WELCOME to SNAKE RANCH

THE 'NO SUBSTRATE' METHOD OF INCUBATING PYTHON EGGS

In the wild, female pythons remain with their clutch of eggs, more often than not coiled turban-like around the mass. Although these snakes are experts at choosing a nest site with ideal or almost-ideal temperature and moisture conditions, they are also able to adjust these conditions to a remarkable extent. Through the exertion of body muscles in what appears to be a systematic 'shivering', a certain amount of warmth is produced, and transferred to the eggs. Other behavioural activities are available to increase the moisture conditions surrounding the eggs.

A black-headed python has produced a beautiful clutch of eggs

The incubation techniques employed by Snake Ranch are designed to maintain clutches of python eggs within a narrow range of both temperature (31-32ºC) and humidity (80-90% relative humidity).

Snake egg incubation techniques are usually held very near-and-dear to breeders, who are understandably loathe to 'fix what ain't broken', and unlikely to experiment with anything as precious as a clutch of reptile eggs derived from efforts that sometimes span years. The basic process for most breeders is to place their eggs within a closed container – e.g. a plastic tub, with the eggs either nestled into dampened substrate, or suspended over an inch or so of water, and to place that plastic container into a thermostatically controlled box or room. Admittedly some breeders allow brooding pythons to retain possession of their clutches, and with provision of appropriate external conditions, generally have quite good luck producing healthy hatchlings.

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With the establishment of Snake Ranch, the decision was made to switch from a predominant history (by its founders and keepers) of using vermiculite or perlite substrate to the ‘water’ technique – popular in Europe and championed in Australia by well-known breeders Peter Krauss and John Montgomery, in a thermostatically controlled room. Following are some thoughts and explanations about this switch, and why we support it as a very stable way of maintaining conditions of temperature and relative humidity, and protection against direct moisture forming or dripping onto eggs for incubating clutches. Hopefully it will at least stimulate some thinking on the subject.

Although the goal here is all about creating a stable environment for the eggs within narrow parameters of temperature and humidity, it should be stated from the outset that this notion of stability isn’t supported by everyone - and arguments for a slight nightly cooling of eggs, as well as a general cooling of incubating temps towards end of the incubation period are acknowledged. It’s certainly not the case that reptile eggs in the wild benefit from precisely consistent conditions - but the problem in traditional incubation strategies is that the changes to these conditions can be much more dramatic than the keeper realises, and have a greater impact in the small closed systems traditionally employed. For example, when the keeper opens the traditional (small) 'incubator' – e.g. fridge-sized, cooler air typically ‘whooshes’ in, making contact with containers within (e.g. plastic ice-cream tubs), which are usually covered with thin plastic film sandwich wrap. When this happens, water typically condenses upon the inside surfaces of the tub and plastic wrap. This movement of water can have a cumulative effect, with the reserve of water migrating gradually from the incubating media to the cooler position. This can do a number of things - all bad.

Not only will a gradient of moisture arise within the incubating material (dry in the centre of the mass of vermiculite/perlite to much wetter on the top of the material), but if, as is sometimes recommended, ventilation holes are placed in the plastic wrap, then the movement of water molecules from within the tub to the surrounding, much drier air can be very rapid. In such a dynamic environment as this, it’s not unusual to find that the amount of water originally mixed into the vermiculite will, by the end of the incubation period, have reduced dramatically. What started out as a 50:50 vermiculite to water (by weight) mix, can end up 80:20 in favour of vermiculite.

To make matters worst, the remainin g moisture is typically confined to the bottom of the tub of vermiculite. An even worst problem arises when water condenses on the glad-wrap directly above the eggs in sufficient quantities to lead to the dripping of water onto the eggs – wherein the eggs may die due to inability to respire due to blockage of the pores (i.e. ‘breathing holes’) with water. This is a major cause of egg death late in the incubation when the metabolic rate of the embryo is very high, and respiration is most important.

To complete the vicious circle, at that late period of incubation the increased metabolism of the embryo causes additional humidity within the ice-cream container, and increased condensation on the glad-wrap above. Too dry, too wet – it’s got the makings of a roller-coaster of sleepless nights! Who needs it?

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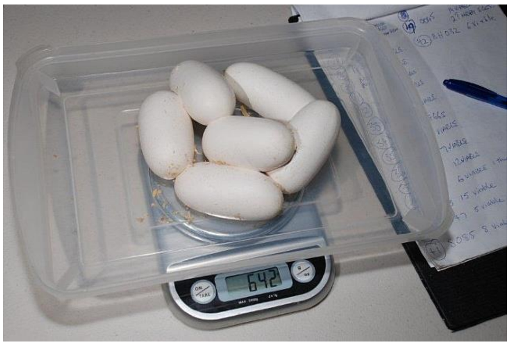
The eggs are gently removed from the brooding female and 'candled'
to ensure that any infertile eggs are detected and removed.

So the European method, modified by Peter Krauss, and 'enlarged' by John Montgomery, and adopted by Snake Ranch, is as follows. An entire room - not a box or converted refrigerator, is thermostatically controlled to a precise temperature. The room is well insulated, and the only access door is via a room that is maintained at roughly the same temperature as is maintained in the incubation room. We do this with a several banks of 500 watt ceramic heat elements with two highly sensitive thermostatic controls controlling each bank, with remote probes in various positions within the room. A pair of reverse thermostats are connected to an air-conditioner so that if ever the room gets too warm, the air-con is likely to save the day.

Several fans in the room continuously churn up the air and effectively ‘de-stratify’ the thermal layers of air that would otherwise form (we’ve all heard about the warm air rises thing). Remember that the electric motors controlling the fans produce heat and in some instances can cause too-much heat in the incubation room. We use a humidifier in the incubation room to maintain 70-80% RH. In fact Snake Ranch makes a lot of use of humidifiers and evaporative coolers to maintain adequate levels of RH in most rooms containing reptiles, since heated air in a cage or room is drier than the surrounding air, and its easy to dehydrate our systems and animals if we don't watch it (think woma in humid burrow in desert conditions, then think ‘difficult skin-shed’ episodes often reported by hobbyists in overly dry heated scenarios). Shelves line the walls of the incubator rooms and upon these we place clear plastic tubs that are available in an extremely wide range of models at hardware stores and discount stores. We use three sizes: 12 litre, 18 litre and 28 litre tubs, the smallest being for a clutch of Antaresia eggs, the largest being for black-headed pythons and olive pythons.

We add water to the depth of approximately 20mm, and above that – say 50mm from bottom of tub we suspend a perforated plastic platform. Having tried various ways of accomplishing this, we have found that the easiest and best way is to place a standard ‘Nylex’ brand silverware tray (that thing that goes in your kitchen drawer) upside-down. They are available by the boxful at Bunnings Hardware stores, and otherwise can be found via Google.

Both John Montgomery and Peter Krauss appear to enjoy staying up all night and snatching their python eggs one-by-one immediately after deposition, and thereafter separating them before they are more permanently ‘glued’ together. These eggs then go directly onto the platform suspended above the water in the incubating containers – which means that their’s is indeed a ‘no-medium’ system. However, at Snake Ranch, we enjoyour sleep, and therefore keep the egg masses together in a single clump. If we were to place the egg mass directly onto the upside-down Nylex tray, the weight distribution for the eggs at the bottom of the clutch would most likely be very uneven, with the greatest weight being borne on as few as three eggs. So we add a small mound of Perlite onto the tray, upon which we then nestle the egg clutch. One danger we discovered in using Perlite in this manner is worth mentioning.



After being measured and weighed, the eggs are placed in plastic incubator box before placement in the incubation room. To ensure constant humidity, water is added to a depth of 1-2 cm; the eggs are suspended above this level.

If the Perlite is of small enough granules to trickle out through the holes in the Nylex tray and float on the water surface below in sufficient quantities, it can bridge the gap between the water surface to eggs with catastrophic results – the ‘wicking’ effect leading to wet egg surfaces, which quickly die due to inability to respire. Larger grain Perlite is the go, and won’t be a problem, otherwise the use of a patch of plastic flyscreen between tray and Perlite will eliminate the risk.

Although the incubation box is sealed with the addition of a sheet on the top, two small holes on opposing sides of the box ensure adequate air circulation. Additionally, a daily 'flipping over' of the glass during the final weeks of incubation ensures that increasing waste gasses are replaced by fresh air. The incubation room is maintained at a constant 31C + or -0.3C. A humidifier ensures that the air within the room maintains a level of relative humidity between 70-80%. This creates a constant level of humidity of 85-90% within the incubation box throughout the incubation process.

Once the eggs are added, we place a sheet of 6mm thick glass onto the tub, which forms a reasonable seal, assuming the tub isn’t warped. We have the glass cut to a size that will overhang each of the four edges of the tub by 20-30mm and grind the sharpness from the glass edges with an emery cloth. Some Americans, who are beginning to switch to this means of incubation, go to special effort to completely seal beneath the glass with adhesive strips of spongy door-gap sealants, or some other form of gasket. Although we have done this in the past, we think it is unwarranted, especially if the incubation room is humidified. We now encourage some air replacement by drilling one small (5mm) hole on the upper part of one of the tub walls to allow limited air exchange.

This is quite safe since the relative humidity within the incubating room is maintained at a very high level. In fact, once a day we lift the glass cover, turn it completely over, and replace it onto the tub, and in effect cause a substantial air change within the tub - again, perhaps as much out of superstition as anything else.
An interesting finding that we have made is that the temperature within the incubating container is usually about 1ºC higher than the surrounding air due to heat-producing metabolic activity of the embryos/eggs.

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Towards the end of the incubation period, the metabolism of the embryos creates substantial warmth within the clutch, typically maintaining a temperature of 1°C greater than the surrounding environment. In undersized incubating containers, this heat production can be compounded.

We don't worry about air exchange into the incubation room, because it happens everyday when keepers walk in and out of the room, but in a much smaller system, it may be a consideration.

It's hoped that this description of a fairly large-scale means of incubating eggs will at least provide someone with some ideas that are applicable to any scale of incubation.

The hatchling black-headed pythons (left) emerge from their eggs after approximately 60 days.
A large clutch of diamond pythons (right) are ready to face the world.

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