may occur all year. The courtship is aggressive with female tortoises bullied into submission through relentless ramming and biting and butting from the males. Male tortoises will then mount the female.

Mating

Once the male has climbed onto the females back, it shuffles and wiggles his cloaca (tail), until his "ventral- opening" lines up with the females "opening." The male will often have his tongue protruding from his open mouth and make high pitched squeaking noises. The male then erects his penis, pushes through his ventral opening of the cloaca and enters hers. Ejaculation is followed shortly afterwards.



Gestation

Mating results in many fertilized eggs which will be laid in a few clutches. The first clutch is often laid around 30 days from mating (although fertile eggs have been reported as late as 4 years after). Tortoise gestation is quite remarkable as the female can vary the length of the gestation period (from fertilization to laying) depending on environmental and nesting conditions.

Once the pregnant female finds a suitable nesting area, sufficient to be able to incubate the eggs, she will proceed to lay the clutch. As early as 2 weeks later the female will lay a second clutch, and may rarely lay more clutches afterwards. Most clutch sizes are 4-8 eggs, with each subsequent clutch containing fewer eggs.



Tortoises that don't have access to a suitable nesting area may retain their eggs. "Egg-bound" tortoises are at risk for peritonitis and may eventually lead to the animal's death. Veterinarian assistance with calcium and oxytocin administration may help. Successful surgery has been employed in some cases, with the eggs being removed via a hole cut in the animal's plastron. However, this unfortunate situation can be entirely avoided by provisions being made for captive nesting.

Nesting & laying

Tortoises are very particular when it comes to choosing a suitable nest site. In the wild they prefer south facing hillsides. Once a site is chosen, the entire nesting process may take 1-4 hrs. The female digs downwards and outwards using long circular movements of her rear legs until a 4-7" deep hole is dug. She lays one egg at a time, rolling them into position, and coating the sticky eggs in dirt, until the next egg is dropped. After the clutch has been laid she covers the eggs with soil, refills the nest. In their native environment, the eggs are left untouched to be naturally incubated.

Captive breeding procedures

Suitable partners

Breeding requires males and females of the same species. Greek tortoises may require similar appearing subspecies. Males are often aggressive breeders and will often immediately demonstrate his courtship behaviour. In captivity, there must be an adequate female:male ratio and environment that prevents the male from relentlessly courting any individual female, which will lessen the chance of injury due to biting or butting. The male may need a separate enclosure.

After the mating sessions have taken place, females should be given access to higher than normal amounts of calcium by leaving cuttlebone in the enclosure or adding additional calcium powder on her food..

Gravid behaviour

Gravid (pregnant) females, usually within a week of laying, display unusual behaviour. A competent tortoise breeder uses these signs as an opportunity to prepare a nesting site, and get ready for incubation. The behavioural changes are usually a combination of the following :

*Restlessness ; Constant climbing, digging, pacing, etc. This is often when tortoises can be found up-ended after falling from somewhere they normally wouldn't have been .

*Aggressiveness ; Dominant behaviour , including butting, ramming, biting , even "mounting" , all of which are usually only seen in males.

*Not feeding ; Eggs consume the space in the tortoise and hormone levels rise.

*Trial nest digging ; Captive females are often found digging "trial" nests, often in unusual places. Tortoises, when they are at this stage, are ready to lay soon.



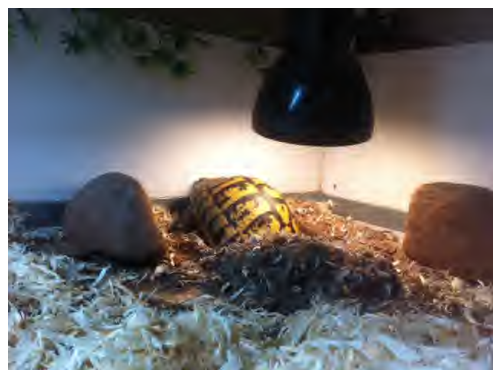
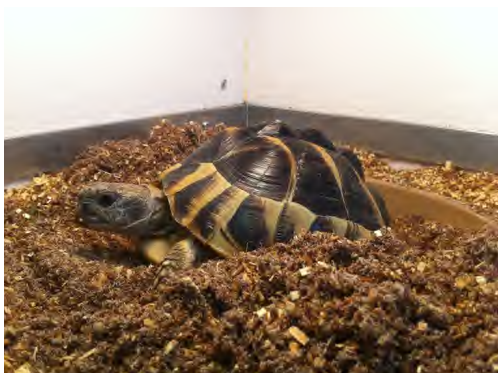
Captive nesting conditions

Outside

The tortoise requires soil that is moist enough to hold together and allow excavation. A raised mound of soil and sand mixture that is slightly moistened is ideal, and tortoises will often lay at the base of the pile. However, it can be surprising how often tortoises choose unlikely nesting spots despite an ideal site prepared by the owner. Sunny areas are often preferred. In Canada, there are only a few months a year where they will nest outside. Some owners build a greenhouse to lengthen the laying season. Eggs should be dug up carefully and incubated.

Inside

Most of the time, Canadian breeders require a nesting site in their indoor enclosures. Flower pots or other 10-12" deep containers (possibly suspended from base of enclosure) containing slightly moistened sand/soil mix will provide a great nesting site. Place a lamp over the nesting site. The tortoise may dig all around the enclosure before finally settling into accepting the appropriate site to lay. Eggs should be retrieved carefully and incubated.



Incubation

There are many store bought reptile egg incubators available as well as some techniques to build home made incubators. Reptibator, Little Giant, and

Hovabator are common, effective and affordable brands. All incubators need to maintain proper temperatures and humidity. The eggs should not be rolled or disturbed. Unlike bird eggs, the yolk must stay on the bottom while the embryo develops.

Incubators should be experimented with beforehand with careful measuring of the temperatures and humidity. Often the incubator readings are not reflective of the area where the eggs are situated. Eggs of similar hatch dates may be placed in the same containers. Each container should have a lid laid on top with many air holes in the container. The eggs should be placed in perlite (dry) or vermiculite (slightly moistened). I prefer dry perlite. Bury the eggs about halfway.

Temperature

Mediterranean tortoise eggs can only successfully incubate if the temperature is between 28 to 32°C. At 30°C the sex determination tends to be random, above this and you will normally hatch females, below 30°C and you'll probably get males. High temperatures often cause shell abnormalities such as extra or irregular scutes.



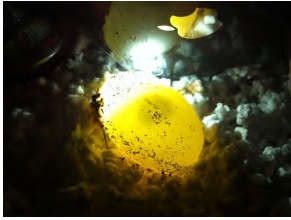
Humidity

The relative humidity required for the duration of the incubation should be between 60-80%. I place trays of water in the incubator in an attempt to achieve 75% humidity. Too high of humidity (or too wet of substrate) causes the eggs to swell and crack. Lower humidity causes dehydration or small offspring.

Egg development

Developing hatchlings stress very easily, so handling should be kept to a minimum. The less an egg is disturbed, the better its chances will be of making it to hatching.

EGGS SHOWING EARLY DEVELOPMENT (Chalking in first week):



EMBRYO AND VESSEL DEVELOPMENT (First few weeks):

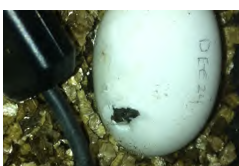
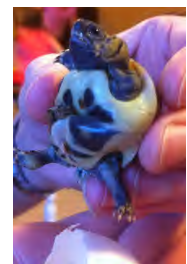


Incubation time

Our Hermanns generally hatch between 53-65 days, and most of our Greeks hatch between 65-75 days. The time will vary with the species and temperatures used.

Hatching

Baby tortoises, when in the egg, are folded in half across their plastron and are virtually round in appearance. When they have absorbed most of their yolk-sack they start to straighten out. Eventually they puncture a small hole in the egg-shells with a bony protrusion which has developed on the end of their snout, called an egg-tooth. The holes that the egg-tooth creates (pipping) allows the hatchling to break out of the egg. The egg-tooth will wear away as the hatchling grows.



Do not be tempted to interfere with the hatching process, unless it is plainly obvious that a tortoise is in serious trouble. Some tortoises take a couple of days to hatch, and require this time to

fully absorb their yolk sac. Also tortoises from the same clutch don't necessarily hatch together either, it may rarely take 2-3 weeks for the last hatchling to emerge safely !

Once they are free from the egg, it is a good idea to give them a lukewarm, very shallow bath, to wash off the sticky membrane surrounding them and to enable them to take their first drink.



Slow 'N Steady Tortoises Experience...

Let Nature take its course!

Sometimes its that easy! Males and females may mate readily after biting and ramming by the male. Usually, about a month later, the female will begin aggressive behaviour as it prepares for egg laying. Providing a sunken bucket/ pot of moistened sand/soil under a heat lamp will provide a satisfactory laying site. Eggs are deposited in a dug nest and buried. They are retrieved, incubated and about 55-75 days later hatch!

With frustrations along the way...

In reality, there are plenty of frustrations along the way... Infertile eggs, or eggs that stop developing are common. Incubator malfunctions are extremely annoying! Maintaining the correct temperature and humidity throughout incubation can prove to be a challenge. If it is too humid, eggs may swell and split, if it is too dry they do not develop fully. The temperature fluctuates throughout the incubator and the temperature reading on the incubator may not reflect the temperature of the egg. I have been surprised how several thermometers may all read quite different. A reliable thermometer located near the eggs is a must! An egg-bound female may be a medical emergency or fatal, and is more likely to occur with females that exhibit signs of metabolic bone disease. Only healthy females should be added to breeding groups.

This booklet has been produced by Slow 'N Steady Tortoises as a guide for breeding healthy Hermann and Greek Tortoises in Canada. TheTortoiseShop.com was an excellent resource. The pictures are from our personal breeding program. The guide is intended for personal use.