# Notes on Incubating Chondropython Eggs

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## Introduction

Chondropython viridis is one of the most beautiful snakes in the world. Many people would like to own one, but the supply is limited, particularly since Indonesia no longer allows exports. This situation has stimulated interest in captive breeding. A number of zoos and private breeders have bred C. viridis but very few have been able to hatch the eggs (Ross, 1978; Rundquist, 1981; Walsh, 1979).

I have incubated three clutches of Chondropython eggs with some success. A description of the incubation methods may be helpful to others who try to hatch green tree python eggs.

## Materials and Methods

Two pairs of Chondropython were responsible for the eggs. The first pair were freshly imported adults when they were obtained in the spring of 1977. The second pair were purchased in June, 1979 from a private collector who had owned them for three months. The first pair produced 15 eggs on 15 February 1978 and 21 eggs on 27 June 1979. The second pair laid 12 eggs on 11 November 1979. Data on the reproduction are summarized in Table 1.

The eggs were removed for artificial incubation. When an egg spoiled, it was opened to check fertility. The first clutch was wrapped in damp paper towels and put in a plastic shoebox measuring 31 x 17 x 9 cm. The closed box was placed in an area where the temperature never got above 29 C or below 25.5 C, and was usually 26.5 C. The old towels were replaced with fresh, damp paper towels after seven days on 22 February. Large tan

blotches appeared on the eggs, and the next day the damp towels were replaced with dry paper towels. The dry towels were discarded on 25 February.

The eggs were set on half of a plastic sink bottom rack in the plastic shoebox. Water in the bottom of the box kept the humidity high. A half cylinder of 1 x 2 steel wire with a paper towel over it prevented condensation from dripping on the eggs and wicked water up for evaporation. Once or twice a week the box was opened and sometimes the eggs were misted.

The second clutch of eggs was divided into two shoe boxes; 14 eggs were put in one and seven in the other. Box 1 contained 227 g (8 ounces) of Vermiculite and 160 ml (5½ fluid ounces) of water, a ratio close to 3:2 (Gray, 1977). The eggs were buried with only the tops showing. Water was lost through a narrow gap between the top and sides of the box. The eggs dehydrated, and an unmeasured amount of water had to be sprayed on the eggs daily, starting about a month after they were laid. In Box 2, the eggs were set on a plastic rack, like the first clutch. There was about 0.5 cm of water in the bottom of the box for humidity. Relative humidity was not measured in either box, but it was later measured at 100% in a setup like Box 2. The eggs were misted daily after they began to dimple, about two weeks before hatching.

Both boxes were placed in a warm room. A Springfield bulb thermometer was placed beside each box, and the temperature was recorded daily at 0700 and 1800 hrs. The temperatures are summarized in Table 2.

The 12 eggs in the third clutch were incubated on a plastic rack at 100% relative humidity, exactly like Box 2. A Springfield combination thermometer and humidity gauge was placed inside the box. The temperature

ranged between 30 C and 31 C and was usually 30.5 C. The temperature was steady because the box was in a wooden incubator. A Sears in-line thermostat controlled a 75 watt heat tape that was wound between two pipes (Ross, 1978). The eggs became slightly dehydrated before they were taken from their mother's cage. As they had not filled out after four days, on 15 November 1979, they were put in a plastic shoebox that was filled with Vermiculite and water, 1:1 by weight. Thirty-six hours later the eggs had developed large tan blotches so they were replaced on a plastic rack. The eggs received no other moisture until they began to dimple, about a week before hatching they were then misted daily.

When mold developed, it was wiped off the shell with a tissue soaked in antiseptic. Both 70% ethyl alcohol and a dilute solution (1 fluid ounce per gallon) of Roccal II were used. The box was opened daily when mold was present and was opened at least weekly the rest of the time for air exchange.

## Results

In the first clutch, ten of the fifteen eggs were opened between the fourth and tenth days of incubation. One of these eggs contained a living embryo, and another had no embryo. All the other eggs contained dead embryos. The last egg was opened on 30 April 1978, 74 days after laying. It contained a 20 cm long embryo.

In the second clutch a total of twelve eggs hatched. Of the fourteen eggs in Box 1, nine hatched between 30 August and 2 September 1979. One severely dehydrated egg was opened on 14 August, after 48 days of incubation. It contained a 25 cm dead embryo. The other four eggs contained dead, full term embryos. In Box 2, four of the seven eggs contained dead, full term embryos, two of which slit the shell before dying. The other three eggs

hatched between 3 and 5 September 1979. All three young showed a spinal abnormality about a quarter of the body length behind the head. Although the babies usually looked normal sometimes the body was flattened and the spine made a sharp downward bend.

In the third clutch nine eggs developed mold and were opened between 20 November and 16 December 1979. All contained small dead embryos. The other three eggs hatched on 29 and 30 December 1979.

## Discussion

Several factors affect the survival of an embryo during incubation. The mother must have enough vitamins and other nutrients to put in the egg. The egg must receive neither too much nor too little water. And the egg must be warm enough for the embryo to develop but not hot enough to kill the embryo.

Vitamin deficiency is hard to measure. However, it is characterized by a large percentage of dead embryos and infertile eggs (Wagner and Slemmer, 1976). As all but one of these eggs were fertile, vitamin deficiency does not seem probable.

Chondropython eggs seem relatively resistant to the effects of dehydration. Several eggs in Box 1 of the second clutch hatched after losing an estimated third of their volume.

The eggs in the first and third clutches developed tan blotches while wrapped in damp paper towels and buried in 1:1 Vermiculite and water. "Transparent areas" (Grow, 1978; Walsh, 1977) have been reported with the observation that they disappeared when the tank holding the eggs was allowed to air out and cool off. The discolorations were believed to be caused by too much moisture (Grow, 1978). I have seen tan dots appear when water droplets land on eggs, supporting the moisture explanation. If water occupies a large amount of the space between the fibers in the eggshell,

it could retard oxygen and carbon dioxide exchange. The embryo could die of suffocation, which would happen quicker at higher temperatures, when the embryo's metabolism is most rapid, than at lower temperatures. This could explain why eggs in a divided clutch hatched at 28.3 C and not at 30.5 C (Walsh, 1977).

In the wild, eggs' chances to pick up water from the substrate seem limited. If they are laid in cavities in logs (Christian, 1981) or in the crotches of staghorn ferns (Gerald Marzec, pers. comm.), only the bottom layer of eggs would rest on the substrate. And, brooding females can lift eggs up totally inside their coils when necessary (Walsh, 1979). The females body would retard moisture loss. Fogs and rain showers would also provide some moisture.

The incubation technique must allow for the eggs' moisture trapping ability. Placing the eggs on a nonabsorbant surface in 100% relative humidity and periodically misting them seems close to my conception of natural conditions, short of having a brooding mother. Placing the eggs on relatively dry Vermiculite in 100% relative humidity might be even closer, but water that condensed on the box top could fall into the Vermiculite and make it too wet. In addition, the first babies that hatched in the second clutch dug their noses into the Vermiculite when leaving the egg. Masses of it had to be cleaned out of their mouths. The problem was minimized by moving the unhatched eggs into a ceramic bowl. In contrast, the hatchlings from the third clutch and from Box 2 of the second clutch crawled around on the plastic rackwand in the shallow water with no difficulties. At present a nonabsorbant surface seems preferable to Vermiculite.

The last egg in the first clutch was opened after 74 days of incubation. The shell had shown no mold at all and no discoloration until a few days before it was opened. The 20 cm embryo appeared freshly dead. If the embryo had died only a few days before the egg was opened, it had incubated past the probable hatching time, but it was far too undeveloped to hatch. As temperature is the major factor affecting the rate of embryonic development (Vinegar, 1973), the proper incubation temperature must be above 26.5 C.

As the best incubation temperature was unknown, the second clutch of eggs was subjected to a day - night temperature variation. It showed that Chondropython eggs can survive temperatures as low as 21 C and as high as 35.5 C, if they are not prolonged.

The long incubation time and loss of embryos at full term in both boxes, and the birth defects in the hatchlings from Box 2, suggest that the temperature was not high enough (Vinegar, 1973). If a day - night temperature variation is used, the average maximum should not be less than 31.1 C, and 32 C to 33 C might be better. The eggs often reached that temperature. An incubator is useful for better temperature control.

The third clutch began hatching after 48 days of incubation. This is close to the 47 days reported for a clutch incubated by the mother (Kratzer, 1962). If the constant temperature, 30.5 C, is not optimal, it seems acceptable.

The optimum incubation temperature probably lies somewhere between 27.8 C (Rundquist, 1981) and 31 C. If the muscular twitching of brooding females indicates that they can regulate the incubation temperature (Vinegar, et al, 1970), then the optimum temperature would probably be the point where the female stops twitching. Females cease twitching when the

ambient temperature is less than 26.2 C and more than 29.6 C (Walsh, 1979). Therefore, the optimum temperature is probably 29.6 C.

## Summary

The incubation procedure that I recommend is summarized as follows. Place the eggs on something nonabsorbant, such as a plastic sink bottom rack or Teflon scouring pads in a bowl. The temperature should be between 28 C and 31 C, with 29.5 C preferred. The humidity should be 100%, and the eggs should be misted from a spray bottle if they start to dehydrate. If this procedure is followed, at least some eggs should hatch.

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Table 1. Summary of reproduction data for three clutches of *Chondropython viridis* eggs

| Clutch | Breeders | Date | Laying Date | Gestation (Days) | Hatching Dates | Incubation (Days) | No. Eggs | No. Fertile | No. Hatched |
|---|---|---|---|---|---|---|---|---|---|
| 1 | PJH 548♂ | ? | 15 Feb. | ? | -- | -- | 15 | 14 | 0 |
| | PJH 551♀ | | 1978 | | | | | | |
| 2 | PJH 548♂ | 17 March | 27 June | 102 | Box 1: 30 Aug. - | 64-67 | 14 | 14 | 9 |
| | PJH 551♀ | 1979 | 1979 | | 3 Sept. 1979 | | | | |
| | | | | | Box 2: 3-5 Sept. | 68-70 | 7 | 7 | 3 |
| | | | | | 1979 | | | | |
| 3 | PJH 624♂ | 17 July | 11 Nov. | 117 | 29-30 December | 48-49 | 12 | 12 | 3 |
| | PJH 623♀ | 1979 | 1979 | | 1979 | | | | |

Table 2. Incubation temperatures (C) for clutch 2.

| | Box 1 | | Box 2 | |
|---|---|---|---|---|
| Time | 0700 | 1600 | 0700 | 1800 |
| Maximum (C) | 31 | 35.5 | 31 | 35.5 |
| Minimum (C) | 24 | 27 | 21 | 24.5 |
| Average (C) | 28.5 | 31.1 | 26.9 | 30.5 |
| Standard Deviation | 1.8 | 1.6 | 2.4 | 2.3 |