A CAPTIVE BREEDING OF THE GREEN TREE PYTHON, *CHONDROPYTHON VIRIDIS* (SERPENTES, BOIDAE)

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The Sedgwick County Zoo has maintained a single pair of adult *Chondropython* on permanent display since May 1975. The female was obtained September 22, 1974, and the male, May 13, 1975. On August 15, 1976, the female produced a clutch of twenty-six eggs, two of which were initially inviable. Of the remaining twenty-four eggs, five were hatched. Of these five, two are currently being reared by myself and my co-workers in the herpetarium. Slavens (1976) lists twelve zoos whose collection includes *Chondropython* although there are undoubtedly a greater number than this. *Chondropython* also enjoys some popularity in private collections. Because of this and an interest in the propagation of Boidae in general, any successful breeding is noteworthy. A tentative review of the literature indicates this to be the first breeding of *Chondropython* in captivity, although our success has since been duplicated (Walsh, pers. comm.).

The specimens are housed in a fiberglass unit, 58 cm x 46 cm x 92 cm with a glass front and a screen top. Suitable props are provided and the animals remain coiled on a branch in plain sight during daylight hours. Illumination is from four overhead 40-watt Vita-lite fluorescent tubes. Photoperiod is nine hours light and fifteen hours darkness in the winter and ten hours light and fourteen hours darkness in the summer. This corresponds with our normal work schedule. Temperature varies between 28°C and 30°C during daylight with a slight cooling to between 24°C and 26°C at night. Humidity is generally 70%. The unit is misted often and excess water drains from a drain beneath the gravel at the bottom of the unit. Each snake is fed two adult mice or the equivalent weekly. The mice are offered alive on tongs or by hand. A tendency on the part of the male to fail to adequately constrict and ingest large adult mice has been noted and half-grown mice are occasionally substituted. The snakes show a preference for drinking from droplets clinging to the sides of the exhibit rather than from a watering bowl. Because of this, the exhibit is usually sprayed when the snakes are watered. The watering interval is every two days. The female is between 1.0 m - 1.5 m in length, while the male is approximately 1.0 m in length. Exact growth records for the adults are not kept since growth rate is minimal.

Copulation in our *Chondropythons* has been achieved by utilizing the following technique. For several days the exhibit is heavily misted just prior to the beginning of the dark period. A sheet of plastic is placed over the screen top of the exhibit. This creates an atmosphere of nearly 100% humidity and little air circulation. At the beginning of the light period the plastic sheet is removed and the humidity falls to approximately 70%, the average daytime humidity. Prior to her ecdysis, the female is separated from the male and housed in a holding cage. Upon shedding the female is re-introduced to the male. The exhibit is misted, the female's cast skin is placed on the screen covering the exhibit, and the plastic sheet is in turn placed over it. No manipulation of photoperiod or temperature is employed.

This technique was first utilized in May and June of 1976. The female was re-introduced to the male in early June. An active response by the male was noted upon re-introduction but lasted only momentarily. The male partially uncoiled and flicked the female's side several times

with his tongue. He then recoiled with the female. This may have been a typical rather than a sexual response. Courtship activity has not been detailed in this species and more extensive observations are warranted in this regard.

On August 15, 1976, a clutch of twenty-six eggs was discovered. Of the twenty-six eggs, two were shrunken and discolored and later found to be infertile. Laying occurred during the dark period and was unobserved. The female did not descend from her perch at any time during the light period prior to laying. Nor did the female cease feeding while gravid. No difference in the temperament of the female was noted during the period prior to or following laying. On the morning the eggs were discovered the female was coiled in her customary posture on the branch. The eggs were deposited in a loose pile that was scattered across the floor of the exhibit. Small pieces of rock and bark adhered lightly to several of the eggs and these were gently removed. Only three pairs of eggs adhered to each other and these were also separated. It is speculated that this may have resulted in the consequential loss of these pairs. After the eggs were removed the female occasionally coiled on the floor of the exhibit. Sporatic muscular contracts were noted by the female, both while coiled on the ground and in the branch and lasted approximately two weeks. More detailed observations are needed before it can be determined whether or not brooding behavior occurs in this species. No records exist detailing egg incubation by *Chondropython* in the wild, nor is it known whether they show facultative endothermy. If fertilization occurred when the female was originally re-introduced to the male in June, the period from fertilization to laying is between 62 and 76 days, assuming delayed implantation does not occur.

No data is available concerning the dimensions of the eggs.

The eggs were initially incubated in a medium of moist Vermiculite in a ten-gallon aquarium. The eggs were partially covered by the medium. The aquarium was covered with a plastic lid and placed in the incubator. Temperature was maintained at approximately 30°C. Within the next few weeks several of the eggs became dented and discolored. Opaque gray areas were observed in contrast to the normal whiteness of the shell. As the eggs spoiled they were examined and partially developed embryos were removed. None of the embryos were malformed. In an effort to retard spoilage, the remaining eggs were removed to one-gallon jars for the remainder of the incubation period. Vermiculite was again used as a medium, however, the eggs were only slightly covered. Water was mixed with the Vermiculite in an approximate ratio of 1:1 by weight and 2:3 by weight. The jars were covered with plastic wrap held in place with rubber bands and again maintained at approximately 30°C in the incubator. During the later part of the incubation period the plastic covers were removed for several hours daily. This allowed for air circulation and partial drying of the jars. It is speculated that this inhibited the development of fungus as well as tending to reverse the discoloration of the eggshell, thereby enhancing viability. The eggs were lightly misted before being re-covered. The increased humidity after drying resulted in expansion of the eggshell to original fullness.

On October 4, 1976, the first egg hatched. On October 7, four more eggs hatched. Hatchlings emerged within twenty-four hours after slitting the eggshell. This indicates an incubation period of between 50 and 53 days at 30°C.

Four hatchlings were brick red in coloration with white dorsal flecking outlined in black and tan venters. One hatchling was lemon yellow with red dorsal flecking. All five hatchlings had orange eyes and white-tipped tails. The evolutionary significance of juvenile dichromatism in this species is unknown. Adults are not polychromic. I have observed a so-called "blue-phase" adult in the collection of the Oklahoma City Zoo. However, I do not consider this to be a true morph but rather a variant. McDowell (1975) states that "transitional forms between juveniles and adults are muddy or olivaceous tan, without spotting." Walsh (pers. comm.) however, indicates a yellow juvenile with green coloration spreading gradually with a retention of the basic yellow ground color. I believe McDowell's statement to be true only of red hatchlings and do not believe that yellow hatchlings undergo this alteration with growth, but rather change directly to green. Partial yellow scalation often persists in the adult form. A gradual lightening of our red juveniles to brownish has already been noted. It is rumored that a sky-blue juvenile coloration exists, however, I have been unable to substantiate this.

The hatchlings shed for the first time about two weeks after hatching (Oct. 19 - Oct. 21). Newborn mice were offered both alive and dead but these were refused. Caudal luring was observed by the young soon after hatching. The white tip of the tail is held in proximity to the head and slowly rotated. This is believed to be a means of attracting potential prey items. Murphy (pers. comm.) reports observing a juvenile lure to an anole. This behavior does not persist into adulthood. McDowell (1975) reports that juveniles in the wild feed primarily on skinks of the genus *Eumeces* whereas adults feed on rodents. Perhaps juvenile coloration is linked with this pattern of predation.

In early November the juveniles were force-fed approximately 2 cc of custard-beef baby food mixture although I now consider this to be an unnecessary risky procedure.

On November 24 the hatchlings were measured for the first time. They ranged in weight from 7.50 grams to 10.95 grams with an average of 9.11 grams, and in length from 25.20 cm to 30.20 cm with an average of 28.3 cm.

On November 20, one juvenile constricted and ingested a juvenile *Natrix* sp. of nearly its own size. This snake regurgitated several days later. This was the first voluntary feeding response observed in our hatchlings.

About five weeks after hatching the juveniles were induced to take newborn mice. A mouse was repeatedly forced into the snake's mouth. If the snake could be induced to hold the mouse in its mouth long enough to be placed in darkness, the natural feeding response usually took over. A slight warming of the snake was also conducive to feeding.

On January 1, 1977, one of the juveniles died. This individual was the smallest of the hatchlings. Exact cause of death is unknown, although this snake exhibited shedding dysfunction complicated by dermal sores.

On February 12, the yellow hatchling overcame and ingested one of the red hatchlings. The yellow hatchling died the following day after failing to completely regurgitate. I consider this to be an artifically-induced example of intraspecific predation and not indicative of this phenomenon in the wild.

Eighteen weeks after hatching (Feb. 26, 1977) the remaining two juveniles struck, constricted and ate live, slightly-furred mice which were laid on top of their coils. This response occurred under full illumination. Since this time the juveniles have fed voluntarily when offered live food items. Occasionally, the snakes were fed lizards of the genus *Sumeces* or *Sceloporus*, however, this practice has been abandoned. The current dimensions (May 18, 1977) of these individuals are 47.7 cm in length, 32.3 gms in weight and 47.0 cm in length, 29.6 gms in weight respectively. As noted above, a slight fading of the vivid red color to a lighter brown has already been observed.

Since production of the first clutch, the technique described above has been further utilized in an effort to induce copulation. In January of 1977, the adult female *Chondropython* was removed from display for the duration of her shed. During this period the male also clouded and underwent ecdysis. Following re-introduction (Jan. 27) the pair were observed *in copula* (Gray, 1977). Efforts were made not to disturb the pair and copulation lasted several hours. Following mating an increase in girth was noted in the female. In early April the female descended to the floor of the exhibit and coiled there for several days. This corresponded with the estimated period of 62-76 days between fertilization and laying. No eggs were laid, however, and the female eventually returned to her perch. The possibility of false pregnancy in this species similar to that in other pythons warrants further investigation. The possibility also exists that this species produces two clutches annually in the wild, although evidence for this is currently lacking. The fact that our pair mated in approximately a six-month interval invites speculation in this regard.

After fourteen months of observations the following conclusions concerning the maintenance and propagation of *Chondropython* in captivity seem valid. *Chondropythons* are relatively hardy animals. Ours do not seem easily stressed, evidenced by the fact that they are on daily display. They are not difficult to maintain and are well-suited for display purposes.

Inducing copulation is not extremely difficult. Introduction of a freshly-shed female to an established male is a simple technique. Cyclic variation of environmental humidity on both a long term and a short term basis seems highly important and may be the key in inducing copulation. Olfaction definitely plays a role as well in stimulating the male to copulate. Manipulation of temperature and light cycles in inducing copulation should be further investigated.

Laying probably occurs 60-75 days after fertilization. Hatching occurs about 50 days after laying at a temperature of 30°C. Incubation is the most difficult step in propagation with no sure-fire method yet established. Too much moisture in direct contact with the egg is certainly detrimental and should be carefully watched. Partial airing and drying of incubation containers during the latter part of the incubation period may increase the final number of eggs hatched.

Rearing of hatchlings is difficult but straightforward. Feeding of young under full light probably hinders the natural feeding response. Forcing the food item into the snake's mouth will sometimes bring about this response as will laying the food item against the snake's nose. Manipulating the snake into striking may also work. It is my belief that *Chondropython* will be bred in captivity with increasing frequency as more information on their propagation becomes available.

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