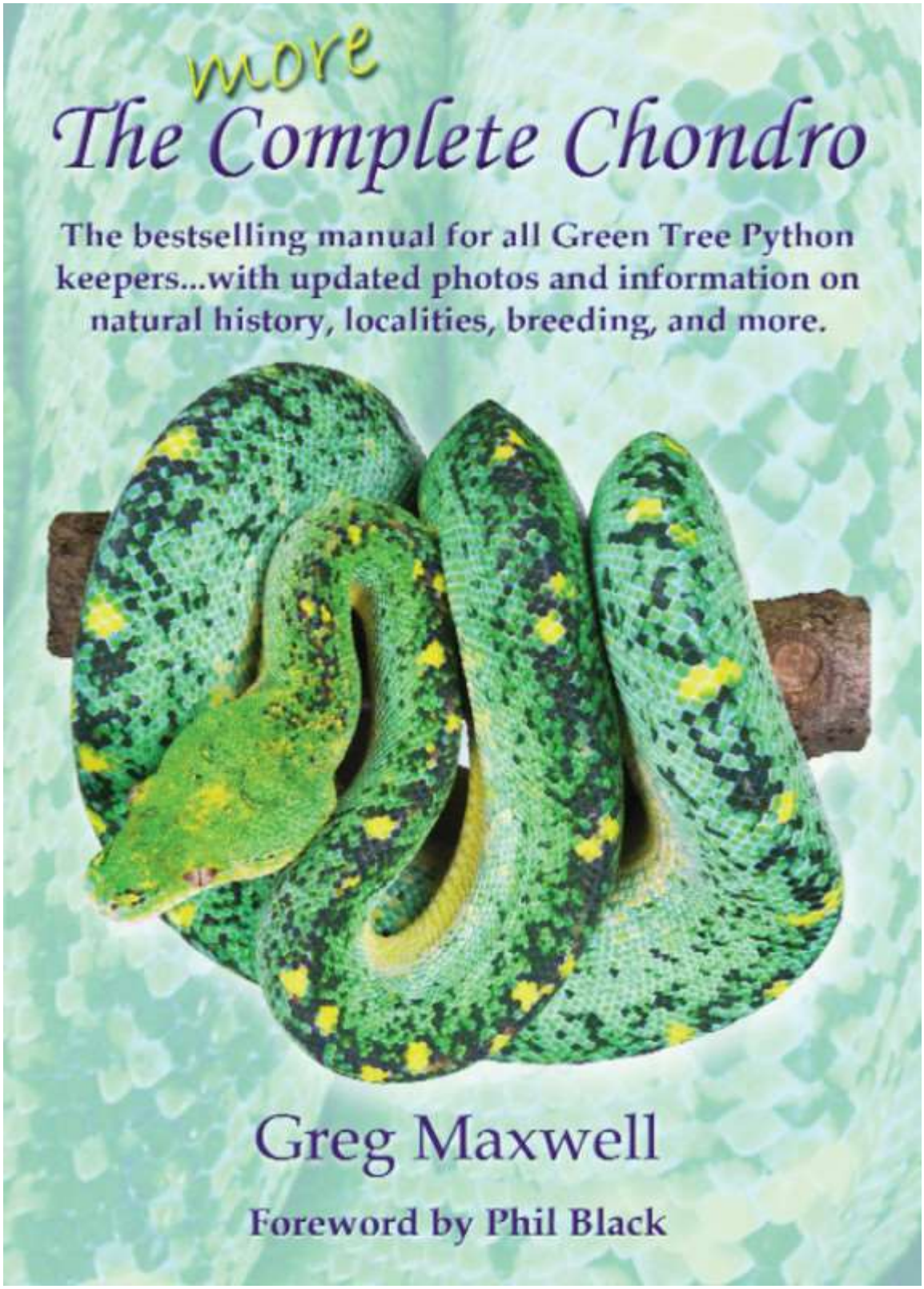

The More Complete Chondro

STANDARD

Green tree pythons (Morellia viridis) have become increasingly popular in recent years, despite having reputation for being difficult to maintain in captivity. In The More Complete Chondro, internationally known “chondro” breeder Greg Maxwell provides a through reference about this beautiful and challenging species. This expanded edition

of the original book covers all aspects of husbandry and breeding techniques, and includes new information about natural history and geographic race. The author discusses breeding genetics and describes all the spectacular color morphs currently being produced, including an update on the albino project. Over 260 color photographs illustrate the text.

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Contents

INTRODUCTION

Welcome to the world of the Green Tree Python (*Morelia viridis*), that beautiful and mysterious inhabitant of the New Guinea and northern Australia rain forests. This nocturnal, tree-dwelling serpent is truly one of God's special creatures and has been a major source of fascination and wonder in my life.

In this book, I will introduce you to the Green Tree Python (GTP), or "chondro," the nickname given them by those who know and love them as captives. We will cover everything from the geography and climate of the chondro's wild home to providing the best captive environment and breeding conditions. We'll talk about solving common problems associated with captive tree pythons and discuss the ethics of keeping and breeding.

As interest in keeping and breeding GTPs has steadily increased over the last ten years or so, a definite need has developed to take the body of work, experience, and efforts of successful keepers and breeders and put them into one volume for the chondro community to use as a reference. I feel there is also a need to sort out fact from fiction regarding this often mysterious and controversial species.

I have applied over thirty years worth of reptile husbandry and breeding experience to working with chondros, and they have become one of my life's passions. I now keep and breed them exclusively.

There are many issues dealing with the captive husbandry and reproduction of green tree pythons that are controversial in nature, and many different opinions

exist. Many people, including the author, are passionate about which conclusions are the correct ones! We can't even agree on the scientific name, for crying out loud! (The time-honored *Chondropython*genus, which is where "chondros" get their slang name, was changed some time ago to *Morelia*, much to the irritation and dismay of some chondro fans and even a few herpetologists. More will be said about this in Chapter 1.) The information and views expressed in this book are based on years of hands-on experience and observation, and most are further backed up by the collective experience of veteran keepers and Green Tree Python pioneers.

The title THE *MORE* COMPLETE CHONDRO refers to my attempt to include everything I have learned about these snakes and to provide an updated and thorough resource for keepers and breeders. As was pointed out in the first edition of this book, it does not suggest that there is nothing more to learn or that I "know it all," a few public comments directed at me notwithstanding. The late herpetologist Carl Kauffeld once observed that a specialist is one who "learns more and more about less and less." Since deciding to focus exclusively on keeping and breeding chondros over ten years ago, it seems to me that the more we learn about them, the less we do know. For example, we have just begun to scratch the surface of deciphering the mysteries of ontogenic color changes and genetic trait functions associated with neonates and unusually colored adult specimens. But I hope this volume will serve as a springboard for future discoveries, while covering the fundamentals about which we now have some depth of understanding. I will do my best to include the viewpoints of those whose perspectives differ from my own, so long as they fall within the realm of good critical thinking and have some logic to them. I'll also attempt to identify those conclusions that are strictly my opinion and separate them from those that are established and accepted facts.

I have decided to include the popular nicknames given to many of the individual chondros referred to in the text or shown in the photographs. I realize that some readers may not be fond of giving such names to animals, and I do think that some reptile owners tend toward anthropomorphism (the attribution of human characteristics to animals). However, it has become apparent that many chondro lovers can more easily relate to a name than they can to an ID number assigned to an animal. We see this same principle at work with thoroughbred horses and show dogs. Since a growing number of valuable breeder chondros are known in the breeding and collecting community by their popular names, it seems appropriate to include the names here. For example, "Calico Junior" calls to mind the specific animal referred to much more readily than #GM-99-09. This is a recognized trade name for the animal and his bloodline much like "Secretariat" is to the racing horse community. I hope that the reader will understand that this is different than simply calling one of my pets "Mr. Squiggles" or "Monty Python." To hedge all bets, I have included the pedigree ascension ID number in parenthesis following popular names, when this is known. It may surprise a few readers to learn than many serious color morph chondro breeders keep bloodline pedigrees on their animals and refer to the parents as "sire" and "dam." This helps to build heritage and

credibility within the breeder's program and demonstrates the commitment to quality and value that such breeders have. I have adopted the ID code format suggested by several people as the best and most intuitive: The breeder's initials (GM) followed by the year the animal hatched (99) and then the individual animal's number (09). This last number usually indicates the hatch order for a given year; i.e. "09" means the animal was the 9th hatchling that year. I do not engage in the practice of putting my own initials on animals produced by other breeders when they enter my collection. It is my opinion that doing so is confusing and counterproductive.

It is my fervent hope that this book does more than teach the basic principles of GTP care and captive reproduction. I hope to instill in my readers the same sense of awe for these remarkable snakes that I have; to communicate the same sense of responsibility for ethical husbandry and breeding practices that were taught to me by those who introduced me to chondros; and to convince you of the responsibility we all share for helping to maintain the integrity and value of the species commercially. I make no apology for engaging in such moralizing. In my opinion, the wonderful privilege of owning these denizens of the rain forest carries with it responsibilities no less than these. As Ralph Waldo Emerson said, "*All high beauty has a moral element in it*."

SECTION I.

MEET THE GREEN TREE PYTHON

This is not a trick photograph, just a chondro being a chondro.

CHAPTER 1. THE NATURAL HISTORY OF THE GREENTREE PYTHON

"Everything on Earth is beautiful, everything, except what we ourselves think and do when we forget the higher purposes of life and our own human dignity."

Anton Chekhov

The Green Tree Python (*Morelia viridis*) is a very beautiful, arboreal, nocturnal python from the rain forests of New Guinea and some of the surrounding islands that are part of Indonesia. It is also found on the Cape York Peninsula of Northern Australia. While the main focus of this book is on the care and breeding of GTPs in captivity, it is my belief that some knowledge of the geography and climate of New Guinea will help keepers to provide a better environment for chondros in a captive setting. Such information adds to the overall enjoyment of keeping them as well. Although some of our captive bred projects no longer resemble their wild relatives, I feel that all chondros are best appreciated within the context of their wild roots. After all, "beauty is only skin deep!" Underneath the exquisite coloration, they are all green tree pythons.

HABITAT AND CLIMATE

The habitat of the chondro is wild, remote, diverse, and gorgeous, with varied terrain and landscape. New Guinea is equatorial in location, which means that much of it is hot and humid and has a high annual amount of rainfall. This geographic area averages at least 80 inches of rainfall per year in the lower elevations and over 120 inches in the mountainous regions. Daily maximum rainfall amounts can be extremely high, with several locations having recorded between 20 and 28 inches. Some parts of Papua New Guinea (PNG) and Indonesia have wet and dry seasons, and these vary in length and intensity depending on location and elevation. Only the Lesser Sunda Islands and Eastern Java have a well-developed dry season.

Locations on the equator and far from the tempering dry air from the Australian landmass have little or no dry season, but enjoy lower amounts of rain during several months. Indeed, Indonesia's location between the landmass of Australia and Asia makes it subject to their strong influences on the Monsoon rainfall patterns. The wet season extends from November through April, and the dry season from May through October, but these are rough time frames and there is great variation, with most of the region receiving heavy precipitation during much of the year. Strong afternoon thunderstorms are common. Herpetologist and nature photographer Karl Switak, who has done field research on chondros from a base camp at 5400 feet above sea level, reports daily afternoon storms in the upper elevations of Papua. Australian researcher David Wilson told me that the all the indigenous Cape York populations are inaccessible during the rainy season due to flooding from torrential rains. It is no coincidence that many captive breeders report breeding activity during strong low-pressure systems accompanying rainy periods, or that most of the successful breeding activity in the United States occurs

from November through March (which corresponds with the time of the PNG wet season).

Laloki River, above Port Moresby (Central Province, PNG): Heavily forested gorge. Photo courtesy of Mark O'Shea.

Ambua (Southern Highlands, PNG): Primary mountain rain forest. Photo courtesy of Mark O'Shea.

With all that rain, it comes as no surprise that the relative humidity is high year round and averages about 80%. Temperatures are high too, with the warmest average daily temperatures recorded in the lowland coastal areas and moderating somewhat in the higher elevations. Temperatures generally range from a low of 68°F to a high of 89°F. Temperature extremes for Jakarta, a city on the Island of Java that is roughly the same latitude as the Aru Islands (location of one of the GTP populations), range from an all-time high of 99°F. to a record low of 66°F. Temperatures can drop even lower in the higher elevations, and Switak recorded average nighttime lows in the 50sF°) at his base camp in Papua. Average temperatures don't vary much from summer to winter, and the photoperiod (the number of hours of daylight during each 24-hour period) is also consistent, owing to its location near the equator. This means that there are about 12 hours of daylight and 12 hours of darkness year round and little seasonal variation of most climactic elements.

Oriomo (Western Province, PNG): Monsoon forest over tidal mud flats. Photo courtesy of Mark O'Shea.

This information leads to the logical conclusion that chondros in captivity will do best with a cage environment that is relatively high in humidity, warm (78° to 88° Fahrenheit), and with each 24-hour period roughly divided between 12 hours of light and 12 hours of darkness. As we will discuss in detail later, it is also prudent to provide fluctuations in both temperature and humidity in each 24-hour cycle.

Plant growth ranges from scrubby coastal areas to lowland monsoonal rain forest, swamps, and woodlands; at higher elevations, the rain forest is more sparse with filtered sunlight and open areas. Both Switak and Wilson have observed that chondros are not found in the swamps or woodlands, preferring rain forest habitat and adjacent transitional regrowth areas. At higher elevations in Papua, the animals are most common in open forest where there is plenty of sunlight penetration. This may be due to a need to bask following chilly wet nights, or may be the result of more abundant prey in such areas. Chondros range from sea level up to elevations of just over 6500 feet (2000 meters).

Alexishafen (Madag Province, PNG): Secondary forest on old WW II Japanese airstrip. Such overgrown, formerly cleared areas provide both transition

habitat for reptiles and their prey, and access for humans. Photo courtesy of Mark O'Shea.

HABITS

Not much is known about the habits of GTPs in the wild. Tidbits of knowledge can be gained from the field observations made by collectors, park rangers, and naturalists who have had the opportunity to see the chondro in its native habitat. David Wilson, mentioned above, has been doing research on Australian green tree pythons on the Cape York Peninsula, Queensland, for several years and has provided me with some fascinating observations on wild Aussie chondros for this chapter.

As their common name implies, GTPs do spend most of their time off the ground. Switak reports collecting a specimen discovered fifteen feet high in a tree, but his observation is that most specimens are collected from slightly lower heights averaging ten to twelve feet. Native collectors indicated that specimens brought to him were collected at an average height of about eight feet. (Mr. Switak related to me the difficulty of getting accurate information from the indigenous people, because they are so eager to please that they will tell you the answer they suspect you want to hear. Switak even had to hold his hands behind his back while questioning the natives because any gesture he made would translate into questionable data!) Wilson has observed chondros resting during the day from just above ground level to the top of the forest canopy, although the subcanopy layer (30-60 feet) typically held the majority of specimens. He noted that they often roost in open and unprotected areas but are normally unmolested by birds or other animals.

Unlike the similarly colored Emerald Tree Boa from South America that moves like a "fish out of water" when not perched on a branch, chondros seem quite comfortable on the ground. This fact surprises a lot of GTP owners, who frequently take alarm if one of their animals chooses to spend a day or two resting on the floor of the cage.

In fact, several importers have remarked that local natives collect many wild caught GTPs as they crawl across roads at night. Bob Withey, an Australian keeper, told me that he has heard that during the rainy season, the animals are regularly found close to the ground at night with the aid of spotlights from vehicles. Wilson also has observed them hunting very near the ground and coiled pancake style on the forest floor. In contrast, Switak reports finding exactly one live chondro, along with two DORs (Dead on Road), during his sojourns in PNG. At the very least, we know that *Morelia viridis* isn't afraid to descend and to utilize habitat close to the ground. As mentioned, captive specimens often rest on the ground, and more will be said about this later.

It is not unusual at all for captive chondros to seek a daytime resting spot in a secluded part of the cage floor. Can you spot the animal in this photo?

It is often reported that GTPs are locally abundant in the areas where proper habitat is accessible to humans. (In fact, many of the so-called “locality” names for these animals are taken from collecting locations near to cities having airports, which helps to simplify exportation.) Switak had some difficulty locating specimens himself, but the locals had no such trouble. The animals were common in the highlands where the writer’s camp was located, and many specimens were brought to him. These were often injured, a fact which mattered little to the collectors, who were just as happy to eat the pythons as they were to sell them. Kamuran Tepedelen of Bushmaster Reptiles told me that on the Island of Biak the habitat is very open and scrubby, and juvenile Biak GTPs are collected in large numbers because they are abundant and easy to find in the open scrub growth. (I suspect that most of these end up as “captive bred” animals at Reptile Expos in the US where large numbers of obviously imported juvenile Biaks are seen.)

Wild chondros are subject to frequent heavy rainfall, and the daily spraying of captive animals and their cages is helpful for maintaining good humidity and adequate hydration.

Australian populations seem to represent an exception to this commonness, and Wilson (an experienced chondro researcher who knows exactly where and how to look for them) told me that he is doing well to find one specimen for every two to three hours of hunting. He states that the Mcllwraith Range may have the largest population of Australian chondros, but inaccessibility during the rainy season (when they are easiest to see) makes ever finding this out unlikely. He estimates the Iron Range population to be at least 500 individuals. It stands to reason that these beautiful pythons probably occur in large numbers anywhere that suitable habitat and abundant food supplies can be found. Since much of their wild range is rugged and uninhabited, there is still a lot of data to be gathered and analyzed. At the time of this writing, political unrest in parts of Indonesia has made fieldwork dangerous.

Chondros are creatures of habit, and this is born out in the observations of both naturalists and keepers. Many animals in my collection have regular daytime resting spots that they habitually return to each morning and nighttime hunting perches that are used each evening. This activity parallels the field observations of David Wilson, who has done radio tracking of wild specimens to monitor their movements and activity. His research has shown that green tree pythons seldom move during the daytime and descend to a hunting location around dusk, where they stay for as long as twelve hours. They hunt from a single location very close

the ground – usually about twelve inches or so – and they return to a resting spot again once they abandon the hunt.

This nighttime photo shows the typical head-down hunting position taken by most chondros as dusk descends.

Females were occasionally seen in a hunting posture during the daylight hours, presumably to increase fat reserves prior to breeding. Individual pythons would hunt from exactly the same location for several consecutive nights, then seek out a new hunting location up to one hundred yards away. There they would remain for several more nights and repeat the process. Overall, hunting success was low… more on feeding habits in the Biology section below.

TAXONOMY

And now, what about that name? As I mentioned in the Introduction, chondros haven't always belonged to the genus *Morelia*. For years they were known as *Chondropython*, and many of those who have worked with this species a long time have a certain affection for this name. After all, we still refer to them as "chondros" and always will. The unusual name*Chondropython*, with just this single species making up the Genus, just seems to suit these unique serpents, and some of us didn't really see a need to mess with that! Why the change, especially when every scientist and snake lover in the world recognized *Chondropython*? The answer lies within the deeper purposes of scientific nomenclature, as well as with the philosophy of some taxonomists.

In 1872, Schlegel placed these snakes in their own genus (*Chondropython*) based on the mistaken belief that they lacked premaxillary teeth. The two words – Chondro and viridis – translate as "cartilage, cartilaginous or granular," and "green," respectively. Hence the name literally means "granular or cartilaginous

green python." Probably the reference to cartilage or graininess relates to the large head lobes covered with tiny granular scales. (Sounds pretty descriptive and accurate to me!) McDowell questioned the validity of *Chondropython* as a legitimate distinct genus in 1975, and in 1994, a paper written by Arnold Kluge sealed the fate of the old name (Barker, pers. comm.). *Chondropython* was eliminated and the snakes were reassigned to the Genus *Morelia* to reflect a close relationship with that group of pythons, of which the Carpet Python (*Morelia spilota*) is probably the best known. This change in how we identify the Green Tree Python illustrates that, along with providing a universal language for reference and communication within the worldwide scientific community, the language must also reflect the blood relationships of organisms to the best of our current understanding.

As mentioned, not everyone is happy with the change. One well-known reptile authority (who shall remain unnamed to protect him from being the target of some of the snide comments I have received) told me that having to place an animal's tissues into a centrifuge or under a microscope in order to identify it, crosses the lines of common sense and an appropriate use for scientific nomenclature. His opinion reflects one philosophy of taxonomy which might be described as "lumping," as opposed to "splitting." Lumpers often have little tolerance for some of the microscopic hairsplitting that goes on when reclassification of animal groups is being considered. We tend to feel that time-honored classifications, based on groupings that make sense visually, geographically, and behaviorally, don't need further scrutiny and division or wholesale reclassification. Splitters, in their defense, are trying to make scientific nomenclature as accurate as possible, based on new information and new technology. However, it is a fair question to ask how many personal agendas get entwined with such research. There must be tremendous pressure to come up with conclusions that call for change when funding and large amounts of time have been invested. Who would want to spend years and thousands of dollars investigating a potential reclassification, only to discover that things are just fine the way they are! When this fact is combined with the prestige of getting one's name on a published paper and maybe even getting one's name (or a spouse or friend's name) included as part of the new scientific name for a "new" species or sub-species - then I think some skepticism is called for. This is not to say that all (or even most) taxonomic changes are wrong. But too often the acceptance of these changes is enforced with an almost religious zeal. Scorn is directed at those who question the changes or the "splitter" philosophy.

There has been some talk of dividing green tree pythons into several subspecies. Certainly the Island races of Biak and Aru warrant further scrutiny. There is a large mountain range that divides most of PNG into northern and southern halves, and there is some DNA evidence to suggest that the chondro populations from each side represent two different lineages. Predictably, the Australian populations have been shown to be closely related to southern PNG animals. There is evidence of an exposed land bridge between southern PNG and Australia in the region of the Torres Straight as recently as 8000 years ago

(Rawlings and Donnellan, 2001). Some of this research has been undertaken to assist Australian zoos and wildlife enforcement with distinguishing pure Aussie greens from PNG specimens or those from mixed ancestry. Rumors of splitting PNG specimens into *two different species* is the kind of stuff that makes "lumpers" roll their eyes.

I am not trying to be controversial or inflammatory with my opinions, and we all need to carefully examine new evidence. The thing to remember is that there can be more than one conclusion or interpretation, and all of this is simply man's attempt to understand the world and its organisms. The critters are the same today as they were yesterday, no matter what we decide to name them. In a world where very little seems secure and reliable, perhaps some of us can be forgiven for wanting to hang on to something old and familiar. That's why all the snakes in my house will always be referred to as "Chondros," regardless of what Latin name the scientific community puts on them!

BIOLOGY

GTPs are small, as pythons go. Even a large adult is smaller in diameter than the average adult person's wrist. The author has observed specimens over six feet in length and approaching 2000 grams in weight, but these are exceptional. The average adult male will be between four and five feet in length and will weigh 900 to 1200 grams. Average females are a bit larger, and can weigh over 2000 grams. Adult females in the author's collection average about 1200-1800 grams prior to cycling for breeding. An experienced person can sometimes predict sex in yearling animals based on growth rates and the more streamlined body shape of some males. Animals from Biak Island are usually recognized as the largest of the geographic races, but a specimen of apparent Aru ancestry is the largest chondro ever personally observed by the author.

“Beauty,” a large Aru-type female owned by Tomm Phillips, exceeds six feet in length. This is larger than the average adult chondro.

Chondros can be fairly long-lived in captivity. Anecdotal evidence indicates that males frequently outlive females, and there is a documented case of one male living to over twenty years of age at the Smithsonian National Zoological Park (NZP) in Washington, DC (Walsh, pers. comm. 2001). Longevity records of animals over ten years of age are becoming common for both sexes, and it seems reasonable to expect captive specimens to reach an age of fifteen years or more with proper care. “Proper care” includes using prudence in the determination of female cycling and breeding regimens, as the toll on females from fasting and egg production can be substantial. Indeed, most female deaths in captivity seem related to complications arising from reproduction, rather than from old age or disease.

This ten-year-old female appears to be having a normal ovulation, yet she died within hours of this photo being taken. Postmortem examination revealed a burst ovary. Reproductive complications are a common cause of death in mature females.

GTPs share some characteristics with most other kinds of snakes. Being exothermic ("cold blooded"), they are reliant on their surrounding environment for temperature regulation, and like most reptiles they have a well-developed instinct for thermoregulation. This is the ability to micro-manage their body temperature using variables within their habitat. This can be seen to an extreme in some types of snakes inhabiting northern latitudes, which have been observed to be active with snow cover still visible in places. Obviously these specimens have body temperatures higher than the freezing point. Chondros have all the same internal organs common to most vertebrates, including heart, stomach, liver, gall bladder, intestines, and two lungs (a larger one and a smaller one). The tongue is used in the same manner as other snakes, to sample and analyze spoors from the environment.

Like other boids, GTPs have heat sensitive labial pits. These can accurately detect minute differences in temperature and are useful in locating and overcoming warm-blooded prey. That chondros rely heavily on these thermo-sensing pits is evidenced by the fact that recalcitrant feeders can often be induced to strike prey after it has been warmed. The snakes will also frequently strike at the human hand if it is within range while food is being offered, indicating that heat is as much a cue for the feeding response as scent is. Chondros have cloacal spurs, as do other boid species. These are usually large in mature males, and small or lacking in

females, but the presence of spurs or their size is not a reliable sex indicator. Males often use their spurs to tickle and titillate females during courtship.

The heat-sensitive labial pits possessed by all chondros can be clearly seen in this photo. It has been speculated that females may even use these pits to help thermoregulate their eggs.

Spurs on a male chondro.

GTPs are egg layers, and females brood their eggs. It is assumed that this takes place in hollow tree cavities or maybe even on the ground in a secluded location. Switak told me that as far as he knows, no one has ever observed or photographed a wild female brooding her eggs. (Years ago, the children's nature magazine *Ranger Rick* published a photo of a female GTP coiled around eggs in the crotch of a large tree. Through extensive research, it was finally proven that the photo was staged by a zoo photographer.)

Chondros do have some characteristics that distinguish them from many other species. Unlike most other boids, chondros are specially adapted for an arboreal existence, spending most of the time off the ground and perched in trees or scrub growth. Most pythons and boas can and do climb, but green tree pythons are a true

arboreal species. They have more slender bodies compared to most other pythons, and they are well suited to life above ground in the growth of the rain forest. Further enabling this aerial existence is the prehensile tail, an appendage that is able to grip and cling to objects. Chondros show an amazing ability to maintain their grip on perches, tub rims, plants… anything within reach of the tail. They can sometimes be observed curling the tail in reverse while moving the posterior part of the body in a backwards direction, winching themselves back to the security of the perch. As was mentioned earlier in this chapter, chondros are not hesitant to leave an elevated perch, and may prowl or even rest on the ground.

Chondros are very skilled at gripping a perch with their prehensile tails, and it can be difficult to convince them to release.

Chondros have a very fascinating use for their prehensile tail that captivates owners new and old - the practice of caudal luring. This behavior is most often seen in the animals as dusk approaches and is quite entertaining to watch. The last few inches of the tail are held erect, and a very lifelike imitation of a small worm or caterpillar is effected by the twitching, wiggling, and curling and uncurling of the appendage. When watching this, it is extremely easy to imagine how a frog, lizard, bird, or any other animal fancying a tender meal of small insect would be fooled into making a grab for the tail. Many keepers believe that their chondros know what they are doing when caudal luring and are “asking” for food when showing the behavior. It is very true that chondros seem to have more intelligence than many kinds of snakes and can react and relate with keepers in ways other

species don't seem capable of. However, I believe that caudal luring is an instinctive, and often subconscious behavior that the animals engage in out of excitement, nervousness, or fear, as well as hunger. Chondros will often begin luring at the sight of a human approaching them in the evening and this has led to the conclusion they are consciously begging for food, like a dog that has learned to sit on its hind legs. GTPs may be one of the more intelligent of reptile species, but they aren't that smart! Dogs drool without being taught, and chondros wriggle their tails; both behaviors are instinctive and associated with appetite. However, I have seen caudal luring in angry, non-feeding animals, and even disturbed gravid females that were solidly off feed. I think the behavior is a deep-rooted, instinctive performance that may help to draw in potential prey, rather than a conscious, deliberate act.

This after-dark photo shows an adult female on high alert and exhibiting the caudal luring behavior. Great caution must be exercised around such specimens, which will often strike at the least bit of movement or warmth.

GTPs are nocturnal by nature, resting quietly on a chosen perch during daylight hours, and actively taking up prowling and hunting when dusk descends. Like other nocturnal species, they have elliptical ("cat") pupils that provide them with excellent nighttime vision. An actively hunting chondro will take up a characteristic ambush posture, with the head and several inches of the neck

hanging down from the perch. The neck is loosely curved into an "S" preparatory to striking. Even the tamest captive specimens are on high alert when observed in this nocturnal hunting posture, and they will strike at the slightest movement. Chondros seem to be the most active during the first two hours or so of darkness. As will be seen later, you will grossly overfeed your captive animals if you offer food whenever you observe luring or hunting behaviors. It is highly educational to learn that wild chondros do not seem to eat often. David Wilson's radio-tracking studies showed that some individuals eat about once per month. Switak describes the wild specimens he observed as nearly always being on the thin side, often with ribs visible. He also noted that most were parasitized. He told me that it would be surprising to most hobbyists to see how thin most wild specimens are. I would observe that the same thing could be said of any animal or even humans that live where food is not abundant, and I think our well-fed captive animals are better off with good fat reserves. However, the average keeper probably tends to overfeed his or her animals, and nature suggests that green tree pythons are not designed to live as fat, lethargic beasts.

The wild diet of mature chondros consists mostly of small terrestrial mammals. Contrary to popular belief, GTPs do not eat many birds. Switak states that in his entire experience with Papuan specimens, not a single animal's feces ever contained bird residue. Wilson noted a few scats containing bird remains from specimens that were hunting next to flowering trees. Apparently the pythons were able to catch a few birds that were attracted to the nectar. In addition to mammals and occasional birds, Wilson lists lizards and insects (beetles and moths) as prey items. Presumably these are mostly eaten by juveniles.

Green tree pythons are shy by nature, and wild specimens have a well-deserved reputation for being snappy. A few captive bred individuals can also be ill-tempered, most notably those of Biak ancestry, but truly savage ones are the exception. The average captive bred adult will respond well to gentle handling and patience, and the majority can safely be handled during the day. As a species, GTPs are somewhat delicate and nervous compared with many other types of boids and are easily stressed from excessive handling. It is best to go easy with individual specimens at first and expose them to handling gradually. Some chondros will not tolerate this well and are best observed without being forced to accept interaction with humans. Chondros are not a gregarious species and do not live in colonies. Some captive specimens will adjust to being caged in groups, but it is probably best to house them singly as nature intended them to live.

In this overview of GTP habitat and natural history, we have gained a glimpse into their world. In the next chapter, we will discuss how chondros have been brought into ours.

Chapter 2. A Brief Captive History of the Green tree Python

"Any written history inevitably reflects the thought of the author in his time and cultural setting."

Charles A. Beard

As the title of this chapter implies, the information presented here is not intended to be exhaustive. It is included to provide a basic history of the popular work with *Morelia viridis*, primarily that which has gone on in the United States, and mostly in the private sector. It should be noted that there are many dedicated GTP enthusiasts and breeders in Europe and other countries and that some of their work with the species predates what has taken place in the United States. Nevertheless, there has been an enormous swell of interest directed at chondros in this country for the last twenty years or so, and there is no doubt that American breeders are producing the majority of captive bred chondros in the world today. US breeders have led the way in the development and production of so-called "designer morphs" of chondros, including high yellow, high blue, calico, "mite-phase," and other selectively bred colors and patterns, although some real progress is being seen in other countries now as well. Therefore, it seems appropriate to discuss a little of the history of the work with these pythons in captivity in the US. It has always been my belief that having some knowledge about the initial work with these pythons helps us to more fully enjoy and appreciate them today. Chondros are truly a species with a heritage that is unique among captive reptiles.

The Early Years

The first hatching of GTP babies in captivity in the United States occurred on October 4, 1973, under the supervision of Karl Switak at the Steinhart Aquarium (SA) in San Francisco, CA. Switak was bringing a gravid wild caught female Chondropython back to the US from a field trip to New Guinea when she laid eggs in the bag containing her, en route to home. All of the eggs hatched successfully and history was made. Switak chronicled his travels and observations in a two-part article for *Reptiles Magazine* in 1995, and the story of the gravid female and the first captive hatch has become a part of chondro folk-lore. I am privileged to have animals from this bloodline.

This beautiful female, “Alice” (GM-99-42), produced by the author in 1999, is a fifth-generation captive bred offspring from the original wild female captured gravid by Karl Switak in New Guinea, 1973.

Three years later, in October of 1976, the Sedgewick County Zoo (SCZ) in Wichita, Kansas, hatched the first clutch of captive bred GTPs in the United States. Also at this time, a young private breeder named Trooper Walsh was accumulating a collection of imported chondros, and also managed to acquire specimens from the 1973 SA and 1976 SCZ clutches. Walsh achieved his own breeding success early in 1977, distinguishing himself as the first private American breeder to do so. A male from the 1976 SCZ clutch, acquired by Walsh, went on to sire much of the early founder stock, and his bloodline is still represented in collections and breeding groups today. He is also one of the longest-lived chondros in captivity, having survived over 20 years in the collection of the Smithsonian’s National Zoological Park (NZP).

Most of the original imported females did not survive to reproduce, and those that did seldom survived long after their first clutch. In 1979, Indonesia imposed restrictions on exporting anything other than captive bred tree pythons, and at that point the flow of legally imported chondros into the US ceased. The successful captive breeding of GTPs was very much a hit or miss endeavor until the early to mid eighties, when enough experience had been gained to realize some consistent success. This was especially true in the area of egg incubation. By the late eighties, enough captive bred chondros had been produced from the early imports to establish colonies. Al Zulich, of Harford Reptile Breeding Center in Maryland, was

one of those to establish a breeding colony. His wild collected blue female (then a very rare color morph) produced one of the early captive bloodlines still represented in collections today, and one that is involved in some of the current high-end projects.

Walsh's chondro room, circa 1976.

History was made when Walsh became the first private US breeder to produce and hatch a clutch of green tree python eggs in 1977. Photos courtesy of Trooper Walsh.

Soon after his initial success, Walsh teamed up with another python breeder, Eugene Bessette of Ophiological Services (OS) in Gainesville, Florida. Dr. L.H.S. Van Mierop, who had been working with Bessette to study thermoregulation in brooding pythons, brought the two of them together. Van Mierop is credited with the early studies involving thermoregulation of brooding female chondros and with working out the temperature regimen used by the females to incubate their eggs. Walsh and Bessette formed a working relationship to study and reproduce chondros, attempting to solve the difficulties of captive breeding and egg incubation. Their goals also included marketing captive bred pythons to other collectors and breeders. That collaboration lasted over two decades and made Walsh and Bessette “household names” to those interested in keeping and breeding GTPs. Together, they pioneered many of the procedures and techniques still used today and they worked hard to promote the buying of captive bred chondros only. The OS slogan, “Buy the best, forget the rest,” reflects the commitment to quality that both men brought to captive breeding and selling of GTPs. It is a testament to their success that these words now apply to the work of many breeders who are

carrying on that same commitment to quality. We owe them a debt of respect and gratitude for laying that foundation.

The author produced this female ("Sheila," GM-00-08) in 2000; she is a fourth-generation offspring from both the 1976 SCZ breeding and the 1977 Walsh breeding. What other species of snake carries this kind of heritage?

More Breeders and More Chondros

In the 1980s and 1990s, interest in captive bred reptiles of all kinds grew rapidly. In 1988, veteran keeper and breeder Don Hamper of Ohio started a monthly herp swap meet, and soon swap meets, shows, and expos became very popular. This in turn fueled the interest in reptiles, and by the early 90s, captive bred snakes of many different kinds and many different captive-developed color morphs were available to everyone. None of this enthusiasm and momentum was lost to chondro aficionados, and with the strides in breeding success made by the early pioneers, others began to enjoy a modest success rate with the species as well.

As more chondros were produced and more information was shared, the captive breeding pool in the US became firmly established. The chondro bug bit me hard in the early 90s, at which time I was maintaining a large colubrid collection as well as running CageMaster, the reptile cage manufacturing and distributing company I founded in 1991. I began to assemble a sizable collection of captive bred chondros, and by the late 90s I was consistently producing clutches of *Morelia* (*Chondropython*) *viridis*. I phased out keeping and breeding anything

else to focus exclusively on working with that species. Successful chondro breeders active during this time include Al Zulich, already mentioned; Tim Turmezie, founder of the “Lemon Tree” blood-line; Dave and Tracy Barker; Tony Nicoli; Gary Sipperly of San Diego Reptile Breeders; Winslow Murdoch; Craig Trumbower; Rob Worrell, Rico Walder, and others.

Imported chondros, legal and otherwise, continued to flow into the US, and even more so as the swap meet phenomenon created a huge new demand for reptiles. Much of the buying public, uninformed about the merits of buying captive bred and the pitfalls of buying imports, looked at price alone and usually paid for the mistake with disappointment and the feeling that chondros were too difficult to successfully keep. A few breeders, myself included, have fought long and hard (and sometimes loudly) to educate buyers about avoiding imports and obtaining captive bred animals, and how to tell the difference. To be sure, this has been (and still is) an uphill battle, but much progress has been made despite the shifting methods of some importers to disguise what they are selling. Much more will be said about this later.

The author with a small display of captive bred chondros at the Reptile Breeders Expo in Orlando, Florida, 1998.

One of the author's 1998 offspring.

CHONDROS AND THE INTERNET

I think it is safe to say that the invention of the World Wide Web, and its accessibility to the masses, will go down in history as one of the biggest influences on life in the late twentieth century. The Internet has made a way for instant, global communication to become a part of daily life for millions, and it is still growing and evolving. "Dot Com" companies have made (and lost) millions, and few and far between are the business interests that do not have a web presence or have not tapped in to the incredible potential of this vehicle for advertising.

The rapidly expanding reptile industry, still gaining momentum from the influx of new hobbyists and more and better captive bred animals, gradually began to adopt the new Internet as a way of inexpensively and effectively marketing animals. The web also provided a great new way of networking between those with specialized interests and of hosting discussion groups. Discussion forums sprang up, and some forums devoted to popular species became very active. One of these discussion groups, dedicated initially to locality specific Gray Banded Kingsnakes, grew into Kingsnake.com (KS), largely regarded as one of the biggest and most active reptile web sites on the Internet. In 1998 I launched my own web site, "Fine Green Tree Pythons, by Greg Maxwell," which quickly became the most popular dedicated green tree python site on the web.

KS played host to an ever-increasing group of forums, each dedicated to a particular topic or species. Of course, all this Internet activity caught the attention of GTP enthusiasts, and chondros became such a popular topic on the "Python Forum" that eventually they were given a dedicated forum of their own. I was involved on the KS Python Forum as well as the KS Green Tree Python Forum from its inception and served as one of the "resident experts," answering questions and providing help and information to users with many levels of experience. While I am not comfortable being designated an "expert" about anything, I did have many years of experience and results to bring to the table, and for a while I was one of a very small group of people who were qualified, able, and willing to handle the daily task of answering chondro husbandry and breeding questions, many of them the same ones over and over. However, I realized that each new person was excited about learning all he or she could about these fascinating animals and so I took on the task with enthusiasm.

As the number of forums grew and the popularity of the most active forums increased, moderation became a problem. Self-styled "experts" with little or no experience jockeyed for attention and juveniles with no apparent education about grammar or punctuation used the boards for daily playgrounds. As many people know, the biggest problem with the Internet is that anybody can say literally anything. If knowledgeable and experienced people don't correct errors and keep things on track, then bad information spreads rapidly and confusion abounds. If these people do stand up and speak, those corrected can be openly hostile, and if forum moderators don't control this then good forums can be quickly ruined. At

one point, the strife became so bad that KS shut down its forums for a brief period. More than one forum was left closed, but those that remained open continued to allow a "free for all" atmosphere. Those who were intent on having intelligent discussions grew more and more frustrated with the situation, and most serious users got fed up and left. Unfortunately, human nature being what it is, this situation is doomed to be repeated anywhere mature and qualified moderators are not actively involved with Internet discussion forums. These forums are an interesting microcosm of the larger world around us, and just as with society, the rights and needs of the peaceful majority must be protected from the abuses of the few who cause trouble.

In the midst of all the chaos on the Kingsnake GTP forum, Thomas Phillips (Webmaster of ChondroWeb.com, a site dedicated to gathering and organizing information, web sites, breeders, and other data for use by the chondro community) and I decided to build our own forum. We had a vision for what we believed a forum should be, and for what the majority of the community needed and wanted. Launched in September 2000, the ChondroWeb ChondroForum rapidly grew, and it was soon obvious that Tomm and I were correct: there was a need and a desire for a clean, accurate, and well-run forum where enthusiasts of every level of skill and experience could share and learn, all within a properly moderated environment. The ChondroWeb Forums (a Photography Forum, a Breeder Forum, and an Interactive Classifieds Forum were added) quickly became a model for other Internet reptile forums. With hits exceeding 200,000 in 2001 and surpassing the one million mark early in 2003, the ChondroWeb Forums have become the most active Internet forums dedicated to a single reptile species, according to data and statistics at the time of writing.

The ChondroWeb Forums is one of several fun and informative Internet meeting places for hundreds of "Chondroheads" from all over the world.

Noted for its professional and civil tone and a dedication to quality, accuracy, and great photography, the ChondroForum is the information site of choice for many of the best keepers and breeders around. Several other individuals have opened green tree python forums, and chondro lovers now have several choices when it comes to online fun and information about chondros. There are even live

chats available 24/7 for those who enjoy these informal and sometimes colorful cyber gatherings.

With the ability for GTP breeders and keepers to share information so easily, successful chondro keeping and breeding has continued to increase measurably. Strides have been especially noticeable in the area of artificial incubation, which was, not all that long ago, considered very difficult and nearly impossible to get right on the first attempt. This is directly due to the availability of good information and access to those who have the experience to help, via the web. New breeders now have a way to introduce themselves to the market, and established breeders are no longer limited to bringing delicate animals to swap meets and expos to sell them. Although not without its frustrating issues, the World Wide Web has opened up a whole new arena of enjoyment, information, and success to chondro lovers worldwide.

The Future of Chondros in Captivity

With the success of more and more hobbyists reproducing the species in captivity, it is obvious that the supply of healthy, captive bred stock is increasing. Some see this as a threat to the commercial value of chondros and have openly criticized me for sharing information, but I disagree. While it is true that the number of enthusiasts is at an all-time high, there is still a huge, untapped market to be reached. Most Americans don't know what a green tree python is! My position has always been that as more individuals experience success in both keeping and breeding their animals, the more they will pass on that passion to others. Passion is what has built the market to the present level, and passion is what will continue to build and expand it. I know of no other reptile that evokes the same kind of dedication, passion, even obsession, as chondros do. The saying "You can't have just one" is literally true! This is why I have always been willing to share everything I know and don't have "trade secrets" that I hold back. If I help you succeed, you will hopefully in turn help someone else, and so on.

“Blue Frost” (GM-01-30) represents the next level of ontogenic blue breeding projects; he was the first selectively bred blue male to morph directly into a blue adult without the usual intermediary green phase. Both parents were blue.

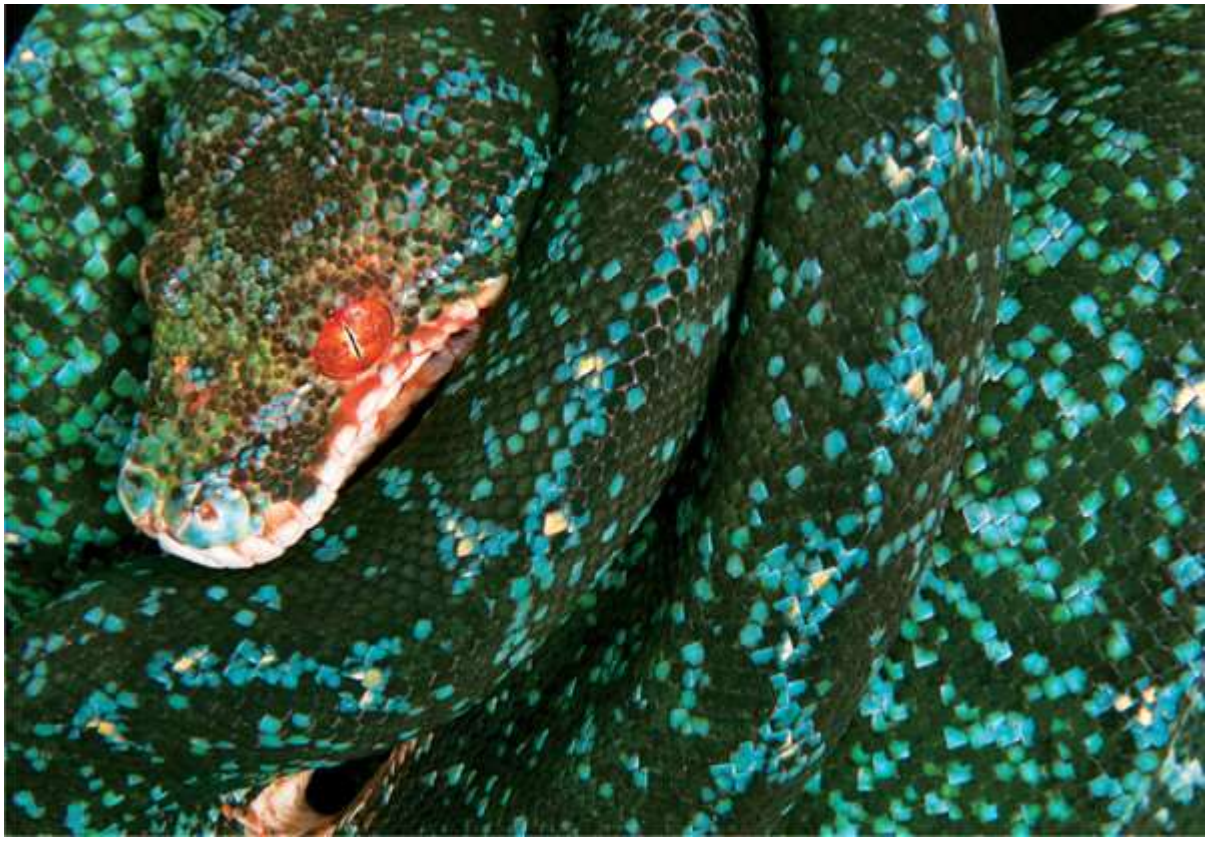
Perhaps if chondros bred and fed like Cornsnakes, market saturation would become a problem. The truth is, the importation of wild collected and farm raised animals in bulk numbers is far more deleterious to the value of the chondro market than domestic breeders who are succeeding too well. Besides, as long as chondros are being bred, there will be neonates to get started, and that is one important ingredient that will always limit the number of animals that make it to market, at least by honest sellers. Many of the more difficult aspects of chondro breeding have been smoothed by the spread of good information, but the feeding of neonates can test the skills and patience of many beyond what they are willing to deal with. Chondros are not Cornsnakes, and they never will be.

While the increase in the supply of captive bred stock will inevitably lead to some decrease in the average price for entry-level animals, I feel strongly that there

will never be a huge chondro price crash such as other species have experienced. Such a crash has been predicted to me for years, but I've yet to see it take place. If anything the opposite is true. Chondros are truly unique among the species of reptiles commonly being bred in captivity in that they have shown themselves to be remarkably resilient in the face of general market decline and falling prices over the last several years. Further, their extreme variability of coloration and pattern has virtually eliminated the stagnation that other types of reptiles have experienced. With many kinds of reptiles, "you've seen one, you've seen them all," but chondros are the snowflakes of the snake world…each one has its own unique beauty. Now, with the high-end "designer" morph projects being developed, the future of chondro breeding is wide open and ripe with possibilities. With the 2002 hatch of the world's first living albino, even more fantastic breeding projects are on the horizon. In an early 2002 ChondroForum poll about albinos, 74% of those responding stated that they believe that the first albino would be worth over $50,000, and 33% said over $100,000. Over half said that they believed an albino would be produced in captivity in the next five to ten years. What a great surprise that the event occurred later that same year! Truly, this is a species whose morphological potential is limitless.

To some, chondros are a hobby and always will be. Others, like me, are commercial breeders who make a living from breeding reptiles, including chondros. While some look on what I do as driven by greed, I disagree. As long as the animals are treated with the humane respect they deserve and customers are given honesty and quality, then there is no reason to criticize someone for making a living doing something they love. The high prices commanded by the top animals are the natural result of the market forces of supply and demand. The truth is, there are always a few people that "demand" that breeders "supply" them with their best animals for minimal prices and are offended because they can't afford them. However, that is not the way the free enterprise system works.

There is a healthy, self-sustaining and genetically diverse population of chondros in the US today. There is also a growing number of enthusiasts and more and better information available to those who want to take on the challenges of keeping and breeding these beautiful and mysterious rain forest serpents. Due to the communication possibilities of the Internet, European breeders, as well as those from other continents, are having more dialogs with American breeders than ever before. The future of the green tree python in captivity is bright indeed.



This fantastic chondro (“Ella-Diablo,” GM-04-47) is not only incredible in her own right, but she is also the offspring from a 50% possible het-for-albino male. Can you imagine such an animal expressed as an albino morph?

Collection and exportation locations frequently associated with the geographic races and locality-specific populations of *Morelia viridis*


Sorong
Manokwari
Biak Island
Arfak
Misool
Nabire
Yapen
West Papua
(Irian Jaya)
Lereh
Jayapura
Cyclops Mins
Fak Fak
Tokondini
Karubaga
Wamena
Agat
Angguruk
Papua New Guinea
Tanah Merah
Aru Island
Merauke
Port Moresby
Australia
Cape York
Peninsula
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CHAPTER 3. GEOGRAPHIC RACES AND LOCALITYTYPING

"The great majority of mankind are satisfied with appearances, as though they were realities, and are often even more influenced by the things that seem than by those that are."

Machiavelli

Disclaimer: The information provided in this chapter (including the section on the Cape York race) is accurate to the best of my knowledge. It was obtained from multiple sources that I consider to be credible and trustworthy. However, it is inevitable that different opinions and claims will be expressed by some. I am simply the messenger, and the facts and opinions expressed should not be taken as "written in stone" because of their inclusion in this book. In other words, the text should not be used as "proof" of anything unless the claim is backed up with other credible documentation.

I'm sure that not a few of my readers turned to this chapter first to see what I would write concerning this controversial topic! I hope that anyone who feels, as I do, that chondro locality issues are important will take the time to carefully and thoughtfully read the information presented here. Consider the facts as well as my opinions, which I will make every effort to keep separate from each other. I also ask that the reader consider all the information presented here and not react negatively to a single statement or position taken out of context. Most chondro lovers fall into one of two schools of thought regarding the importance of localities: One group tends to feel it is all much ado about nothing and simply fodder for unnecessary arguing; the other side believes that locality issues can impact the chondro market (and even husbandry to some degree) in important ways that can't be ignored. I am one of the latter. In recent years, the locality debates have spun out of control, and as with most controversial issues, the truth seldom lies with extreme views from either side. The position that every chondro is identifiable as to locality is ridiculous; so is the attitude that all locality claims are false. I have done my fair share of debating with those who tend to make unsubstantiated locality claims, and I have argued long and hard for the chondro community to insist on the facts and documentation when considering such claims. This has gotten me the reputation for being close-minded and one who categorically rejects all chondro locality claims. This is simply not true. I would state for the record that questioning data and doing some critical thinking does not make one "close-minded." If that were true, then every legitimate scientist is close-minded. Too many people today define being "open-minded" as agreeing with them! However, extreme views usually don't benefit anybody regardless of the cause or principle being defended, and so it is with green tree python localities. A balanced approach is the best solution to discerning the facts, and that is my intent here.

The truth is, an awful lot of what washes for locality specifications are simply claims made by importers, dealers, and brokers to give an appearance of credibility and/or value to otherwise inferior animals. When I say "inferior," I mean imported animals that are not equal to the robust, well-acclimated captive bred stock

available from private breeders. I want to make it clear that I have no quarrel with anyone who prefers the more natural appearance of the various geographic races of this python, and I am not suggesting that these chondros are substandard to the various “designer” specimens so long as they are captive bred and honestly represented. But there is a large part of the commercial reptile trade that uses locality tags merely to boost sales and set prices. By labeling a chondro with some locality name, the seller hopes to give an impression of added value, and the more exotic sounding and “new” the name is, the higher the supposed worth. This mindset has so permeated the mass marketing of GTPs by animal dealers that recently an acquaintance of mine found it impossible to sell some animals of his on a large online classified site because he refused to make up a locality for his stock. One respondent after another told him if the animal wasn’t “locality” they didn’t want it.

Besides questioning why the supposed geographic origin of an animal is so magical, I would ask these buyers how they think that some second or third party involved in the sale could possibly have accurate information about the capture location of a specimen. To see just how pervasive this practice has become, just try locating a chondro for sale on most Internet classified boards or reptile shows that doesn’t have a locality designation attached to it. And yet, the vast majority of these vendors have no factual position to base such claims on.

Wild parents of undocumented origins produced this attractive chondro for Janet Hickner in 1999. By no definition can this be a locality specimen, yet such animals are labeled with a locality name at virtually every reptile show.

The problem is not a lack of locality specific animals; every wild collected chondro is a locality specimen. The difficulty lies in the near impossibility of obtaining accurate information, as well as in sorting out just how different in appearance some localities truly are from others. The arguments raised about taxonomy changes in Chapter 1 also apply here: Too many locality proponents enter the debate with preconceived ideas and a personal bias for what they want the facts to indicate. Let us examine this topic with an open mind and try to determine the truth using a balanced and unbiased approach that is willing to accept the conclusions that result from such an investigation, whatever they may be.

Some Definitions

I think that right up front it is important to establish some definitions of terms. A lot of potential confusion can be avoided if standard definitions are applied to the terminology that is commonly used in locality discussions. Let's look specifically at two important terms: Locality and Race.

LOCALITY

Locality, in the context of a biological specimen, refers to the exact location where the particular specimen was collected. *Webster's Dictionary* defines locality as "a particular place." This location or place is only as significant (in the context of a locality habitat) as the size of it and the effective boundaries that define it. If the locality is a small marsh in the middle of a large dry plain, the animals that live there are much more representative of a true locality than are the animals that inhabit the large plain. Both groups are from a specific location, but only the marsh specimens are likely to have distinct characteristics. The large plain population may be huge, with multiple color variations occurring within the geographic expanse that don't have definable limitations or boundaries. As a real-life example of this, I can cite the populations of the Eastern garter snake (*Thamnophis s.sirtalis*) that we have in Ohio where I live. There is a distinct population of these normally brown or greenish and yellow-striped snakes that contains jet black specimens. These melanistic garter snakes are only found in an area adjacent to the shores of Lake Erie, a large glacial lake that defines the northern border of the state. The eastern garter snakes that populate the rest of Ohio (and also much of the eastern half of the United States and well into Canada) are quite variable, ranging from brown to very greenish; some have red on the sides and some do not; others are quite speckled while most are a solid color with stripes making up the only markings. The black phase of this snake is a local variant that is restricted to a small area. It is not possible to look at a normal garter snake and tell which Ohio county it came from, or even from which part of the US it was found. Black garters can be visually identified as to origin because they have a restricted geographic range and a distinct appearance. If Lake Erie garters looked just like all the rest, then it would be impossible to select a garter at random and claim it to be an Erie locality animal.

The whole concept of locality-specific reptiles was popularized some years ago by a group of Gray Banded Kingsnake (*Lampropeltis alterna*) collectors. "Gray bands" are a beautiful and highly variable species from southwestern Texas. These *alterna* fans place a premium on specimens that have exact collecting data, and they are convinced that individual locality populations have unique characteristics that distinguish them from other populations. This focus on locality Gray-Banded Kingsnakes triggered the popularity of a whole new concept in reptile collecting and marketing…the "locality" specimen. Leaving aside questions about the validity of the belief that such locality *alter-na* are more valuable or desirable than non-locality specimens of that group, the important point to remember is that these hobbyists have the ability to collect their own snakes and to carefully document the exact collection point of each animal.

These *alterna* collectors insist that the more accurate the collecting data obtained and the higher the credibility of the collector, the greater the value of the specimen. It is important to note that it is the documented geographic origin of the specimen that identifies it as a locality-specific animal, not its outward appearance. Most dedicated locality *alterna* collectors are very skeptical of undocumented

locality claims or locality identifications based on mere morphological traits. This is because they recognize that given the highly variable nature of this snake, and the added value that locality specimens have, the more likely it is that false locality claims will be made.

I think that after studying the two examples given above, any intelligent and sensible person can begin to understand the inherent problems facing green tree python locality identifications. In a nutshell, these are: Lack of definable population borders for much of New Guinea and Indonesia; the fact that *Morelia viridis* is a highly variable species; and the impossibility of collecting our own specimens. We will consider each of these in more detail, but first, let us consider a second important definition.

RACE

Webster's defines race as "a family, tribe, people, or nation of the same stock." When discussing GTP race distinctions, it is important to understand that these are based on external, identifiable traits that result from distinct populations that inhabit identifiable geographic area with boundaries. These race designations can be as large or small as is required by the context and some common sense. For example, as *Homo sapiens* we make up the human race and inhabit the boundaries of our planet called Earth. But there are also racial distinctions between geographic populations of people. Asian, African, and Anglo-Saxon peoples (and many others) all have unique traits that identify them as belonging to a specific race. But, an African American may have been born on the west coast or in the south. This example is an oversimplification, but it illustrates the important difference between Locality and Race. Race is what definable group you are descended from; Locality is where you were born (or hatched, to be more specific to our discussion!).

Morelia viridis is a race of python; within that large race there are some geographic distinctions (races) that can be identified. A few are much more distinct in appearance than the rest.

Biologist Dr. Guido Westhoff made this clarification between race and locality in response to a question about locality and race differences on the ChondroForum:

"There sure is a difference! A 'locality' just describes that an animal comes from a certain geographic location…a locality therefore doesn't describe any specific character or feature of that animal…just the geographic origin is the point regardless of morphological relevance.

"A 'race' is always determined by certain characteristics (look at dogs: German shepherds, poodles and so on). A race is not taxonomically of any value because a race just describes a bundle of features and characteristics that can be found in man-made or natural populations. A natural race may have the status of a subspecies but that's not always the case."

If the difference between these two terms would be understood and applied, what a lot of misunderstanding and confusion could be avoided when statements regarding locality are made! When most GTP keepers ask about the locality of an animal they own, what they really should be asking is what geographic race (if

any) the animal may belong to. With some populations of reptiles (such as the black garter snake above), race and locality are nearly synonymous because the population is both visually distinct and confined to a specific area.

Some island populations of chondros fall into this category. But those from the mainland are much less restricted and far more variable.

JUST THE FACTS, MA'AM

When applying these two definitions to the present topic, it is quite easy to see that there are very few true locality-specific chondros around. For one thing, it is illegal for Indonesian dealers to export wild caught chondros. While this minor technicality hasn't stopped many of them, they certainly aren't sending out valid collection data along with the animals. Second, the remoteness of the region and the current political instability in parts of Indonesia make it quite unattractive for foreign would-be collectors, especially Americans. Karl Switak told me that although the Papuan native collectors knew where and how to find plenty of GTPs, he himself had trouble locating many. Third, it is well known that the native collectors gather specimens from wherever they find them, and bring them to holding facilities pending exportation. Often these holding pens are cold, dirty, and crowded.

Many of the most popular locality names are simply Indonesian cities in proximity to collection sites that have airports readily accessible for shipping the animals out. This would be akin to naming some randomly collected Gray Banded Kingsnakes "El Paso" locality because that was the nearest town with an airport. Switak also emphasized to me just how difficult it is to get accurate information from natives. These collectors try to determine what the purchaser wants to hear and then they tell him that! To those readers who have never been to a third world country, I can tell you that things work in a very different way than what you are accustomed to in more developed areas of the world. Any information received from such places is nearly worthless as scientific data unless the person providing it is beyond question.

So to be perfectly fair and honest, how many wild collected GTPs can be accurately represented as "locality"? And by definition, captive produced animals, unless from documented locality-specific founder stock, cannot be locality animals because locality means "collected from a specific geographic location." Nearly all captive bred chondros are from undocumented (mixed) ancestry, even those that are supposedly from locality specific parents. Selecting parents for a breeding pair based on racial appearance is fine and helps to maintain specific naturally occurring traits; but unless the parents are documented locality specimens, such pairings are simply being selectively bred for color, much like high yellow or some other morph. Again, this is a legitimate breeding goal, but it is not locality breeding as defined by the true meaning of the term.

True Locality Chondros

So, are there any bona fide locality-specific chondros in captivity? Absolutely! I'm personally aware of a several such projects. In each case, the breeders are working with animals that have a documented unbroken trail back to the collecting locations of the founder stock. In one case, the breeder even has a map showing the Jeep trail leading to the collection point. In another, a missionary known to the breeder actually hand carried a chondro from Biak and brought it back to the States. There is a very small group of true Australian GTPs in that country. (More on these animals later in this chapter.) Such animals, and the accompanying documentation, are very hard to come by. High standards for sorting the facts, unbroken data trails, and sound ethics are required for credibility. There are good reasons to resist taking just anybody's word for things, especially when making money from the information is an issue. To the point, some animal dealers will say anything they think (or know) a buyer wants to hear in order to make sales. A few of these are knowingly practicing deceit; most are simply going with the status quo and repeating what the exporter tells them regardless of any solid evidence to back it up. These folks care about the bottom line, not scientific accuracy.

Indonesian Breeding Farms

By 1979, Indonesia had begun to regulate the green tree python trade by allowing only captive bred specimens to be exported. This led to two developments: Legal, licensed Indonesian breeding farms and illegally exported chondros being sent out as "farm-raised." The existence of legitimate breeding farms in the home territory of GTPs would seem to be a perfect solution to the problems of acquiring locality chondros, and in some ways it is. However, there are some important qualifications to this statement which must be factored in. And as always, you can't believe everything that you read or hear. One person, who wishes to remain anonymous, told me that he was amused to read that he supposedly was part of the Indonesian locality-specific collecting and breeding scene, yet he has never collected a wild chondro!

Perhaps the best (and certainly the best known) Indonesian farming operation is the one that supplies Bushmaster Reptiles Inc. of Boulder, Colorado, USA. The actual name of the farm is Terraria Indonesia, and it is owned by Budiyanto Tasma and was built by him in 1996. The farm is managed by two talented Russian breeders who came to the farm from the Moscow Zoo. Bushmaster is the US distributor for the farm, has been in business for fifteen years, and is owned by an American named Kamuran Tepedelen. Kamuran is a very helpful and interesting person to talk to, and he graciously supplied me with photos and information about the farm as well as some descriptions of the geographic groups being bred there.

The farm houses approximately 300 adults, which are comprised of both wild collected and F1 (first generation) animals that were produced at the farm. The farm holds back a number of offspring each year to replenish the pool of breeding stock. Annual production on the farm has steadily increased during the first nine years of operation, and between 700 and 1000 red and yellow babies are now being

produced each year. According to Kamuran, the farm is working with about eleven locality types.

I think it is a fair question to ask how accurate the locality identifications for farmed chondros truly are, and what methods are used to make these determinations. Kamuran told me that his farm uses two factors to determine the geographic types for wild collected breeders: They are visually sorted by appearance, and they are grouped according to the general location of the supplier. “This is as exact as we get,” Kamuran told me. “Obviously we’re not getting Aru type chondros from our collectors in Biak, etc.

The photos on this page show the clean and well-organized Indonesian breeding facility that supplies Bushmaster Reptiles with an annual supply of farm-bred baby chondros. Photos courtesy of Kamuran Tepedelen.

The small island populations are easier than, say, animals which are reported to have come from Sorong or Jayapura where you can have overlap amongst locality types. Animals from Biak, Kofiau, or even Aru are easier to keep separated, as there is no crossover." I like Kamuran and have found him to be an honest and informed person whose word can be trusted. Based on the above data, I think that persons who buy Biak, Aru, and Kofiau specimens from Bushmaster can have reasonable certainty about the race of their animals. Mainland groups are more difficult, and I would have to question the position, taken by some, that any locality chondro originating from Bushmaster is a bona fide locality or race-specific specimen. Unfortunately, these obscure and exotic sounding locality names are most often the ones that get thrown around on the Internet as fact. One Indonesian farm has reportedly implanted microchips in their breeder chondros. While this would be very useful for tracking the movements of specific captive animals within large outdoor breeding enclosures, and would also be of great value in identifying stolen animals, such microchips would be of no value as locality identifiers unless they were implanted and logged at the location of capture.

Vladamir, one of two Russian keepers that manage the farm, feeds rats to some of the breeder chondros.

A clutch of babies hatched at the farm. Photos courtesy of Kamuran Tepedelen.

This is not to say that there aren't legitimate distinctions to be made between mainland populations. There is a mountain range that divides New Guinea into northern and southern halves, and although this barrier does not extend coast to coast, it almost certainly restricts populations on either side from commingling to any great degree. (The genetic evidence of this was commented on in Chapter 1.) Rivers, gorges, and elevation may all serve as partial limiting factors for a local population. For example, Karl Switak observed that, without a single exception, all the Papuan specimens he observed from 4000 feet in elevation and higher had a single row of white dorsal scales. (This would coincide with the commonly held description for Merauke type chondros.) In his experience, elevation was definitely a limiting factor in the appearance of Papuan specimens, and those from lower elevations were much more variable.

All of this simply means that there is little in the way of solid evidence or verifiable data to make dogmatic or conclusive statements about most imported chondros, island populations excepted. This is even truer for animals that originate from less credible sources than the good guys at Bushmaster. It may interest my readers to learn a little about the process of becoming a legal, licensed reptile farm in Indonesia and about some of the things that take place in so-called third world

countries. I have traveled several times in such places, and you can pretty much circumvent any law for the right price or by knowing the right people. This is not viewed in such places as corruption; it is a way of life. It doesn't take a rocket scientist to figure out how hordes of illegally exported wild chondros continue to flow into the US and other countries, despite the appearance of regulatory policies and strict guidelines for operating a legal farm. In order to have a legal commercial reptile breeding facility in Indonesia, a permit must be obtained to collect the wild founder stock. It takes up to a year to obtain a permit, and collecting is not legal until it is in hand. Each facility is allowed to have a maximum of three hundred and fifty adult chondros, and unscheduled government inspections can take place at any time. Farms that break the rules or that exceed the legal limit of breeders can be fined or have their permits revoked.

When captive bred stock is produced, an export permit must be obtained. To obtain the permit, breeding reports with documentary photographs and data are required. Visual inspections of offspring can also be made by the Indonesian Management Authority (MA) or the Scientific Authority (SA). Rumor has it that the SA has begun to get more involved in this process and has exercised stricter judgment than the MA has done in previous years. Some of the older farms don't get the scrutiny that newer ones do. Currently, there are five licensed farms claiming to breed chondros for export, and one application in process for a sixth. However, just because a "farm" is licensed doesn't mean that it is engaged in legitimate breeding. Several years ago, Eugene Bessette of Ophiological Services in Gainesville, Florida, was approached on behalf of an Indonesian exporter, asking to obtain photos of the OS facility to use as "proof" of his own operation (Walsh, 1997). According to another source, one of the licensed farms is little more than a garage converted to a holding facility for wild collected Biak juveniles, which are shipped to a supplier on the west coast of the US and sold as "farm bred."

One may wonder why US Fish and Wildlife would allow such fraud to take place. The fact is, shipments of obviously wild collected GTPs arrive with (apparently) valid permits, and US F&W doesn't have the time or resources to investigate these documents or to enforce Indonesia's wildlife laws if they don't see the need to do it themselves.

Further exacerbating the problem of enforcement is a lack of knowledge about chondros among various government wildlife agencies. Herpetologist and television personality Mark O'Shea related a humorous story to me about being approached by a PNG Department of Environment and Conservation officer who was seeking advisement regarding a cooperative who planned to farm GTPs for export. Their plan was to round up as many pythons as they could find and put them into a fenced enclosure. Then they planned to enter the enclosure periodically and harvest the baby chondros. After that, they figured on separating the sexes and selling only males in order to protect their market! O'Shea laughed and explained the folly of such an idea. In defense of this officer, I am sure that he undoubtedly has a complicated and difficult job to do and I know that he can't afford to

specialize in one species. However, this story illustrates just how ignorant about animals a government agency can be. It is no wonder that so many illegal activities and false claims slip by these officers.

In light of these and many more stories like them, is it any wonder than many of us are skeptical of information coming from overseas? I think that a person would have to be pretty gullible (or willfully ignorant) to put much weight on many of the locality names that these animals arrive with. Anybody who buys a so-called locality animal and simply takes the word of an importer or middleman dealer about its captive bred status (or locality identification) without thoroughly checking out the credibility of the source, is fooling themselves and has no grounds to become defensive when questioned about such claims.

After sorting out all the available information, it becomes clear that some farms are working hard to produce legal and healthy chondros of several geographic types, and others are merely fronts for illegal exportation of wild caught animals. Even the best farms are not working with true locality-specific chondros, using the most narrow (and accurate) definition of the term. However, Bushmaster and a few others like them are providing the closest thing to locality chondros that we in the US are likely to have access to, with the exception of a few private breeders who also have such projects. Certainly the descriptions and photos provided to me by Kamuran Tepedelen are valid as a guideline for making general statements about the appearance of various groups of chondros.

INDONESIAN MICRO-LOCALITIES

Most chondro lovers recognize and accept a half dozen or so geographic races of *Morelia viridis*. These include the island forms of Biak and Aru, as well as several mainland groups that are generally less distinct than the island forms, but that differ from each other in recognizable ways. These include Sorong, Jayapura, and other forms. There is also the Cape York, Australia, population which is related to southern Papuan animals, although they differ in appearance. A relatively new island locality (Kofiau) is also gaining recognition. Basic descriptions of these races will be provided later in this chapter.

In recent years, some new and strange-sounding locality names have come into use, mostly in Internet classified ads. Some of these pur-ported locality populations have been viewed with skepticism by much of the captive breeding community and have been largely assumed to be marketing ploys. There are several reasons for this: For one thing, some of these “new” locality claims have come from dealers who are not exactly the cream of the crop when it comes to reputation in the industry; further, attempts to obtain any kind of documentation about the legitimacy of these locations as being unique chondro populations have been met with everything from indifference to outright hostility. These “micro-localities,” which include such names as Arfak, Wamena, Bokondini, Karubaga, Lereh, Cyclops, Manokwari, Nabire, and others, are based on the names of towns or mountains that are associated with collection areas. It is probable that the PNG side of the mainland has some populations that might represent some distinct

forms, but all the names mentioned above are located on the Indonesian (West Papuan) half of the land mass. This is undoubtedly due to the concentration of farming and collecting activities in this region.

As has been clearly explained in this chapter, reliable information from native collectors is not been easy to obtain, and too many locality advocates quickly accept any locality claims as fact simply because the concept appeals to them. As mentioned earlier, one of the problems with identifying local populations of mainland chondros is the fact that New Guinea has limited geophysical barriers that would tend to confine and separate populations in the same manner as the island forms. Obviously, there must be some limiting boundaries to a specific population in order for that population to develop distinct and separate characteristics. Otherwise, the intermingling and overlapping of populations over the entire mainland would preclude the evolution of distinct micro populations. Again I quote Dr. Westhoff:

A typical Lereh specimen from the Bushmaster breeding colony. Photo courtesy of Kamuran Tepedelen.

"Usually phenotypes of species vary within their range. Depending on species this variation might be higher or lower. As we all know, the variation in chondros is high. Localities or subspecies of any species are usually defined by specific features and characteristics that occur only in a geographical isolated range. Three important things to define when considering such localities are:

"1. The definition of characteristics and features (or combinations) that clearly do not occur in the rest of the range. To achieve this, one has to define the 'types' inside the suspected locality range and outside this range.

"2. The definition of the geographical range! A name of a town nearby is certainly not providing this most [important] argument to talk about a true 'locality.' Usually borders of the range of this [proposed] locality are drawn into a geographical map. This is absolutely necessary to make sure that the third point (below) is valid.

"3. The borders of the range of the described locality must define the geographical isolation. In other words, the same species cannot live [as a] neighbor to that border. If that is the case and point 1 is truly valid, we would have a case of no gene flow making our locality a new species (which is not the case, as crossbreeding localities proves). If there is another locality right next to our new locality type, we have to describe the size of the bastardizing zone (I won't go into detail about what a hybrid-zone and bastard-zone tells us about species and subspecies, they are a tool often used by taxonomists and evolution biologists). If the bastard zone is too large/broad, the first point (above) cannot be valid, especially in a 'micro-locality.'

"Finally, I know none of these three points have been evaluated or considered with any accuracy for any mainland chondro. However, they are most likely valid for the island forms. Most accurate documents on mainland localities are only as good as the definition of the locality itself! If there is no definition of character, described border or range, you just have a chondro that was caught nearby a town with a nice name.

"I understand the arguments of purists concerning conservation of variation of chondros. However, when it comes to so called micro-localities, documented or not, I see the risk of conserving only a locality-tag produced by some local dealer or some hobbyists who just want to own some 'special' chondro that others do not have."

I would add, "The ability to claim to sell some special locality that others don't have," to Dr. Westhoff's last thought.

On balance, there are collectors and breeders who claim that local and regional populations of chondros having recognizable, if subtle, traits do exist. Efforts are being made by some to establish breeding groups that reproduce these traits. Several non-American breeders have on-site collecting experience and claim to have documentation of the geographic origin of their founder animals. According to information and descriptions about some of the mainland forms I've been able to obtain, the names Wamena, Bokondini, and Karubaga all refer to the same specimens from the same area, and there isn't a valid reason to consider them as separate localities. However, one breeder does feel that there are enough differences in color, pattern, physiology, and possibly scalation to warrant making a distinction between Wamena specimens and those from Lereh. These two mountain locations are not connected and are sufficiently far enough apart to produce GTPs with their own unique traits (Nuyt, pers. comm.). As mentioned

previously, it is possible that mountain elevations could be a defining boundary for some populations, which have been labeled as “highland” localities by those working with them. Field observers indicate that distinctions can be made between these two highland forms and specimens from lower elevations, based on morphological differences that include tail shape and color, and the shape and hue of the blue dorsal markings.

Some highland specimens tend to go through a heavily speckled stage during the ontogenic color change. A few of these animals keep the dark pigment in varying degrees, but many lose it altogether as they mature. One theory is that the dark coloration aids the animals in gathering heat from the sun’s rays, an occurrence which reptiles living in the cooler temperatures found at the higher elevations would theoretically benefit from. This would not explain why many of the animals lose the dark pigment; certainly chondros don’t need warmth only while they are yearlings. Perhaps the dark pigment is a coincidence and is a random trait in animals found from that part of the country. This same phenomenon can be seen in captive bred bloodlines that have no known relationship with any highland stock. Nonetheless, breeders working with designated highland localities are enthusiastic about them, and perhaps in the future some of the questions about these and other micro-localities can be answered.

A young highland “mite-phase” chondro. The speckling usually decreases with age in both farm bred and domestically bred designer animals. Photo: K. Tepedelen

Although indigenous collectors and exporters with enough experience may come to recognize certain traits as being frequently associated with chondros from general areas, it is still essential to have valid documentation to identify true locality specimens. Mainland chondros are far too variable in color and pattern to make firm conclusions about origin without verifiable collecting data. In reality, too much of what passes for locality identification is simply speculation and wishful thinking, based on claims that come from an information chain with many weak links. Attempting to guess the origins of undocumented CB specimens is nearly useless. Locality animals are identified by specific data, not guesses. Recognized race names can serve to identify general morphological traits and provide some common ground for collectors and breeders to use when referring to various groups. But in truth, these specimens should not be represented as locality specific. To do so is not only inaccurate, but can be downright dishonest, and it does a huge disservice to those who have put in the time and work to properly validate the locality specimens they are working with.

Race and Locality “Type” Chondros

We have seen that several island, Australian, and mainland races of green tree pythons do exist, and all of these have some defining characteristics. Many keepers want to make a basic identification of their animals’ geographic origins. In some cases, this can be done with reasonable confidence; a classic Biak looks nothing like a classic Aru. Too much of the time, chondros fail to look “classic” and can bewilder their owners with a wide range of variable colors and markings, even within a particular race group. Chondros that appear to have traits commonly associated with one group are discovered to come from another area. (For example, there is Switak’s Merauke-like Papuan highland animals noted in Chapter 1.) Add to this the fact that main-land animals are far less likely to adhere to rigid descriptions, and the possibility exists for all kinds of confusion, guesswork, and even misrepresentation. It is clear that these difficulties aren’t going to go away and that some common ground needs to be reached within the chondro community regarding what to do about locality and race issues.

Practicing what I preach: I produced this pretty female from wild Aru-type parents in 2003. It would have been easy to call this chondro an "Aru locality" but I did not, because the parents were not documented.

Several years ago, I began to promote the use of the word "type" to designate specimens that conformed to established race descriptions, but at the same time had no real documentation. Hence, "Aru-type" was used to indicate an animal that exhibited enough of the typical Aru traits to be labeled an Aru, but that in all honesty could not be proven to have come from pure Aru founder stock. This designation has really caught on and has provided a way (for those who wish to do so) to have a valid and honest way to describe and discuss his or her animals so that everybody involved knows exactly what is being claimed and presented for consideration. Adding "type" to any geographic race or locality lets others know that the animal in question exhibits visual traits that may help identify it as belonging to a recognized group, but stops short of making a conclusive locality claim in the absence of any real proof. My own practice is to also identify the source of the information. This allows others to judge for themselves what they think about the information. For example, stating "Here is a photo of my Aru-type male from Bushmaster" has a lot more credibility than "Look at my new Manokwari!"

With this background behind us, let us now examine the most widely recognized races and locality groups of wild chondros.

Geographic Races of the Green Tree Python

Most GTP keepers recognize at least four definable races. These are the two island forms of Biak and Aru, the mainland Sorong race, and the Cape York race, usually referred to as Merauke by non-Australians. Nearly any chondro person will recognize these names and the traits associated with them. However, this list is incomplete and too simple to be considered accurate. For example, a quick look at the map on pages 28 and 29 will show that Sorong, a city located on the western tip of the Vogelkop Peninsula in western Irian Jaya (West Papua), is far too removed from the rest of the mainland to represent the bulk of that population. The Cape York race and PNG Meraukes are related but deserve separate treatment. The island form of Kofiau (home of the so-called Canary chondros) may represent a valid new race. Several common mainland names besides Sorong are now in common use and would benefit from a standard description.

These name designations are more useful for identifying the associated color and morphological traits than for scientific or specific locality purposes, but they do function well in the former capacity. That is, they provide a consistent word-picture language for use by collectors and breeders that puts everyone on the same page when making visual identification of specimens. There has been some talk of recognizing one or more of these as a subspecies, but currently no such distinctions have been made. A brief description of each race is made below, with emphasis on generally accepted color and pattern traits.

The Aru Island Race

The Aru Island group lies off the southwestern coast of Irian Jaya (West Papua), and is home to a race of chondros named after the main island. This race is noted for having several consistent characteristics, the most obvious of which is the sprinkling of white scales on a rich green or blue-green body color. These white scales are usually concentrated on the dorsal area and may appear singly or in small groups. They may also connect to form a partial dorsal stripe, but do not make a single-scale dorsal chain as is seen on Merauke chondros. It is quite probable that individuals of this race have made it to the southern coast of New Guinea and it is not uncommon to see white speckling on mainland animals. Also, the amount of white on Aru-type specimens is variable, making absolute distinctions between pure Arus and some mainland animals speculative. This is further evidenced by some European breeders reporting red Aru hatchlings, even though it is an accepted fact among US and Indonesian breeders that Aru babies are always yellow. The most obvious explanation for this discrepancy is the blending of mainland “Aru-types” with pure stock at some point in the past.

A long-term captive wild Aru-type male in the author's collection displays all the characteristics associated with this race: white dorsal scales, blue spots, a stubby tail, medium-sized head, and blue belly and labial scales.

Some older specimens may have gray or silver scales mixed in with the white. Blue spots, blotches, or bars are present on the sides and dorsal areas of many specimens, and a beautiful blue color covers the lateral and belly area on the best specimens. This can be quite stunning when viewed in good full-spectrum lighting. The blue may also extend onto the lower and upper labials.

Aru Island chondros have a short, blunt tail; so much so that the impression is made of the snake having lost its last few inches. I hatched out a small clutch of F1 babies from wild collected Aru-type parents in 2003; each little yellow hatching had a blunt, jet black tail. Uncharacteristically, mine were easy to establish, taking pinky mice from the first feeding with no hesitation. Most breeders of Aru chondros report that the babies are usually among the most difficult to get feeding, largely because they are so placid in nature that the usual technique of tease feeding is ineffective.

The typical Aru chondro has a well-proportioned, medium-sized head with rounded lobes. They are larger than many mainland type adults, averaging about 60 inches in length, although the author has seen an adult female that exceeded 72 inches. (See photo in Chapter 1.) Individuals of this race are usually among the more tame and easy to handle of chondros, but there can be notable exceptions, especially when dealing with wild caught specimens. I consider keepers who suffer frequent bites to be lacking in handling know-how and I take care to avoid being bitten, but one of the more severe chondro bites I have sustained came from the wild caught Aru female that produced the babies mentioned above. The animal was

reportedly a three-year captive at the time I received it, and I assumed that being of the Aru race, she would be safe to free-handle. I was quite wrong, as I quickly discovered when I carelessly removed her from the bag she was shipped in. Prior to her death some months after her clutch hatched, she was one of the most irritable and easily provoked adults in my collection, and the same thing can be said of her wild caught mate, seen in the photo on page 47. I held back a female from the clutch, and she is one of the most gentle-natured animals I have. This dichotomy of nastiness and sweetness is highly typical of wild versus captive bred specimens of most types.

Aru specimens are less common among groups of imported juveniles due to two factors: Their habitat is more lush and dense than other locations, making collections more difficult; and curiously, the native collectors on Aru can't be convinced that the yellow babies are the same snake as the green adults and consequently they don't collect them! (Tepedelen, pers. comm.)

Typical Aru-type wild female.

Blunt Aru tail.

Head detail.

These are F1 Aru-type babies from wild parents. All the babies had stubby black tails. Aru neonates are always yellow, according to most breeders working with them.

The Biak Island Race

Biak Island chondros, the second of the two primary island forms, certainly outrank Arus in terms of size, personality, numbers, and variableness. Widely regarded as the largest of the geographic races, Biaks can be impressive, with big bulky heads, long dragon-like snouts, flared nostrils, long sharply pointed tails, and sizeable bodies. They also have a well-deserved reputation for being snappy and easily provoked. A few keepers have challenged this last characterization as false. There are exceptions to just about any generality that can be made about chondros, and outcrossed animals (specimens that aren't pure-blooded) may benefit from the tempering effects of cross-breeding. But it isn't good to stake a position on a small sample size, and most keepers who have been exposed to typical Biak animals are very aware of the fiery temperament possessed by these animals and smile wryly to themselves when they hear such protests.

A captive bred Biak-type female chondro. This race is highly variable in appearance, and even captive bred individuals are usually irritable.

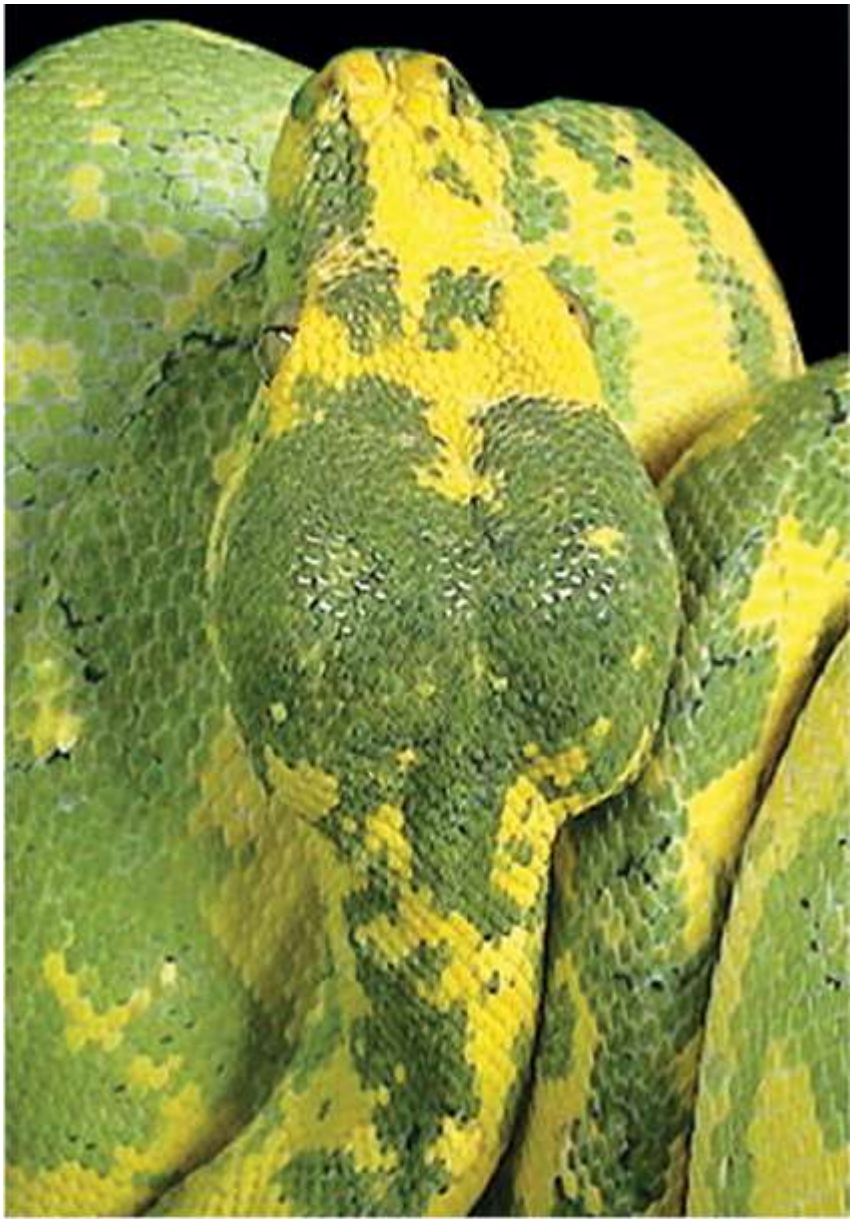
A typical Biak-type, with large chunky head, variable blotchy markings, yellow on the face, and an alert attitude. Photo by Damon Salceies.

Biak coloration is variable and tends to be more muted in adulthood than other types of chondros. The blotchy pattern frequently includes some yellow patches. The green is often more pale or olive-colored than in other forms and is usually the dominant color. Although variable, the blotchy pattern is unique and has been described by the wife of one of my customers as having a “tie-dyed” look. (Readers old enough to remember the Sixties will know what she means!) Often some white is evident too on single scales, or more frequently manifested as small “flowers” made of several scales. Specimens from the nearby island of Yapen are reported to have these white flowers in profusion, often without the characteristic yellow blotches. A very common Biak trait is a patch or bar of bright yellow on the face or nose. Some specimens have black pigment on the edges of their scales or the skin between the scales. As a group, Biaks are the most recognizable of the races. Some feel they deserve subspecies status.

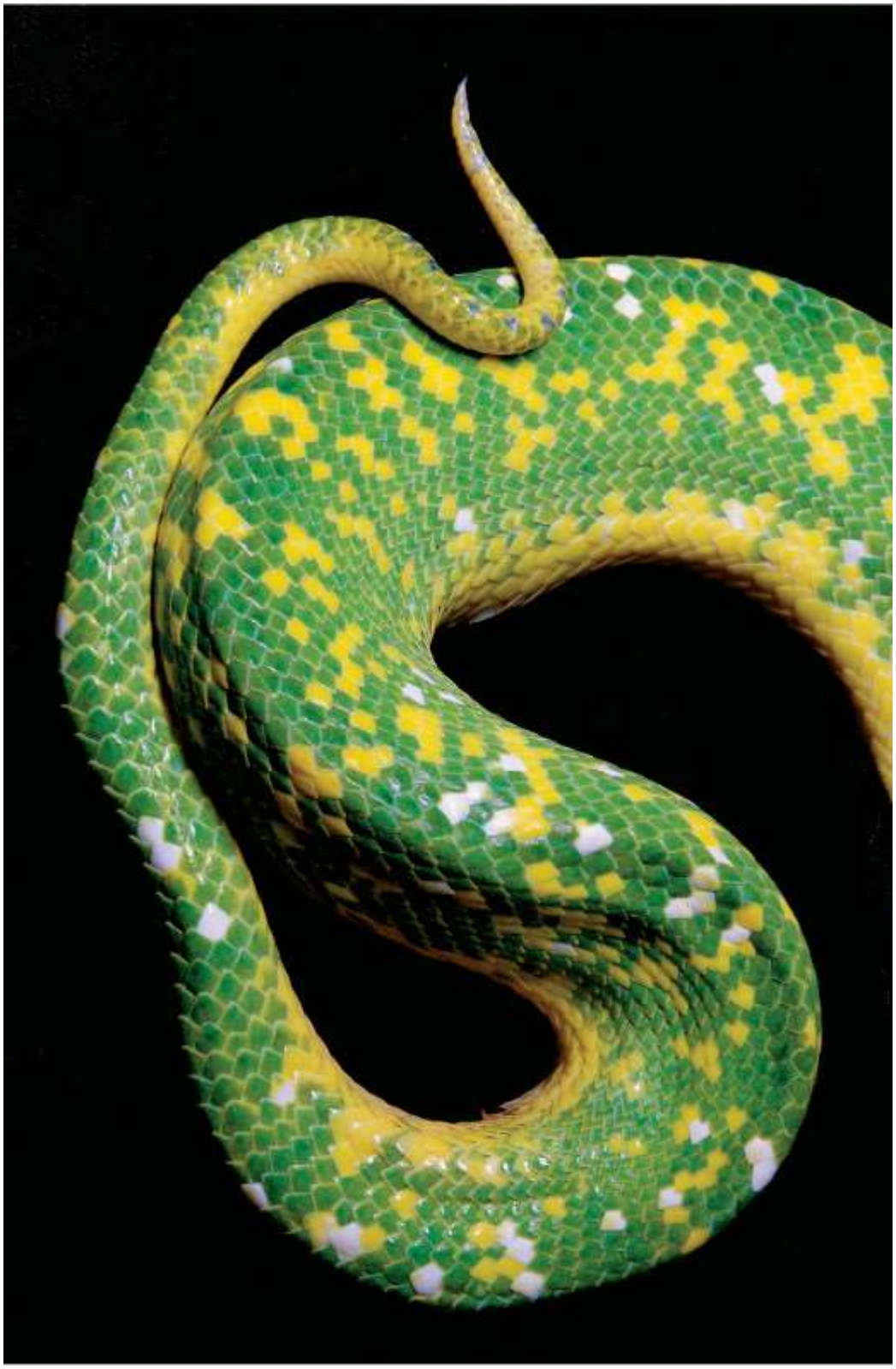
Biaks can be yellow or red as neonates, and the red offspring are often orange in color, with bold yellow dorsal triangles. These chondros typically undergo the ontogenic color change in a rather unique way, usually taking much longer than the other forms, and often exhibiting some beautiful and spectacular, if temporary, colors and patterns during the change. This is especially true of red babies. Those uninitiated to the long length of time and unusual colors associated with Biak ontogenic color changes can become quite excited, thinking they have acquired an extraordinary chondro. This usually gives way to disappointment as the animal slowly adopts a more typical adult appearance as it matures. This can take as long as three to four years with some of these animals, and some Biak keepers have

observed that subtle color changes occur throughout the life of the snake. Some beautiful high yellow projects have been produced by crossing Biak types with other forms. More about this will be said in the next chapter. Wild collected juvenile Biaks are without question the most common form that is illegally imported into the US, where they are frequently represented as captive or farm bred. One of the reasons for this is that the young animals are easily collected from the scrubby Biak Island growth that is less dense than other habitats. Also, wild Biaks are quite prolific and breed like rats, according to one collector.

This farm bred female has more blue than is typical of most Biaks.



K. Tepedelen
Biaks have huge head lobes.



Typical long-pointed biak tail.

Biak hatchlings are often red or orange, with bold dorsal markings. Yellow hatchlings of this race are common as well.

The Merauke Race

Merauke is a southern mainland coastal city that lies just west of the PNG-Irian Jaya border. This lies across the Torres Strait from the Cape York Peninsula of Australia. Some eight to ten thousand years ago there was an exposed land bridge between the two countries, and this accounts for the fact that southern PNG and Cape York specimens are genetically linked. However, the Australian specimens have a somewhat different appearance, and according to Australian ecologists, these "Aussie Greens" should be treated as a different race. Both forms produce yellow offspring.

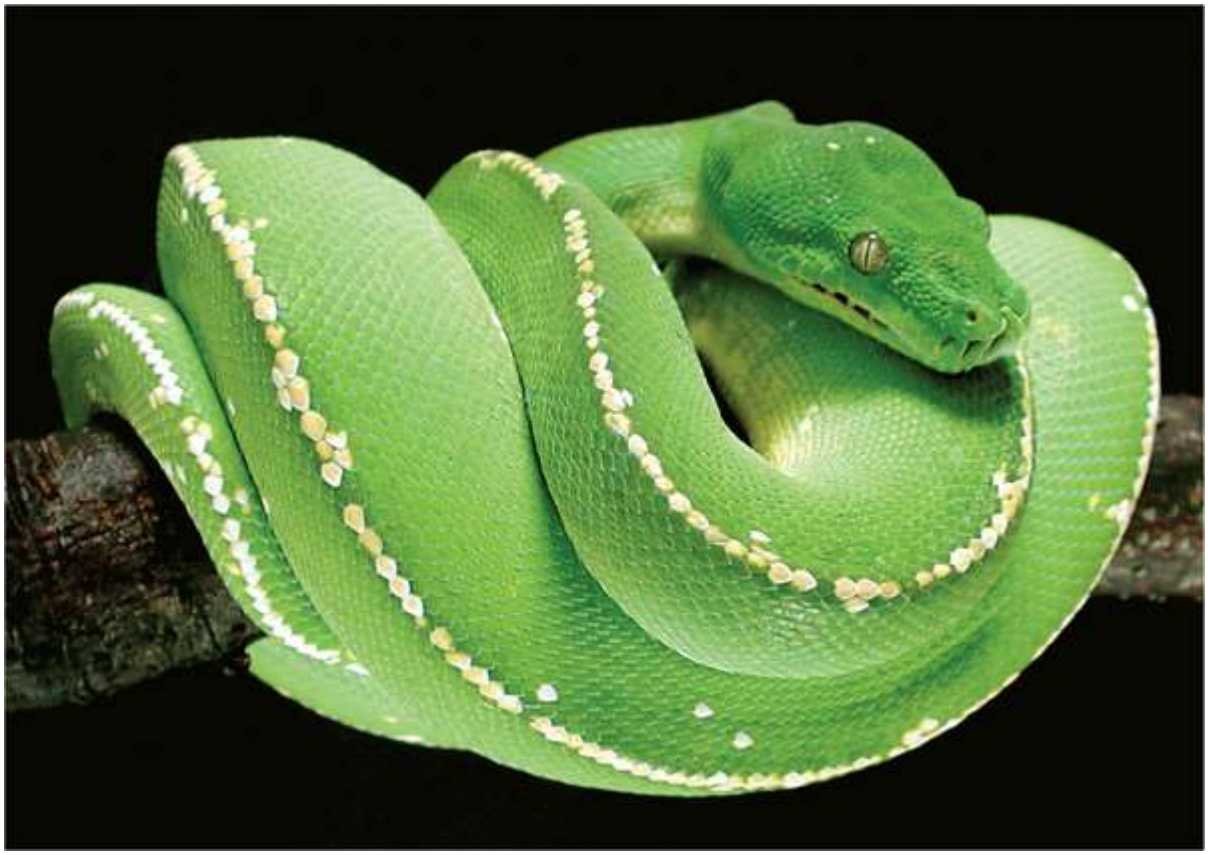
PNG Merauke chondros are handsome, impressive animals with a rich green color and a white dorsal stripe made up of mostly single scales. The contrast between the deep green color and the white stripe is striking and attractive, making this form desirable among hobbyists and breeders. Currently, Meraukes are not common in collections, although there are a few groups of them here in the US and in Europe. Not all Merauke chondros have a full stripe, and striped parents do not necessarily produce striped off-spring. I have seen photographs of wild specimens

that were represented as Merauke in origin, and many of these didn't have a stripe. I was offered a group of twenty such animals by an Indonesian dealer, and although I am not questioning the identification of the animals, about a third of them would have been labeled "Arus" by any hobbyist I know. This illustrates the difficulty of visually sorting animals into locality groups, and also suggests that chondros from the Merauke region in south-central New Guinea are as variable as other mainland populations.

It is possible that elevation is an important factor in determining the appearance of these animals. As was mentioned in Chapter 1, Karl Switak observed that without exception, all the Papuan GTP specimens he saw beginning at 4000 feet and up were fully striped animals, but that they were much more variable at lower elevations. A group of fully striped specimens, imported into the US in the mid 1990s and purchased by Dave and Tracy Barker, were documented to have come from the highlands around the village of Tanah Merah, north of Merauke. In 1996, Tracy Barker successfully bred two of these imports and the offspring are now in several private collections. One of those working with a group of these offspring, Damon Salceies, successfully produced a clutch in early 2002 from a sibling-to-sibling pairing. Damon told me that most of his F2 offspring did not develop dorsal stripes, although they all have some white dorsal spots. (Damon's locality-specific breeding accomplishment was overshadowed by the news that the clutch had produced the world's first albino chondro.)

Duncan MacRae

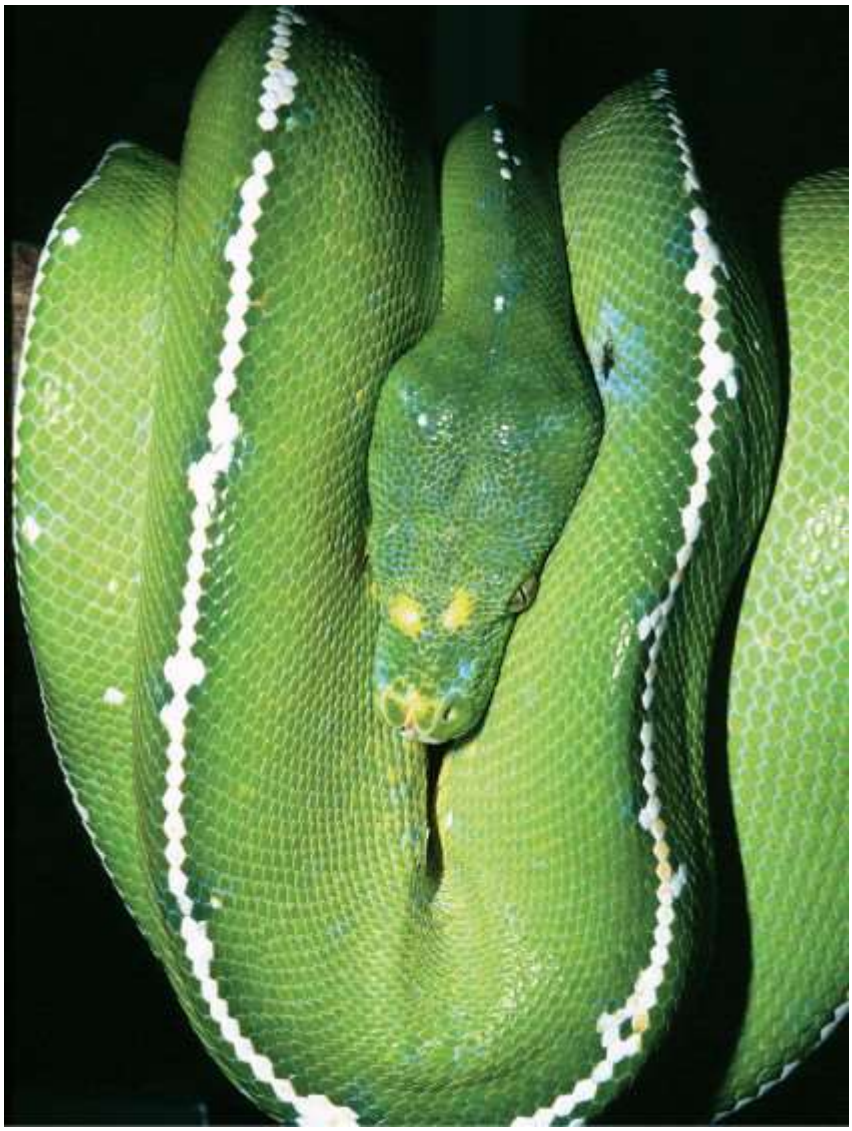
This is one of a large group of wild collected animals offered for sale as Merauke locality and reportedly collected about 250 KM north of the city. The resemblance to an Aru is noticeable, and illustrates that having a full dorsal stripe is not necessarily a Merauke trait.



A beautifully striped wild female that was collected from the forested region of Bade, on the outskirts of Merauke. Photograph courtesy of Rich Culver.

Another long-term captive from the Culver collection, also reportedly collected from the Bade region near Merauke, Indonesia. This is the kind of fully

striped specimen that most collectors think of when this race is mentioned. Photo by Rich Culver.



One of the wild collected Meraukes owned by Tracy Barker. Photo by Damon Salceies.

Trooper Walsh obtained a male from the 1996 Barker clutch, and his Merauke outcross clutches, sired by the male, have produced some very attractive designer animals, but none that I have seen have developed classic Merauke traits.

Walsh also joined in the Merauke-albino project when he hatched the second albino in the spring of 2005. He proved the het status of his Barker male (which is a sibling to the parents of the first albino) by breeding him back to one of his daughters. For all the details and current updates about the albino project, see Chapter 5.

A lot of buzz has been created about Merauke chondros since the albino hatch in 2001. Certainly the albino cast a bright light on this form, and this publicity, combined with the relative rarity, good looks of the striped specimens, and locality status, has fueled interest in these chondros among collectors. It should be noted that the albino trait manifested itself in the Tanah Merah imports as a happy but

coincidental occurrence. I have heard of hobbyists who want to acquire some Meraukes with the hope of obtaining the albino gene, but there is no evidence to suggest that albinism is inherent in the Merauke race. This form is likely to become more common in collections as more captive offspring are produced. It will be curious to see if Meraukes hold their appeal if subsequent generations fail to retain the striking dorsal stripe. It has been noted by other breeders and I that curiously, almost all F1 and subsequent offspring produced from wild Aru parents fail to develop the deeper shade of green that most imported adults have. Many don't develop as much white either. Some have speculated that diet or some other biological factor may be responsible for these colors being present in wild Arus. Perhaps this is also true for Meraukes. I have also noticed that white scales on chondros are often slightly larger and thicker than adjacent green or blue scales. Is it possible that white scales are the result of some physiological abnormality, and that captive breeding slowly reduces the factors responsible for them?

A gravid wild collected female produced this farm hatched F1 offspring. A paler green color and a reduced broken stripe are typical of many captive bred Meraukes. Rich Culver photo.

THE MAINLAND FORMS: SORONG, JAYAPURA, AND OTHERS

All things considered, the mainland populations of the green tree python are more difficult to sort out and describe than the island races. Certainly the mainland varieties are less distinct from each other than the other forms covered so far. As noted earlier, it is the Indonesian half of the mainland (called West Papua by the indigenous people and Irian Jaya by the Indonesians) that has been the focus of

most of the commercial collecting and breeding for the last ten to fifteen years. As a result, the majority of geographic typing has come from this area. In all likelihood, PNG populations vary by location and elevation as well, but lack of commercial collecting also brings lack of information. The city of Port Moresby, located on the southeastern arm of PNG, is the only location mentioned with any amount of frequency in relation to wild PNG chondros. This is due to the city's function as an export location, which is also true of many Indonesian GTP locality names. Animals that are believed to have originated from the Port Moresby region are usually designated as "PNG" by breeders, which is pretty general when you consider the size of the area. There are several attractive and variable captive bred bloodlines that trace their roots to PNG origins. One notable line, developed by Rico Walder, has produced specimens which include blue and high yellow. The high yellow "Lemon Tree" bloodline also reportedly came from PNG stock. Probably most of the early imports into the US came from PNG, and Switak brought back his gravid female from this area in 1973 (See Chapter 2).

Green tree python populations from the western half of the mainland can be loosely broken down into four groups: The **Sorong** area which includes the large Vogelkop Peninsula and the mountain areas of Manokwari, Arfak, and Nabire; the **Jayapura** region in north-central Irian Jaya that includes the mountain locations of Lereh and Cyclop; the **Wamena** highland area that includes Bokondini, Karubaga, and Angguruk; and what should probably be called the **Merauke** area, although as we have seen, the best striped animals associated with that name seem to come from the higher elevations to the north of this coastal city. It is probable that the entire area of southern IJ/PNG – south of the central mountain range and located between Agat to the west and the Port Moresby "arm" to the east – is home to a variable group of chondros with genetic ties to the Cape York group. Some refer to these as simply "PNG," but this seems to be too general, given the size and diversity of this half of the mainland. Some general descriptions of these four groups can be given, but it must be emphasized that these are generalities and that there is much overlapping and blending of these populations.

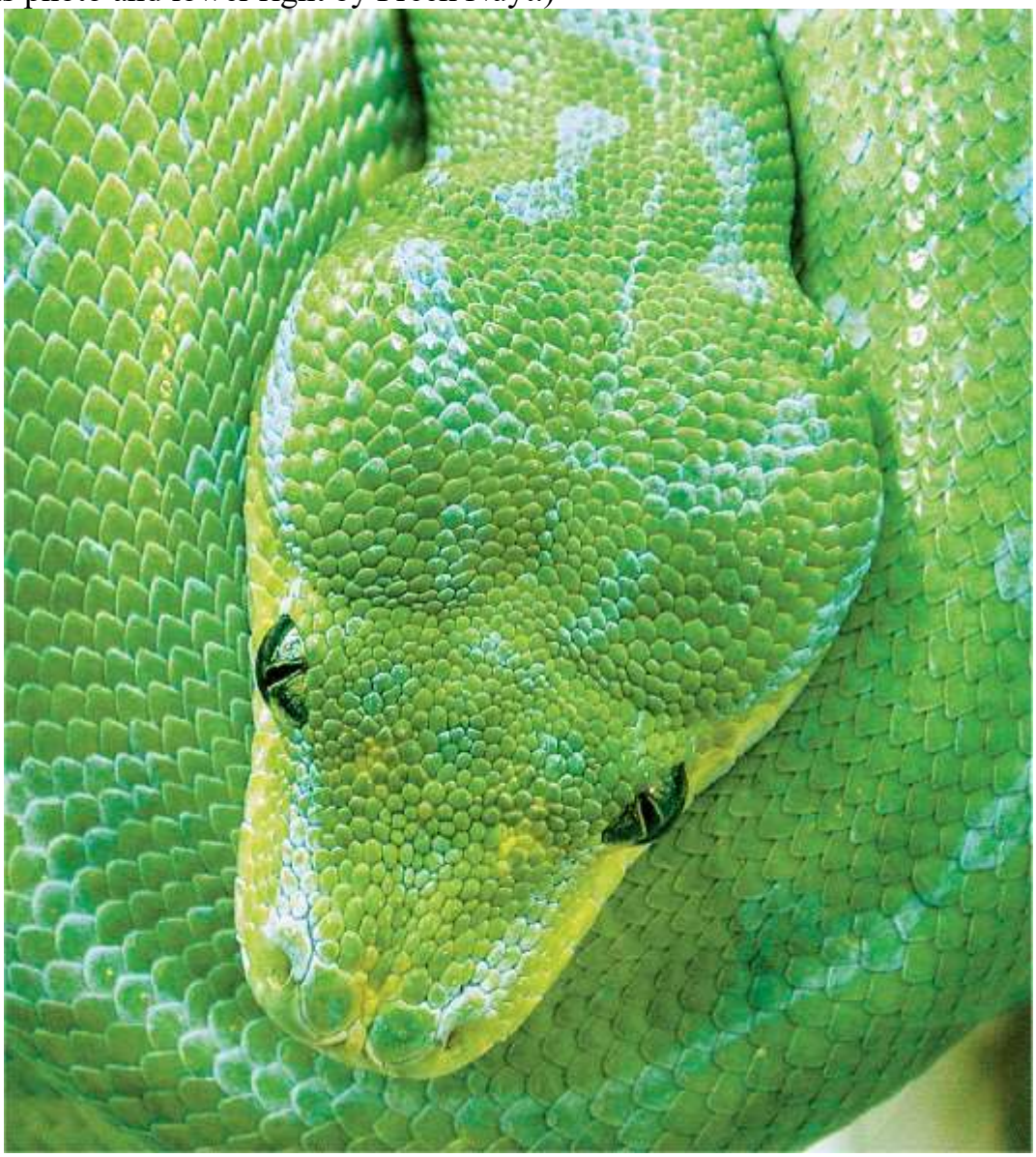
THE SORONG AREA

Sorong chondros are best recognized by a blue dorsal stripe and triangular shaped dorsal markings on a bright green body that is not as deeply colored as a typical Aru or Merauke. The quantity and intensity of the blue can be highly variable, especially in captive bred animals. Blue spots are frequently found on the lateral areas of the body, and there are usually blue stripes on the head. Some specimens have a few white scales on them. Other typical traits of the Sorong race include a smaller head with a shorter snout than the island forms, and a tail that is longer and more tapered than those possessed by Aru specimens but that is shorter and not as sharply pointed as a Biak's. A Sorong tail is always pigmented with black or dark blue, according to European locality type breeder Freek Nuyt.

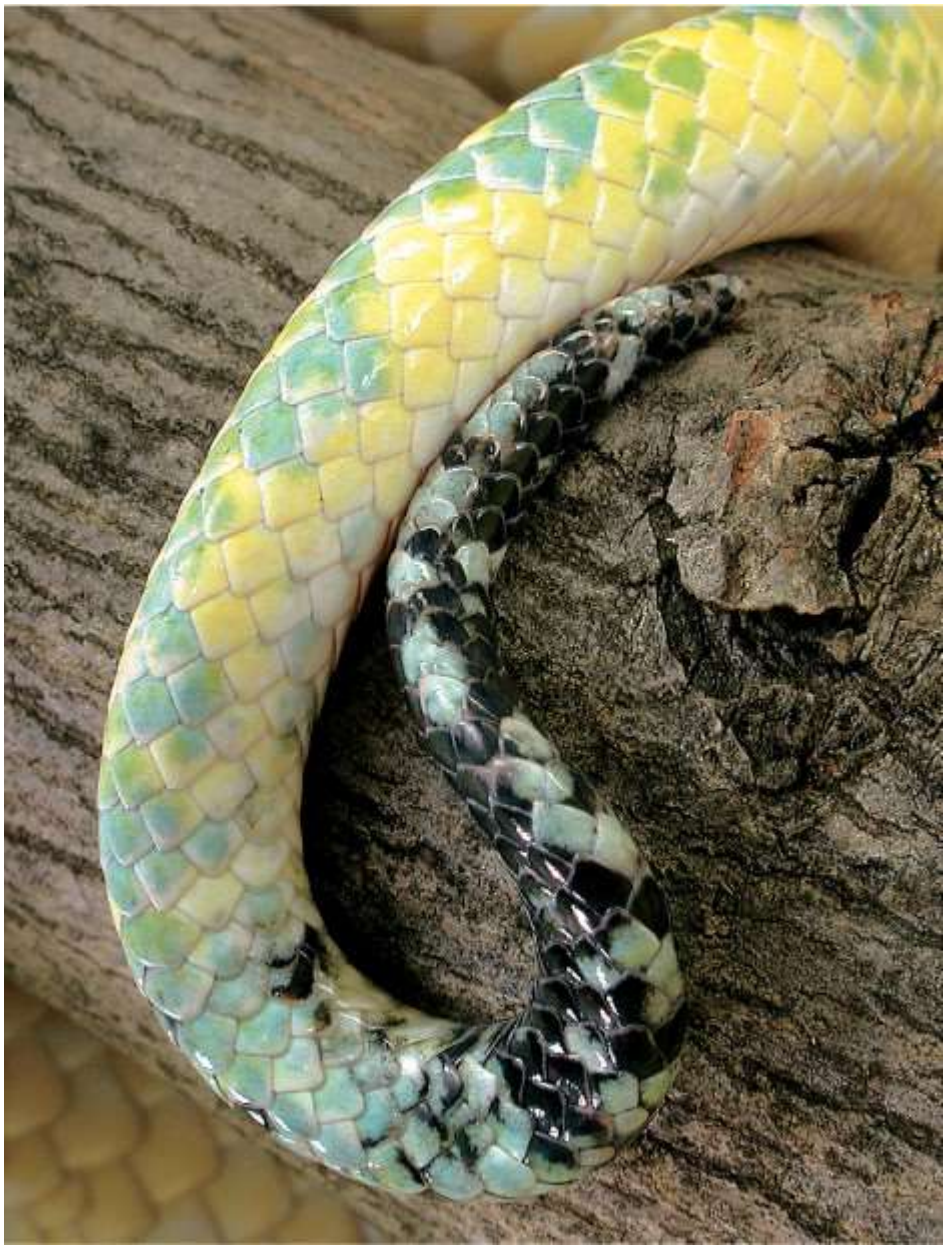
The bold dorsal markings on this neonate will turn blue with maturity.

Chondros from the Sorong region tend to be of moderate size, and captive bred specimens usually have a shy temperament.

A classic Sorong chondro.
(This photo and lower right by Freek Nuyt.)



Typical Sorong head, showing smaller size and much shorter snout than other forms.



Sorong tails are of medium length and taper, with a slightly blunt tip.

The tail of a Sorong is always pigmented.

Sorong chondros seem to be a bit smaller overall than other races. Temperaments can run the gamut, but on average the Sorong (and other mainland forms) tend to be fairly tractable as captives. Both maroon and yellow neonates are produced, and these usually have bold dorsal markings that turn blue with maturity.

The Mountain locations of Manokwari, Arfak, and Nabire are also located on the Vogelkop Peninsula. Specimens from these three locations appear to be very similar to each other and closely resemble chondros from other mountain areas. For descriptions, see comments on highland forms below.

JAYAPURA

Jayapura is another coastal city located in the north-central part of the mainland near the Papua New Guinea border. This town is also frequently mentioned as a chondro locality. Like Sorong, the name has been applied to chondros collected from the surrounding areas and exported to Europe and the US. Chondros from the Jayapura region typically have light blue dorsal markings, with a green body that is more olive or yellowish than the grass green seen on typical Sorongs or the deep green of Arus. Some Jayas have yellow on the lower sides. The tail may be yellow, blue, or greenish and is not sharply pointed or blunt. Lereh and Cyclop Mountain are located in this area. Lereh GTPs are similar to Wamena specimens, but tend to have white patches on the dorsal area rather than random

This captive bred male appears to have typical Jayapura characteristics: Medium size, faint dorsal and lateral markings, and a medium-sized head.

Jaya-type adult from Bushmaster's breeding group. Photo courtesy of Kamuran Tepedelen. scales. The tails are yellow or bluish green. European breeder Freek Nuyt told me that he feels there are morphological differences between the Wamena and Lereh groups.

Jayapura and Lereh offspring can be maroon or yellow, with dark red offspring being more common. DNA research has shown that animals from the north side of the central mountains are of a different lineage than those from the southern side.

Jaya-type maroon offspring can be quite attractive, but the bold markings don't usually carry over into maturity. Most adults are rather plain.

Wamena and Other Central Highland Groups

It has already been noted that elevation plays a role in defining the appearance of local populations, and this is demonstrated by several groups of highland chondros. Those from the central region of the mainland are the best known, and may in fact constitute the majority of specimens in captive breeding programs. Other highland names, such as Arfak, Nabire, Lereh, and Cyclops are also mentioned on dealer lists. Highland animals are variable, as are all chondros, and some highland descriptions and photos are very similar to others. Caution should be exercised when making visual identifications of specimens reported to be from highland localities unless credible data is obtained from the original source. The central populations in the Wamena region are located in close proximity to each other, and splitting them up into separate "localities" is probably more of a marketing tactic than a legitimate distinction. I was told that one Indonesian dealer divides clutches into red and yellow groups and assigns different "locality" names to each color. One hobbyist told me that he knew his highland animal probably didn't deserve the special name it was sold under, but he used it anyway because "it sounded cool."

A Wamena male from Freek Nuyt's group. Photo courtesy of Freek Nuyt.

Highland animals from all the various groups can be distinguished from Sorong and Jayapura specimens by subtle yet unique variations of the dorsal markings. As you can see from the photographs, the alternating dorsal saddles on highland specimens tend to be smaller and more teardrop shaped. Some animals have green dorsal saddles with blue borders that may contain small yellow or white clusters of scales. Often a thin dorsal stripe is present. The Wamena group tends to have reduced dorsal patterning compared to those from Lereh (see photo on page 41) but all the high-land forms tend to lose the contrast of their blue markings as they mature and appear more faded than Sorongs. Highland neonates are more likely to be dark red than yellow, but both phases are possible.

I purchased this animal as a locality Wamena neonate from Freek Nuyt. At the time, it was the only yellow Wamena he had ever hatched. The appearance is slightly different from adults that were red babies.

The animal as a juvenile.

Some highland specimens have black pigment on the edges of their scales or on the skin between the scales. This is seen mostly on young animals and it usually fades as maturity is reached. It has been speculated that this “mite-phase” coloration may assist highland forms in absorbing more heat from the sun, since these populations are subject to chilly nights that routinely drop into the 50s F. This seems to me to be disproved by the fact that the dark color is temporary. Also, this melanistic pigment is common in some captive bred bloodlines that have no known connection to any highland groups.

SOUTHERN IRIAN JAYA/PNG

Most of the information about these animals has already been mentioned. To recap: This area is large and includes the Merauke and Port Moresby regions. The green tree pythons from the higher elevations of this area tend to show dorsal striping. This area was connected to Cape York by a land bridge several thousand years ago, and the two populations are genetically related. Other than striped Meraukes, there doesn’t seem to be any distinguishing characteristics that identify southern PNG chondros, except to say that they are variable and may have a tendency to produce blue specimens, especially hormonal females. Some high yellow captive bred specimens reportedly trace their roots to PNG/Port Moresby founder stock.

Rico Walder produced this very attractive female as a part of his PNG bloodline, which traces its founder stock to the Port Moresby area.

The Cape York Peninsula Race

The Cape York Peninsula of Queensland, Australia, juts into the Torres Straight and divides the Coral Sea (to the east of the Peninsula) from the Gulf of Carpentaria to the west. This is one of the few remaining large wilderness regions in Australia. The topography is rugged, the roads are mostly unpaved, and access to the area is cut off during the rainy season. The peninsula is split by The Great Dividing Range, and the green tree pythons inhabit the rainforests along the eastern edge of the mountains. According to Wilson, they avoid woodland and swamp habitats and are only found in the lowland rainforests and adjacent regrowth areas. There are three known populations of chondros on the Cape: the Iron Range, the Mcllwraith Range, and the Lockerbie Scrub. This last area has the fewest number of specimens due to being the smallest in size; the Mcllwraith potentially has the largest population and these may be connected to the Iron Range group but should be treated as a separate population (Wilson, pers. comm.).

Cape York chondros (or “Aussie Greens” as they are fondly known by Australian keepers) are similar in appearance to some Merauke specimens and are genetically related to specimens from southern PNG. However, there are

differences that identify true Australian GTPs, and according to the keepers and naturalists I spoke with, the Aussie specimens are very consistent in appearance. The most obvious visual trait is a single row of irregularly spaced off-white or yellow scales on the dorsal ridge. It is not uncommon for some specimens to have blue patches on them, and the ventral area may be white or yellow. Switak communicated to me that most of the Aussie specimens he saw had yellow bellies. The offspring are yellow, and no maroon neonates have been observed in the wild or been produced from the captive breeding of documented Cape York specimens.

As in the US, controversy surrounds identifying true locality chondros in Australia. Most of those I spoke with agree that a high percentage of the chondros now in captivity are non-Australian in origin and have been smuggled in illegally. Of course, because of strict regulation of all native wildlife by the Australian government, these Indonesian/PNG specimens have been represented as true Aussie chondros. Some of these went on the books as legal specimens during an amnesty offered by New South Wales. It is probable that a few illegally collected Aussie Greens are kept quietly in collections. All of this means that any documented and legal Australian specimens are rare and valuable. A few insiders told me that there are at most three or four such adults in Australia, and these are all descended from a legally collected group of Iron Range specimens from the early 1980s. The collector was the late Joe Bredl (father of Rob Bredl, TV's "Barefoot Bushman"), who had collection permits from the Queensland National Park Service. These wild collected specimens were distributed to several individuals, two of whom were successful in breeding the animals. Rob Bredl was the first, producing clutches in 1987 and 1989 and using maternal incubation to hatch the eggs. There were approximately twenty neonates from the '87 clutch and twenty-five in '89. A collector named Ray Fields managed to hatch two neonates on his third breeding attempt. Another Australian collector, Bob Withey, received two F1 offspring from Rob Bredl and bred them successfully in 1992 and 1994, producing a total of twenty-two live hatchlings. All of Withey's chondros were confiscated by wildlife officers in 1995, and all but one animal died while in the care of the Taronga Zoo. This original Bredl male was returned to Withey in 1997 and died in 2004.

A very special animal: This female is one of a very few surviving F1 off-spring from the 1989 Bredl clutch of Iron Range locality chondros. Photo courtesy of Graeme Gow, taken at his reptile park by Karl Switak.

A well-known Australian keeper named Graeme Gow also received F1 hatchlings from Rob Bredl and three of these animals are still alive and accounted for as of this writing. One is a fifteen-year-old female still in the care of Graeme that is unable to reproduce due to surgery following egg binding in 2003. The other two, which are a sexual pair, are now in the care of experienced Australian breeder Tim Mensforth of Ultimate Reptile Distributors in South Australia. This female laid large infertile clutches in 1996 and 2003, and may be gravid at the time of writing. A forth F1 Bredl male is believed to still be alive but is currently unaccounted for. Few other clutches of chondros have been produced in Australia to-date. Wilson reports knowing about one successful pairing in 2004. Captive bred chondros are extremely expensive in Australia, reportedly selling at prices ranging from $5000 to $8000 each. Because of these factors, theft and poaching are present risks to Aussie GTPs, both in and out of captivity. Two adults, worth upwards of $20,000 AUD each, were stolen in 2004; two groups were caught trying to poach wild chondros in the Iron Range a few years ago. High demand, combined with high prices, always leads to an illegal black market as well.

Aussie keepers and potential breeders are understandably frustrated with the tight regulation of reptile keeping and breeding by the Australian government. Also understandable, at least from my perspective, is the desire of the government

to maintain the purity of the true Australian form of this python. If collecting restrictions were to be eased or removed, then the almost certain result would be an increased inflow of illegal Indonesian specimens being marketed as Aussie GTPs. This is further complicated by the existence of Indonesian specimens already in the country. DNA research is being done, with one of the goals being the ability to identify true Australian specimens. Because southern PNG specimens have been shown to be nearly identical to Aussie specimens in DNA samples taken from both populations, this is not likely to work well. Personally, I am also suspicious whenever an economic or political benefit is to be had from getting specific results during such testing.

It is hoped that in the not-too-distant future, chondro lovers and keepers from "the land down under" will have more plentiful access to legal specimens. Australian keepers who seek to legally obtain and breed chondros should not be prevented from doing so by over-regulation. It seems to me that issuing a predetermined number of collecting permits, along with micro-chipping and recording of the captives, should not be excessively difficult. Within a few years, a legal captive bred population could be established, just as there is in the US. Governments should not penalize their citizens by preventing them from owning and breeding indigenous species; after all, wildlife belongs to all of us. Regulating agencies perform a necessary service by managing this natural resource, but this can be taken to extremes. It is well known that the surest way to guarantee the survival of any species is to allow it to become a valuable and domesticated asset of humankind. Best of luck, fellow Aussie chondroheads!

This F1 Aussie Green is one of two Bredl offspring now in the care of Tim Mensforth, who is attempting to breed them. If successful, this will be an important

event and one that probably represents the final chance to perpetuate this historic line.

Kofiau Island

The island of Kofiau is located to the north of Misool Island off the western coast of Irian Jaya and to the south of the Vogelkop Peninsula. Recently a new form of chondro has reportedly been collected and exported from this island. These are the so-called Canary chondros, and some nearly solid yellow specimens have brought much attention to this form. I am treating this group as a color morph as well as a race, and more information can be found about them in Chapter 5. Although any new color variety or isolated population is cause for genuine interest among collectors and breeders, much of the hype (and high pricing) associated with Canary chondros is, in my opinion, premature. (Photo below courtesy of Marc Spataro.)

Locality-specific and Racially-pure Breeding

Many factors motivate people to breed chondros in captivity. The fascination of seeing new life come to be through our efforts, the over-coming of difficulties and conquering of challenges, and the desire to profit financially from doing something worthwhile can all play a role. Equally diverse are the predilections and values that influence our decisions as breeders. There have always been those who favor

working with naturally occurring color morphs over the unusual varieties produced by selective breeding, and which often bear little or no resemblance to wild specimens. I feel that there is plenty of room for both pursuits. In fact, although I specialize in selectively bred morphs, I consider myself a fan of wild-type breeding projects too. (Please see the definition of "wild type" in the Terms of Heredity at the beginning of this chapter.) Where I draw the line is at the notion that one kind of breeding program is somehow morally superior to another.

In reality, unless a breeder has detailed, specific documentation about his or her founder animals (such as was noted with the Barker-Salcieis Merauke project), he or she is simply endeavoring to reinforce desirable traits by selective breeding and is engaging in the same process as those breeding designer morphs. Both types of breeding reflect human tastes and opinions; neither is morally superior to the other. Even the locality-specific breeder with his or her group of carefully documented animals, be they *alterna* or*viridis*, is making choices and manipulations that almost certainly would not be duplicated exactly in nature, and this only becomes more true with each successive generation that is produced. If this type of selective breeding produces offspring that duplicate the appearance of wild-type adults, then this represents a legitimate attempt to perpetuate and preserve a specific type of natural appearance. But it seems to me that the animals become less locality-specific with each successive captive generation, due to human manipulation. I think there is a difference between selectively breeding to preserve a wild-type appearance, and locality-specific breeding. An example of the former would be a breeder who works with "Sorongs," selectively breeding specimens with blue dorsal markings but are from unknown or mixed ancestry.

I am not an advocate of the extremist view that anything man touches or influences is somehow perverted or tainted. Some locality advocates seem to act as though pure locality specimens represent nature that is "undefiled" by man, which is mostly untrue. For instance, locality *alterna* are often hunted on paved roads that were made by man! I do agree with those who feel it would be a sad loss if specific natural populations were to be wiped out for any reason, natural or otherwise. I think we as humans have an obligation to manage wildlife and wild habitats in a responsible manner, conserving and preserving wild populations in a balanced approach that takes all factors into consideration. I have no quarrel with those who seek to maintain breeding colonies that reflect, as closely as possible, the natural appearance of wild chondro populations. I reject the assertion that to do otherwise is unethical, immoral, or irresponsible. Perhaps the two most important things an individual can do regarding wild GTP preservation is to avoid buying wild caught imports, a practice which supports an industry that is not promoting the best interests of either the customers or the wild populations; and to support and promote those who are working to stop or reverse habitat destruction.

It bears repeating: A breeder working with Sorong-type animals (as in the example given above) that have been visually selected for morphological traits is not doing "locality breeding." Rather, he or she is engaged in selectively breeding for chosen characteristics, the same as another breeder might work to produce high

yellow animals. Both are doing what they enjoy, and as long as both of them are honest with the public and treat the animals with humane respect, then both are to be applauded.

In closing the discussion about this controversial subject, I'd like to recap the important points I've made in this chapter:

- Locality means a specific geographic collection location and the chondros collected there, regardless of appearance.
- Race refers to a group of chondros from a defined geographic region that share unique, distinguishable traits.
- Race and Locality are not the same thing; most chondros conform more to racial descriptions than to the narrow definition of a locality animal.
- Island forms constitute the most easily recognized race groups because the habitat is confined within a physical barrier (the ocean). This isolates the population and keeps other groups from co-mingling with it under normal circumstances.
- For a chondro to be accurately labeled with a locality name, documentation for the collection site must be available. This is not merely an opinion; it goes to the very definition of the word.
- Many chondros can be grouped according to race, and the designation of "type" indicates the animal has sufficient traits to be categorized within one of the recognized race groups but does not have documentation of its wild origins.
- The more generations of captive breeding that take place within a group or project, the less accurate any locality-specific designations will be, and most captive bred chondros cannot be accurately identified as to locality or race. Breeders in several countries are working to preserve the appearances of naturally occurring geographic races in captive offspring.

It is sincerely hoped that the information and opinions offered here will go a long way toward eliminating the confusion and division that has been all too common in the chondro community regarding the locality debate. I don't think I have asked for anything unreasonable in what I have written. Those interested in the truth, and committed to searching out the facts, should not have a problem with being asked to back up their claims and beliefs with evidence, good science, and solid logic. There will always be a few who have an agenda to accomplish and who will react in a negative manner when confronted with the issues and questions raised here. Nothing constructive can be accomplished by arguing with those who aren't interested in facts and who have their minds made up. To the rest I say, let us continue to work together, sharing data and learning new things that will enhance our enjoyment and appreciation of these beautiful and mysterious pythons. As long as we all pursue our goals with an open mind and focus on facts and sound data, we can't help but arrive at the same destination! We may not always agree or interpret data in the same way, but we can respect each others' positions so long as they are reached and expressed with intelligence and integrity.

CHAPTER 4. COLOR GENETICS AND ONTOGENIC COLORCHANGE

There is no excellent beauty that hath not some strangeness in the proportion."
Francis Bacon

One of the famous "Merauke outcross" offspring from Trooper Walsh's 2001 breeding between his F1 Barker Merauke male and a mite-phase female. The black pattern on my male has diminished with maturity.

I have to say that I am not completely comfortable with the term "designer." This always conjures up an image in my mind of someone with a palette full of bizarre colors and patterns, which they mix and match until they get just the right effect before somehow implanting these colors into their animals. The word also seems to imply that people have the ability to control at will the results of their breeding. The fact is, there isn't a single one of us who has the power to create the spark of life in another creature or who is able to exercise control over the complicated genetics involved in the beautiful and highly variable colors found on GTPs. Nonetheless, it is true that many of these specialty morphs are the result of human efforts and manipulations, and that animals are produced from these would not occur in natural populations, at least under normal circumstances. Certainly any wild individuals with such stand-out colors would not be a good survival bet.

I also am hesitant to use the expression "high-end" to describe certain color morphs. From the perspective of demand and value, it is true that some of the specialty lines are quite high up on the measure of worth and desirability, but I fear

that to describe such specimens as high-end gives the impression that other animals may be "low-end." Again, from a purely commercial consideration this may be accurate, but it sounds arrogant and elitist. While certainly there are lesser and greater chondros within the context of health and vitality, any captive bred healthy chondro is of great worth as a beautiful animal and as someone's prized possession. Perhaps high-end is better used to describe outstanding specimens of any color or pattern, natural or humanly influenced, rather than applied narrowly to extreme captive produced morphs.

Since high-end and designer have come into relatively common use, and everyone knows what is commonly meant by them, I will use them in this book and in this chapter. Maybe sometime soon we will come up with better ways to refer to these selectively bred, captive-produced color morphs that lack the possible negative connotations the current terms do. One thing is sure: the morphs themselves are wildly popular! The extreme variability of colors and patterns that chondros are able to exhibit has resulted in the development of captive bloodlines with the goal of fixing these traits, more or less, into reliable and trustworthy genetic characteristics. A lot of progress has been made in the last few years and several distinct color morphs have been established as inheritable traits and have become a part of many collectors' wish lists. Even naturally occurring color and pattern traits can be improved by pairing above average specimens of race-specific specimens; high white Arus are but one example, and would also be considered by many to be high-end.

Before getting into a detailed description of the existing morphs and the future of designer morph breeding in the next chapter, it would be wise to discuss the matter of GTP genetics. A realistic understanding of this topic is vital to begin unraveling the mysteries of selective breeding and morph development. We will also discuss the ontogenic color change and the different color phases of neonate chondros.

CHONDRO GENETICS

Usually the first thing someone will ask after seeing an unusually colored or marked tree python is, "Do you think that is genetic?" What they actually want to know is if the trait is heritable, and if so, how reliably it will be passed on in the offspring. Every trait of any living organism is "genetic," but not all traits are heritable, and not all heri-table traits are the result of simple dominant or recessive genes. Confused? You are not alone! While I'm the first to admit that I am not a geneticist, I do have some basic understanding about reptile genetics, as do many herpetoculturists. More important to our discussion here, I can make some solid observations about how genetics work when considering chondro colors and other morphological traits, having made this an area of personal research and study for a number of years. In fact, my interest with the genetics of reptile breeding predates my work with chondros. My purpose here is not to attempt to make genetics experts out of us, but rather to enable the reader to grasp the important and foundational truths necessary for sorting out fact from fiction regarding the

development and improvement of the various designer color morphs of captive chondros. Let's wade in and see if we can make some sense of this confusing and mysterious aspect of GTP biology.

GENETICS TERMINOLOGY

It would be good to begin with some basic definitions of "terms of heredity." Barry C. Nielsen supplied these definitions on his excellent web site, "The Advanced Genetics Wizard," and they are used by permission. Please see Appendix B for the web address.

Allele – either of the two paired genes affecting an inherited trait (one from the father, one from the mother).

Co-dominant – an allele that causes the homozygous form to look different from wild type and the heterozygous form to have traits of both (all three look different from each other).

Dominant – an allele that causes the homozygous form and the heterozygous form to look the same as each other, but different from wild type.

Recessive – an allele that affects an animal's appearance if it's present in the homozygous state only; an animal that's heterozygous for a mutant, recessive gene looks wild type, but that gene can be passed on to offspring.

Heterozygous – having two different alleles for a genetic trait.

Homozygous – having identical alleles for a genetic trait.

Wild Type – the way an animal looks with the greatest frequency in a wild population ("normal").

APPLICATION

The problem with applying these definitions to green tree python color varieties is that adult color traits in chondros are not the result of simple dominant or recessive genes. If they were, then predicting the adult colors of the offspring from specific parents would be as simple and accurate as predicting the results from other reptile breeding projects, such as Ball pythons. But they are not.

For example, let's consider a popular color variety, the high yellow morph. The Lemon Tree bloodline is probably the best known example of this color variety. The first high yellow Lemon Tree male was produced from wild collected green parents. When a new reptile color variety is spontaneously produced by captive breeding, we normally make the assumption that the trait was caused by a recessive gene passed down from the parents. In this example, both parents would be heterozygous for high yellow, but would appear normal (wild type) themselves. Neither parent can be dominant or homozygous, because then they would exhibit high yellow coloration too. But there are several problems when applying this understanding to our example.

A Lemon Tree male, descended from an F1 hatchling produced from wild type imported green parents.

First, it is unlikely that two random and probably unrelated adults would be carrying compatible alleles for the yellow trait. Second, fairly predictable results should be able to be calculated for the offspring of recessive parents, using the familiar Punnet Square. But when the off-spring of unusual adult chondros are tracked, they seldom if ever develop along the expected mathematical ratios that traditional predictors would indicate. Third, GTP traits are often expressed inconsistently among offspring from the same clutch, rather than as definable and clearly distinguishable traits. This is why we have “high yellow” adults rather than simply “yellow.” Six different offspring from the same parents can have six different amounts of yellow on them, and it is up to the eye of the beholder to determine what is high and what isn’t. This is opposed to an actual dominant or recessive trait, such as albinism, which is either expressed in an individual animal or it isn’t. There are no “high albinos.”

What we do observe consistently in chondros are two phenomena: A tendency for spontaneous color variations to randomly surface and the tendency for various traits to express themselves in gradients. That is, the yellow trait (to use our example) will appear in different amounts, concentrations, and even tone, among the offspring from the same parents. Over time, selective breeding does tend to

improve many color traits and the reliability with which they manifest in off-spring, yet without the predictable and reliable percentages which recessive traits can be assigned. It is important to repeat that this does not mean these traits aren't genetic or heritable. But it does mean that the results of breeding specific pairs for specific traits cannot be predicted with any degree of certainty unless and until there is some history of documented results. This statement is true for yellow and blue morph, calico, and most other color varieties of chondro, and understanding it is the key to an honest and accurate assessment of many selective breeding projects.

We can observe this same principle of the gradual expression of traits when breeding dogs. Many of the desired characteristics of show, field trial, or hunting dogs are developed over time and by mating parents that have these traits themselves. Even so, any given litter of pups is likely to have a range of results, with one pup being judged the pick of the litter and the others ranked in descending order. Consider a characteristic such as size: in a litter of puppies there will be random results. These results can be strengthened over time, and breeding larger examples of the same breed of dog will tend to develop puppies that will grow to be large adults, with results expressed in a gradient. Of course, puppy colors in some dogs such as Labrador Retrievers are the product of dominant or recessive genes, and fairly predictable results can be obtained when crossing adults of known genetic traits. However, temperament and many other canine characteristics, such as hip problems, are seen randomly and are much less predictable, although they are still very much affected by the family tree. In the same way, chondro color traits have demonstrated themselves to be highly variable, and not the result of simple dominant or recessive genes, although they are strongly influenced by ancestry as well.

What this means in plain language is that you can't be sure of getting the desired results from breeding one or more unproven high yellow parents. Only when some history has been established with specific animals, and to a lesser degree with specific bloodlines, can we begin to anticipate specific results with anything approaching reasonable accuracy. Happily, most of these traits do tend to strengthen with selective breeding and much more so in some bloodlines than in others. For example, the Lemon Tree (LT) bloodline developed by Tim Turmezie and referred to previously in this chapter, has demonstrated itself to be very potent when compared with some other chondro projects. One of my Lemon Tree females has produced high yellow off-spring with two different males, neither of which had any known relation to the LT line. Other high yellow bloodlines have produced random and exquisitely colored specimens, but often with less consistency than Lemons. Most designer morph bloodlines have shown varying degrees of success with producing offspring having the same or better characteristics than the parents.

This leads to yet another important aspect of chondro genetics, the fact that a hot-looking adult of either gender often produces different looking offspring with different mates. For example, a blue male may sire a good percentage of blue offspring with a particular female, yet give disappointing results with a different

mate. Serious breeders are always looking for male-female combinations that yield the best results.

"Blue Frost" (GM-01-30) is the offspring from an ontogenic blue male and a hormonal blue female. History has demonstrated that it takes the right combination of parental genetics to obtain the desired results, and many times blue offspring are in the minority in a clutch from a blue parent. I was very fortunate to hit on a good combo when producing this animal; his siblings are blue also.

What conclusions can be drawn from all of this, especially in light of some of the prices charged for designer morph offspring? Certainly the most important one for buyers is to include the reproductive history of the parents in the decision-making process when choosing offspring. Of course, when unproven adults showing desirable characteristics reproduce, the offspring are certainly worth more than offspring from more normal-looking adults, because the odds of getting an unusual or outstanding specimen from such a clutch are definitely higher. But customers need to understand that buying such offspring is a decision involving some degree of risk, and the honest seller will reflect this in the price. The more detailed the reproductive history of one or both parents, the better your knowledge about what you may be getting. Conversely, first-time breeders or parents with no available history represent the highest risk.

As has been explained, the fact that one animal has produced high-end offspring in the past is no certain indicator that it will do so again when being bred to a different mate. Offspring often strongly reflect the traits of one parent over the

other; breeder chondros that have demonstrated the ability to produce high-end offspring with multiple mates are valuable indeed. Pairs that repeatedly produce consistent results when bred to each other represent the most secure choice when buying offspring in the hope of obtaining a specific result. Since specific designer morph breeding is still relatively new, it can be stated that much of the designer breeding being done currently is still in the experimental and developmental stages. However, a lot of progress has been made, and better results are being obtained all the time.

Color Phases of Neonate Chondros

Baby chondros come in two basic phases… golden yellow and maroon. (I refer to these as color phases rather than "morphs" because a phase is temporary, and certainly the baby colors are not permanent.) There is wide and sometimes extreme variation within these two basic color phases however, especially the maroon phase.

A beautiful golden yellow neonate, produced and photographed by the author in 1998.

These "dark" babies (a term used by breeders to refer to all non-yellow neonates) can be red, orange, brown, almost black, and variations of all these, in addition to the more normal maroon color. Yellow hatchlings tend to be much less variable in color, and usually have a pattern of red or brown speckling, bars, spots, or geometric shapes on a beautiful bright yellow body. They may also have a few white markings, usually in the center of the other shapes. Although the differences

between yellow neonates are more subtle than that of dark babies, yellows are not without variation. Some are boldly marked with solid dorsal markings and some have a more speckled, “busy” appearance. Some high yellow adult bloodlines produce yellow offspring that are somewhat lighter than normal and that have reduced markings.

A typical maroon baby from Jayapura-type parents.

Although attractive, the blaze baby phase has little to do with the final appearance of the animal. This handsome neonate developed into a solid green adult. The genetics of the parents have much more to do with the adult traits of offspring than the blaze pattern.

A popular phase of yellow baby that has shown up in recent years is the “blaze” form. Blaze babies have a reddish wash of color in varying degrees of width and intensity down the dorsal area. While such babies are very attractive, there is evidence that the trait itself doesn’t mean anything in particular about how the animal will color up as an adult. Yellow chondro babies are very appealing to the eye, and there are more than a few chondroheads who were first drawn to this species when they saw a yellow neonate for the first time.

This dark brown hatchling is from the author's 2005 calico project pairing and illustrates the rich beauty of this neonate phase.

Dark neonates have such rich, gorgeous colors that it is no wonder they are the favorites of many and command higher prices on average than yellow babies. The most common dark color is a deep maroon, but colors can range from tomato red to almost black, and some designer bloodlines have produced dark offspring that are almost surreal in appearance. Normally, dark neonates are marked with yellow or white cross bars or triangles on the dorsal area. Sometimes these are large and bold and sometimes they are reduced in size or number, and they are usually outlined with dark borders. In some neonates the dorsal markings are broken up into small fractured shapes. There may be dark- or light-colored spots and bars on the skin in between the larger markings, and brown babies with subtle black head and body stripes are popular among many collectors.

A calico baby from 2004. Is it any wonder than most breeders favor dark babies?

Dark neonates can show a lot of variation in color and pattern, much more so than yellows. Some very reduced pattern dark brown babies have been produced from selectively bred bloodlines, and due to their tendency to develop into high-end adults, they are prized by breeders and collectors alike. “Calico Junior” (GM-99-09) was an example of this very dark, patternless baby phase. (See photo in Chapter 5.)

This very red baby from the 2004 calico clutch turned into an outstanding calico male.

A red neonate hatched in 2005 by Damon Salceies.
Damon Salceies

A recent development is the production of some very red neonates. I hatched my first “super red” in 2001 as part of a Calico clutch, and have hatched more from this bloodline and a second one as well. An interesting note is that my Calico reds change to a more reddish brown after shedding for the first time, but the red babies from my 2004 “Pepper” clutch remained red until the onset of the ontogenic color change.

Baby Color Genetics

It is interesting to note that the baby colors of hatchling chondros do seem to be very dependent on the original baby colors of the parents. It is often easier to predict the color of hatchlings that a pair of adults might produce than it is to predict how the offspring will look as they change to adult colors. That is to say, parents tend to produce babies that are the same color as they were as hatchlings. Clutches from parents of both colors (one yellow and one dark) often contain both yellow and dark babies. How many of each seems to depend on the relative strength of each baby color in the family tree for each parent.

Yellow hatchlings used to be the most common, and for many years it was considered unusual to hatch out any maroon babies (Walsh, pers. comm. 1997). This was most likely due to the acquisition of founder stock by early US breeders that were yellow as juveniles. As breeders began to utilize adults that were maroon as babies, more maroon offspring began to show up. It has now been demonstrated

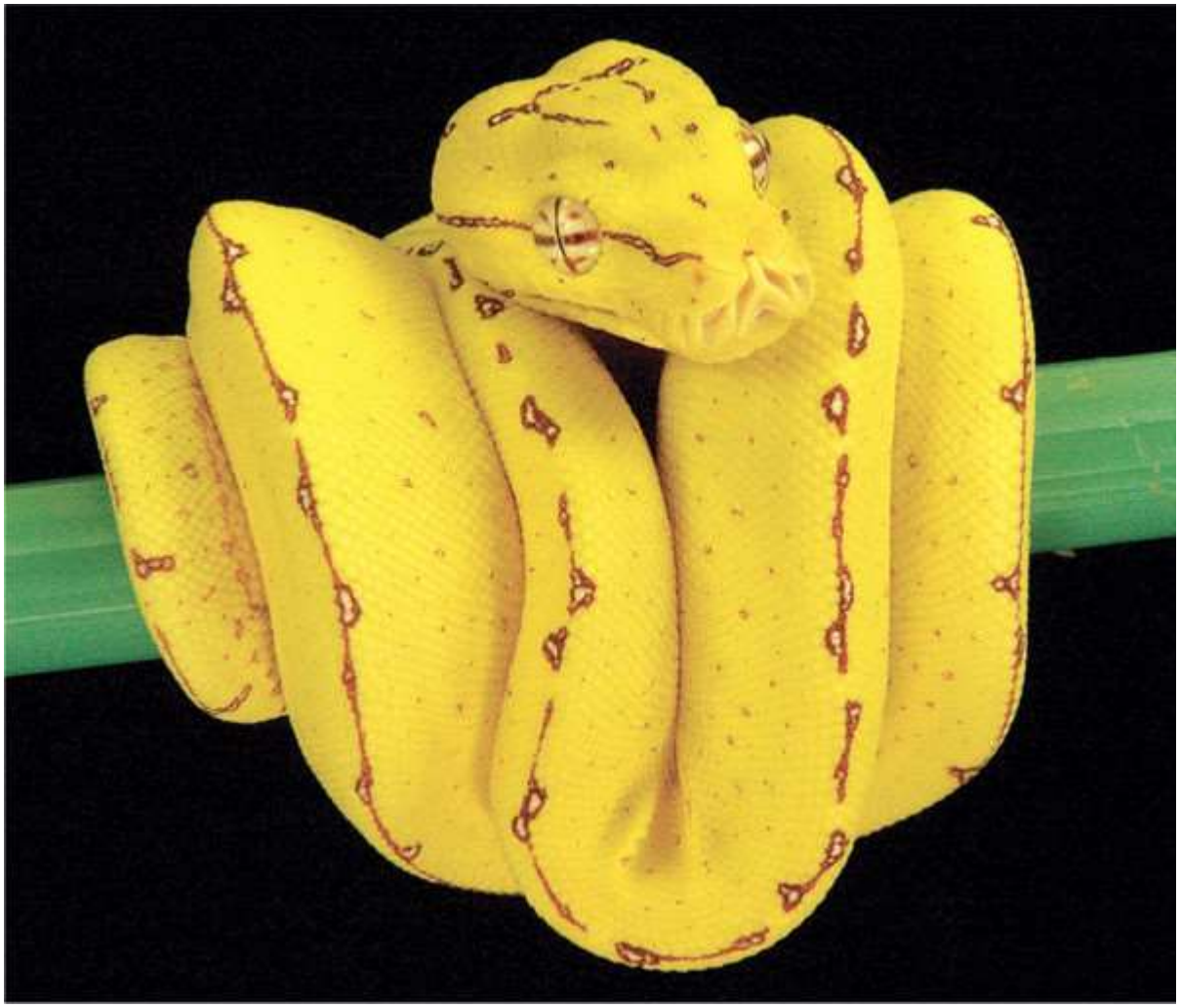
many times that clutches of all dark babies usually result from parents that were both dark as youngsters, and both baby color phases can be produced and strengthened within a breeding program by selecting parents that had the desired color as neonates themselves. There is no evidence of sexual dimorphism related to baby color phases.

This outstanding Biak outcross male ("Goldenrod," GM-02-04) started life as a maroon baby. Not all high yellow adults come from yellow neonates, although the Lemon Tree bloodline is noted for always producing yellow babies.

One of the most frequent questions I am asked by prospective customers is about the relationship between baby color phases and the final results of the adult color change. I can state with certainty that the genetics of the parents in particular, and the entire family tree in general, have much more to do with the appearance of an adult chondro than its baby color. There are a few common beliefs about the relationship between neonate colors and the adult colors that result from them. For example, it is often thought that only yellow babies develop into high yellow adults, and that maroon or brown offspring are more prone to produce unusual adults. There is some truth involved with both of these theories, especially in the case of some high yellow bloodlines. For example, the Lemon Tree bloodline is known to produce only yellow offspring. However, I have high yellow adults in

my collection that came from maroon babies. It is true that several high-end morphs are known to mostly come from brown babies, especially ontogenic blue adults. (See discussion about blue morphs and the difference between hormonal blue females and ontogenic blue adults in Chapter 5.) The fact that many high-end morph breeders in the US prefer to selectively breed for dark babies has contributed to the reality that many of the best lines come from dark babies. In high-end clutches that have babies from both color phases, the dark babies usually have the best chance for the desired adult appearance, and it has been my observation that most of the time, the yellow neonates will tend to develop into more normal looking adults. But, this is not always the case, and it is best to refrain from making dogmatic statements about chondro colors because there is usually an exception somewhere. Chondros love to prove chondro people wrong!

This was the only yellow baby from a small clutch of brown offspring. Both parents were ontogenic blue animals and brown as juveniles.



A high yellow Lemon x OS neonate, with the pale yellow and reduced patterning that such babies often have.

There has been some speculation as to the possible correlation between baby patterns and coloration and the racial purity of the parents. European breeders, who have always focused more on race than “locality” in their breeding projects, favor the perspective that each race tends to produce babies with patterns unique to that race.

One of my favorite hatchling color phases: Chocolate brown with orange dorsal markings. The red eyes really add to this feast for the senses!

(See the discussion about race and locality in Chapter 3.) While I admit that I don't have the depth of experience with selective breeding for race that some Europeans do, I haven't really seen a clear distinction between the yellow babies of the Aru Island and mainland forms. What I have observed is wide variability in the appearance of all off-spring, as well as neonates that closely match illustrations of sup-posed race-specific colors and patterns but, in fact, have no known relationship to a particular race. In some instances, my neonates exhibit characteristics that are supposedly associated with one race but are in reality from parents that more closely resemble the descriptions of another race. In truth, the experiences of many US breeders working with specific forms seems to directly contradict the views of others. For example, there is wide agreement by US breeders that pure specimens of the Aru race produce only yellow offspring. European breeders not only report dark Aru neonates, but also feel that these offspring exhibit a unique broken pattern.

Designer baby from high yellow bloodline, with blaze coloration.

I've hatched many babies with the broken dorsal markings that had no known relationship with Aru specimens. There are several possibilities that might explain this apparent contradiction, but the important point here is that one must be cautious when ascribing unique baby traits to specific race or locality animals.

A very busy pattern distinguishes this Sorong-type neonate. The bold dorsal markings will turn purple, then turn blue with maturity.

A frequent exception to this is certain off-spring of the Biak Race. While I haven't been able to make any consistent observations about yellow hatchlings of this race, the maroon babies often do have a distinct look to them, with large, rounded yellow or orange dorsal markings. These offspring are notoriously slow to fully change into the adult colors. There is also some evidence that babies from race-specific parents may have distinct tail colors. In 2003, I hatched babies from two wild collected Aru-type adults, and all the babies had blunt black tails.

A typical Biak neonate, showing a bold yellow pattern on an orange body color.

Ontogenic Color Change

Perhaps the most fascinating element of raising chondros is watching the yearlings go through their color and pattern changes. There are no rules here, and literally anything can happen. Some animals change quickly, even overnight. It may take several years for some chondros to fully assume their adult appearance. A few are rather drab as they exchange baby traits for adult colors, and others may temporarily look like the autumn forest ablaze with orange, rust, and yellow colors. Predictably, yellow neonates often have a different progression of changes than dark babies do. However, there are some generalities that can be made which apply to the majority of specimens.

A very typical color change progression is beginning on this yellow juvenile. The head has a green wash developing, random body scales are turning, and the dorsal markings are darkening and will soon turn lavender.

On average, young chondros begin to show color changes from about six months to a year in age. Yellow neonates usually begin the development of adult colors with the appearance of a few flecks of green on their bodies and sometimes around the nostrils. These green scales continue to spread and grow and soon the animal has a green wash of color over most of its body. This change can happen very quickly, but often takes place over several weeks or even a few months. The green can be bright or dull, even slightly gray looking. If the animal is destined to have white dorsal markings as an adult, such as specimens from the Aru race, these are usually the first to develop, sometimes even before the green begins to come in. The white markings don't contrast well with the yellow body and may be a little difficult to see at first. Some collectors have observed the white markings continuing to develop into the second and third year of growth. A few yellow neonates will turn very dark, almost black, during the color change, but will usually go on to become a green adult. Aru-type babies often go through a "dirty" stage on the way to becoming a green adult.

Many yellow babies of the Sorong type have red dorsal markings at hatching that will turn gray or lavender as the animal changes colors. These gray-blue markings often develop into pretty blue markings as the animal fully matures, often with a purple intermediate stage. It can take two to three years before the blue fully develops, and even then these markings can look purple or gray in poor lighting,

such as indoor fluorescent lights. In fact, all chondros will look their best when viewed outdoors. This is the ultimate “full spectrum” lighting, and the effect can often be somewhat duplicated indoors using full spectrum lights. Standard yellow or white indoor light bulbs can render blue almost invisible and make really nice looking chondros appear bland. GE brand “Reveal” incandescent bulbs do a great job of showing off your chondros’ true colors.

This Merauke outcross x Pepper yearling started off as a red hatchling. This is a female sibling to “Ella-Diablo” (GM-04-47).

Dark babies start their color changes most often by a general lightening up of the body color. Maroon babies can turn reddish or greenish, and Biak babies usually go through an orange phase as they change. Dark brown off-spring are less predictable, but usually begin by getting lighter too. Some of these can develop adult colors, such as blue or yellow markings, without much of the brown body color changing first. Dark stripes and dorsal diamond borders often turn blue, and yellow dorsal markings often lose their brilliance and fill in with blue or gray, although some specimens keep the bright yellow into adulthood. Some maroon or brown babies slowly change to some shade of light or dark green, but others go through a period of intense coloration that is exciting and beautiful to watch. This is one of the reasons some keepers favor maroon babies. In my experience, dark babies take longer on average to complete their color change than yellow babies. Red or orange specimens of the Biak race frequently take much longer to complete the color change than most other chondros, regardless of whether the Biaks are wild type or designer bred. As was mentioned earlier, these changes can be temporarily dramatic, leading the observer to conclude that something really special is taking place. However, these specimens characteristically go on to become typical adult Biak specimens that conform to the description of the race given in the previous chapter. Many Biak owners and breeders say it can take four to five years for these pythons to fully change.

Biak and Biak outcross chondros are notoriously slow to complete their color changes. These photos show the same animal as a three year old as a yearling.

Happily, outcrossed specimens often retain unusual coloration; those from normal Biak parents usually don't.

A common question regarding the color change is how to know when a particular animal is done changing. This is especially on the mind of those watching the offspring from expensive designer morph parents. I will make some comments about the specific color changes often associated with designer morphs in the next chapter, but as a generality, most young chondros will go through a stage where change is occurring most rapidly, and then it will slow down and taper off. Usually the color change is mostly complete by the time three months or so has passed without any significant changes taking place, once the initial changes have slowed or stopped. I have also noticed a loose correlation between how quickly the onset of the color changes occurs, and how long they will last. Animals that experience a rapid onset of color change often complete those changes in a relatively short time. When color changes begin very slowly, the completion of them usually takes longer. Most chondros tend to undergo subtle changes as they pass through the stages of young adulthood into a mature animal. But in my experience of observing hundreds of chondros, you usually have a good idea about how the animal will finally look, once the change slows and several months pass without further change taking place. Again, Biaks are the exception to the rule. Also, blue often takes several years to fully develop on a maturing chondro. This is true of both Sorong types with blue markings and ontogenic blue adults.

Another Biak outcross color change study: This sibling to the animal on the previous page has retained much more yellow into young adulthood.

Seen here as a yearling and a two year old, it was three and a half in the photo on page 80.

From what I can observe, color change is not dependent on the environment, but it is clearly tied in with growth rates. Chondros that are “late bloomers” in terms of eating and becoming established as hatchlings, will change colors well behind the schedule of their average clutch mates, and right on time with their own growth rate. Because of this, the time frames mentioned above are relative to average feeding and growth rates. I do not believe that the timing, rapidity, or ultimate results of yearling color changes are affected by temperature, cage environment, or exposure to other external stimuli, except for how any of these may affect the growth rate. For example, I don’t think there is any way to manipulate the color change of individual animals by exposing them to external factors.

A 2004 “Oz x Angel” yearling; this is the same chondro seen at the top of page 83.

My feeling is that the DNA of each animal determines everything about how it will look and how it will get there. These comments apply specifically to CB chondros. There has been some discussion about environmental factors influencing the appearance of wild caught specimens of certain geographic races. There may be something to this, and there are known cases where specific kinds of captive born reptiles or amphibians look different from their wild caught counterparts due to habitat or food differences.

“Hat Trick” (GM-04-20) is a third-generation calico male, seen here at the beginning of the color change. What genetic factor is responsible for some of the fantastic colors and patterns on chondros such as this? Do designer animals develop their unique colors, or is this the result of certain colors *not* developing? Either way, these are among the most beautiful of reptiles.

Thus far, I have not speculated about the actual mechanics of GTP color changes. A lot of theories have been postulated, some making sense and others seemingly a bit far-fetched. I don’t think anybody completely understands just how or why young chondros change colors. Many theories about why neonates are colored so brilliantly have been offered, as have ideas about why they are found in both gold and maroon phases. In fact, color change isn’t limited to young animals; gravid female chondros are known to frequently undergo color changes that may or may not be permanent.

Designer chondro heaven: The photos on this page, showing two of the most beautiful animals ever produced by the author, as they were undergoing onto-genic color change. *Top*: “Ella-Diablo” (GM-04-47).

Some color morphs may be explained by the absence of a normal pigment. For example, high yellow animals may be lacking the pigment that is responsible for blue. This blue pigment, when combined with yellow, might produce the common green adult color. This theory is further strengthened by evidence that gravid high yellow females often tend to turn pale or white rather than blue, as is usually the case with gravid females undergoing color change. However, there are far too many variables, color combinations, and strange color developments to explain all of them so simply. It is probable that the presence or absence of several kinds of pigmented skin cells, and the combinations they produce, are responsible for the fantastic colors these animals display.

The incomparable “Darth Maul” (GM-02-12), featured on the cover of this book.

Another theory about color change in designer bloodlines is the “arrested development” idea. Briefly, this theory states that something causes the cessation of normal color development during the color change which results in an altered appearance. As an example, it is known that Biaks go through a yellow or orange phase as they develop, as was mentioned previously. When Biak parents are outcrossed with non-Biak mates, the result is often high yellow off-spring. It is possible that the blending of the two genetic color traits caused the Biak yellow to be retained into adulthood by arresting the change process.

As you can see from the photographs in this section, the ontogenic color change is a big part of what makes chondro keeping so fascinating. Although certain race groups and designer bloodlines with a known history will tend to produce specific results (more or less), there is always the element of the unknown when anticipating the color change of individual animals. While it isn’t realistic to expect high-end results from randomly pairing normal animals, there is always the possibility of discovering a new genetic line with wonderful offspring resulting. This is true whether one is breeding for wild-type locality traits, or for something more exotic. Some of the most thrilling times as a chondro keeper await you as you watch your animals begin to change. Some do it quickly, others take months or even years…but each time it happens, you will know why you love chondros!

A calico bloodline yearling male in the midst of its color change.

Chapter 5. Selectively Bred Color Morphs

"A thing of beauty is a joy forever: Its loveliness increases; it will never pass into nothingness."

John Keats

In the previous chapter, I discussed chondro genetics, baby color phases, and the ontogenic color change. In the last fifteen years or so, a few breeders have specialized in the development of selectively-bred "designer" color morphs. The number of color variations in wild populations, combined with the extreme variability of the species within both wild and captive bred bloodlines, makes GTPs a perfect candidate for the development of some beautiful and unusual color morphs. While some have expressed having a moral problem with breeding specimens that don't appear to be of the same race, and have even gone so far as to suggest that offspring from parents of mixed ancestry are "hybrids," I feel nothing but awe for some of these incredible animals. It seems pretty arrogant to bestow second-class status to such animals when the founder stock for the supposed racially pure animals isn't even known in the majority of cases! Such bias is purely human and personal; there is no moral absolute dictating which color form or type of chondro is better than another. For more about this issue, please see the comments regarding the breeding of racially pure animals in Chapter 3.

Without a doubt, Trooper Walsh is most responsible for the creation and promotion of the designer chondro. I obtained much of my early founder stock from him, and it was the purchase of the "Computer Chondro" in 1994 that first kindled the passion for selective breeding in me. Much has happened in the last dozen years or so since that fateful day in my life, and it is with gratitude that I dedicate this chapter to Trooper! Now, let us examine the most popular designer projects in detail.

High Yellow

Perhaps the original "designer" chondro morph is high yellow. There is something glorious and breathtaking about seeing an adult chondro that is covered with bright yellow scales. Many chondros have some yellow on them, with the notable exception of typical Aru stock. It was only natural that sooner or later breeders would attempt to reinforce this trait by selective breeding. Strangely enough, some of the best high yellow specimens have come from bloodlines that produced spontaneous yellow adults from green parents, rather than from culling and crossing adults with increasing amounts of yellow on them. There are a couple of well-known bloodlines that have demonstrated the ability to produce high yellow offspring. Perhaps none is more famous than the Lemon Tree (LT) line, originating from Tim Turmezie, a California breeder. In fact, some people view the name "Lemon Tree" and high yellow chondros as being synonymous, although the LT designation rightfully belongs specifically to animals produced by this bloodline. In other words, not all yellow adults are "Lemons" despite the fact that the term is sometimes used that way.

“Happy Jack” (TT-97) is a classic Lemon male in the author’s collection.

The original founder male, purchased as an F1 hatchling by Tim Turmezie in 1992 and now owned by Alex Medrano, who supplied this photograph.

Turmezie works primarily with colubrid snakes, but in the early nineties he purchased a group of three captive bred neonate chondros from Doug Price. Price hatched the three babies from clutches produced by breeding some wild caught adults that were reported to be PNG in origin. The three neonates were not not siblings, but the relationship of the parents is not known. One of the three neonates acquired by Turmezie developed into a gorgeous yellow male with dark green random scales. The male was about 75% yellow, with a green crown, and some random white flowers scattered on the body. This male became the founder of the Lemon Tree bloodline. The other two animals turned out to be females: one with some yellow speckling and the other a blue animal.

“Lilly” (TT-95, above) is from Turmezie’s first Lemon clutch. She produced

“Grace” (GM-99-04)

“Chiquita” (GM-99-01, below right) for me in 1999. Lilly became a grandmother in the spring of 2005 when Grace produced a clutch of fourteen babies. Chiquita remains barren.

Turmezie crossed the male with both females, producing several clutches between 1995 and 2000. Some of these offspring developed into beautiful high yellow adults, including some almost solid yellow specimens. Others were green with varying percentages of yellow, and some were mostly green. These second generation offspring demonstrated the potency of the Lemon Tree bloodline and helped define the characteristics unique to it. These include bright lemon yellow coloration, a tendency for the head to have a crown of contrasting color, offspring that stop developing green at an early stage in the color change process and that were always yellow as hatchlings, and a beautiful forest green color in the areas of the animal that are not yellow. One undesirable attribute of this bloodline is frequent fertility problems, especially between related specimens. Because of this, there are very few Lemon x Lemon offspring.

A trio of Lemons, showing the dam (right), sire (center), and a rare Lemon x Lemon offspring. The dam is an extreme example of the tendency of high yellow females to turn pale following breeding. Greg Schroeder hatched this offspring and supplied the photo.

Ophiological Services (OS), mentioned in the chapter about chondro history, also has a high yellow bloodline associated with their name. OS has produced some very beautiful high yellow animals, but this bloodline is more variable and seems to be less potent than the Lemon Tree bloodline. This is probably due to a more diverse genetic pool in the founder animals. Some OS high yellow specimens have brilliant yellows and bright greens, while others display pale pastel colors that are very different from those of the LT animals.

Like the Lemon Tree line, the OS high yellow line has produced a few outstanding adults that have a high percentage of yellow. Unlike Lemons, the OS line tends to enjoy a higher fertility rate and several OS x Lemon pairings have been successful.

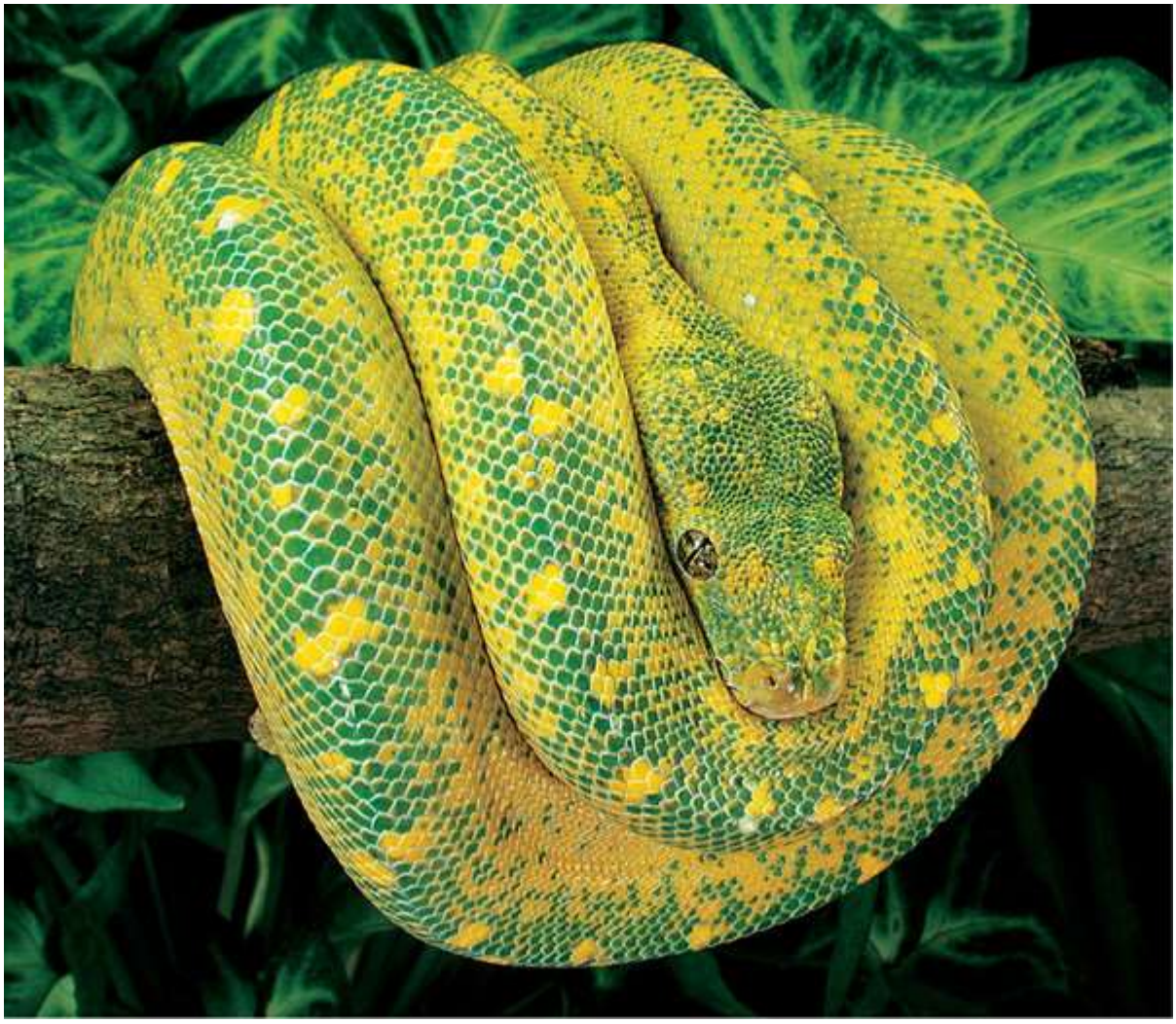
Tony Nicoli, another arboreal breeder from the southern United States, has also produced a number of high yellow specimens. Most of the Nicoli founder stock was OS in origin, according to Gene Bessette of OS, and some collectors don't make much of a distinction between the two lines. Opinions about this differ, and it is still fairly common to see references to "Nicoli high yellows" in the chondro breeding community. All the specimens I have seen bear a resemblance to OS yellows, and the Nicoli name reference is probably of more value as an indicator of ancestry than one of unique traits. Nicoli sold his collection of

chondros in 2000 and no longer works with the species, focusing instead on the Emerald Tree Boa, a completely unrelated species from South America for which he has become well-known.

This striking OS high yellow animal made its way into the Nicoli collection after being purchased by a collector at a New Jersey pet store!

"Oz" (EB-98) is an outstanding high yellow OS male in the author's collection which has proven to be a good breeder. The two OS high yellow chondros on this page illustrate the clear distinctions between this line and the Lemon Tree animals on pages 92-94.

Other breeders have produced spontaneous high yellow specimens from non-yellow adults, including Jeff Hudson (who purchased the Nicoli collection but hatched high yellows from non-Nicoli stock); Jack Sadovnik, a private breeder from Maryland who started the "Golden Sky" project that you can read about on his web site (see Appendix B); and Brandon Osborne's SCZ line. I hatched some Biak outcross babies in 2002 (25% Biak sire x Biak type female): three maroon offspring have developed into outstanding young adults with one male that is 90% yellow at the time of writing (see photo on page 80). It has been claimed that both the LT and OS lines (including the Nicoli animals) do not have Biak blood involved in them. This seems to be contradicted by the evidence, for many specimens I have examined from both lines tend to have characteristic Biak heads with long noses and long pointed tails. However, some specimens do conform more closely to PNG head and tail descriptions. Since the wild founder animals for these projects aren't locality documented, it can't be said with certainty whether Biaks were involved or not.



More yellows: “Matrix” was hatched by Jeff Hudson and is now in the author’s collection;

“Summer” is a Brandon Osborne animal from his SCZ line and is in the collection of Julian Garcia;

"Pele" is a Walsh production owned by Cathy Maynard. Photos by the owners.

The question has arisen more than once as to the genetic compatibility of different high yellow bloodlines, and if crossing specimens from these lines would yield good results. (The alleles responsible for high yellow in one bloodline might not necessarily correspond to the alleles in a different bloodline, even though both adults look yellow – see the genetics discussion earlier in this chapter.) Buddy

Goetzger helped resolve this question when he successfully bred an LT male to an OS high yellow female in 2001. In an outstanding success for a first-time breeder, he produced a clutch of offspring that developed into some great looking adults. I have a female from that clutch, and as an adult she is more blue than yellow, although she has retained yellow dorsal markings, which is a favorite trait of mine. A second animal that I sold as a two year old is about 70% yellow and has developed more blue highlights as he has matured. I hatched an OS x LT clutch myself in the spring of 2005, and it will be interesting to compare my results with other yellow bloodline crosses. So far, the combining of Lemons with unrelated yellow mates hasn't produced any "super yellows" that I am aware of. Biak outcross projects seem to best accomplish that goal, and the female in my 2005 pairing is 50% Lemon and 50% Biak out-cross.

"Rusty" (BG-01-04) from the Goetzger 2001 Lemon x OS clutch. As a red neonate, this male (now owned by Tim Graichen) was used as the model for the ChondroWeb shirt logo.

This animal is pretty, but not “high yellow,” yet chondros like this are frequently labeled as such by on-line and show vendors.

There has been an abuse of the term “high yellow” by some commercial dealers and private sellers. How much yellow is required before an animal can be honestly represented at “high” yellow? That is a question that can only be answered by each individual. Like the US Supreme Court Justice who said of pornography, “I know it when I see it, and in this case this isn’t it,” I have seen a lot of animals advertised as high yellow that came nowhere near a reasonable example of this morph. Especially prone to exaggeration (or dishonesty) are those selling half-changed Biaks, which often retain some yellow for a long time before slowly changing to the typical adult colors, which are mostly green. Perhaps ignorance of this fact could have been used as an excuse some years ago, but these days, the truth about “yellow” Biaks is now well-known. Nevertheless, the deceptive ads keep coming. True high yellow chondros are quite valuable, and the best individuals can command prices well over $10,000. It is also worth noting that as better adult yellows are produced from selective breeding, the bar keeps getting raised as to what makes a true high yellow chondro. Animals that we all would have gone gaga over twelve or fifteen years ago are viewed as being much less extreme today. They are very pretty chondros though!

CANARY CHONDROS

The so-called Canary morph is a relative newcomer to the high yellow morph market, and there has been quite a bit of interest in these animals and not a little controversy. Also called Kafiau Island chondros (the name "Canary Island chondro" was dropped after it was pointed out that the Canary Islands are on the opposite side of the planet from New Guinea!), these animals are a vibrant and unusual color of yellow as young adults. Pale lavender dorsal markings and a sprinkling of green and/or white scales are usually present. The iris of the eye is yellow and the pupil is black.

A young imported male Canary Chondro, approximately 215 grams. Most of the Canaries arrive at this size and age, and many do not retain the yellow into maturity. Photo by Rich Culver.

Of course, the first question one wants to ask when seeing such a new color variety is, "Do these animals retain the color into maturity?" From the research I have done and the information I have obtained, the answer is a clear "yes and no." For example, there is a female, reported to be one of the first Canary chondros imported into the US, which is approximately five years old and 1480 grams at the time of writing. According to information sent to me by Beau Lewis, this female was either captured or hatched in Indonesia and ended up in an Asian collection after it was noticed that something was different about it. The animal remained in Asia for about two years, during which time it underwent its color change. She was

imported into the US in August of 2003 as a 400-gram animal. Mr. Lewis had her until late 2004, when she was purchased by Marc Spataro. She was about 1000 grams at the time he acquired her. Although it is important to note that many chondros have not fully color-changed until they are fully mature and four to five years of age, this female is now an adult as measured by both age and weight. She is the largest and oldest Canary in the US that I am aware of. Marc told me that she changes coloration somewhat after feeding, and varies from having as few as 20 green scales on her at times to having much more green coloration at other times; then she changes back again. Because of this tendency, Marc told me that at some point she may be a green chondro.

Mature Canary female, imported by Beau Lewis and owned by Marc Spataro. It will be revealing to see how many of the dozens of young imports attain this size while retaining the unusual yellow and lavender coloration. Photo courtesy of Marc Spataro.

On the other side of the coin, there are more than a few Canary animals that have turned green while maturing, and most of the photos of yellow animals appear to be of younger specimens two to three years of age. I was told by a very credible source at the 2003 Daytona, Florida, Reptile Breeders Expo that some very expensive examples of this morph have turned green suddenly, including animals that were paid for but not yet in the hands of the new owner. Marc Spataro told me of a yellow Canary female that turned bright green overnight before he had received it! As more of these animals are imported, more cases are being reported of these high yellow animals changing to green. Spataro told me that he is aware of at least two hundred Canary chondros in the US alone. The reports of many of

them turning green have caused prices to drop, and certainly investing in these animals is highly speculative until more is known.

Face of large female, showing yellow iris and normal black pupil. Photograph by Marc Spataro.

There has been a lot of contradictory information circulating around, including warnings of “false canaries” and people claiming to have different sources for the animals. A credible person did confirm to Spataro that at least some of these animals are originating from Kafiau Island. It has also been claimed that this island is being logged out and the habitat destroyed. This hasn’t been verified by anyone I spoke with, and one person suggested that this information is being spread by importers and is designed to simply spur sales. I did confirm that most of the US specimens are coming in through a Florida importer. I think it is important to point out here that it is illegal to import wild chondros from Indonesia. I even received a warning about this from an industry insider in Jakarta, who cautioned me to use discretion when engaging in public discussions about wild imports. I am simply reporting on the facts about this interesting color variety, and I do not condone any illegal activity. Several people told me that at least one Indonesian farm is currently breeding and exporting captive hatched Kafiau Island chondros. To be honest, it gets tiresome to always have to sort out so much contradictory information every time some new locality makes an appearance.

With the increased inflow of imported Canaries into the US and other countries recently, a lot of debate has taken place on the Internet forums about the value and credibility of the Canary chondro morph. Much of the information and photography has been informative and helpful, but there has also been exaggeration, hype, and the inflated prices that sometimes accompany supposed new localities or color morphs. Some dogmatic statements that have been made serve to illustrate the classic problem that many new and unproven GTP projects suffer from: namely, unsubstantiated claims, hype, and prices that are not yet justified by credible results. This is true of some designer projects as well as new wild varieties that may show up from time to time. Most chondro morph fans, including me, are enthusiastic about the potential of the Canary project and are looking forward to what the first captive produced clutches can demonstrate about the heritability of this yellow form. But until this takes place, the jury is still out, and these animals should be priced and promoted accordingly. For example, at the time of this writing, I am in the ninth year of developing the Calico project and have three captive bred generations involved in getting to where I am with it. There are no mysteries, and everything I have done and produced has been documented publicly. It takes time, investment, patience, *and results* to establish a new project. Let's hope the Canary morph proves to be a valuable addition to the high yellow group of chondro projects worldwide. There are plenty of them in captivity, and even after factoring in the high loss rate and reproductive difficulties that import owners frequently experience, we should know a lot more soon.

HIGH BLUE

This beautiful morph is considered to be the Cadillac of high-end chondros by many collectors. While blue adults may not have the same initial "shock" effect on the viewer as other, more vibrantly colored morphs do, there is something very classy and appealing about these sky-colored beauties. Perhaps this is because blue coloration seems appropriate for these tree dwelling pythons; wild-collected blue specimens are occasionally found, and the color does not have the "artificial" look to it that some feel other designer morphs have. Blue colors on adult chondros can range from grayish blue all the way to bright turquoise. The best specimens seem to glow and can be spotted resting on a branch from across a large room. The first blue chondro I ever saw was on public display at the National Zoo in 1994, and even allowing for the exaggeration of my memories, it was spectacular and was visible from the opposite side of the room.

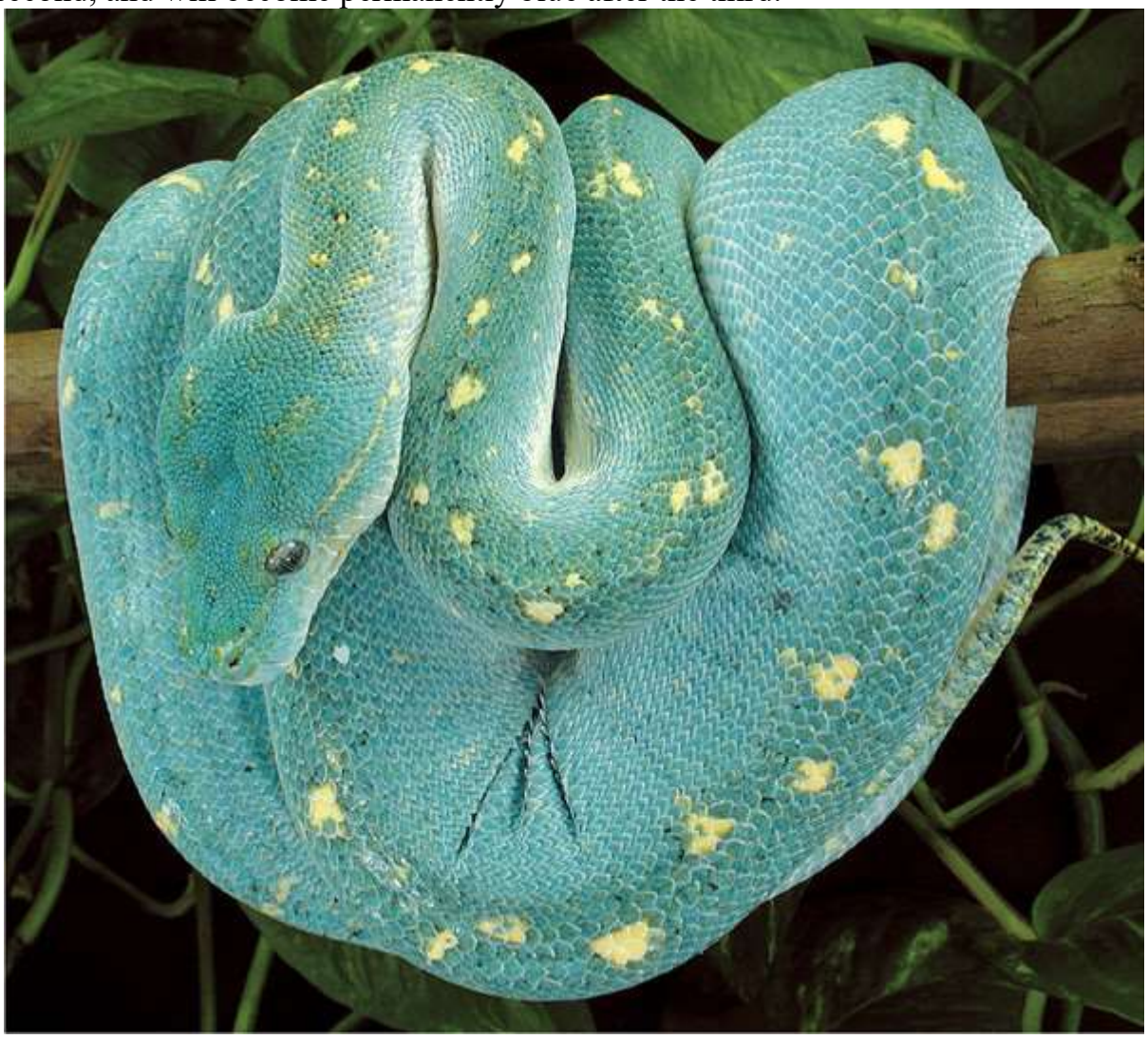
“My Song” (TW-98-25) is one of the best ontogenic (non-hormonal) female chondros in the US and is a favorite of visitors to the author’s collection.

There is a confusing element to this morph and one that is misunderstood by many chondro lovers. This is the fact that there are two types of high blue chondros: females that have undergone a color shift during breeding and pregnancy, and chondros of either sex that have a high percentage of blue pigment over most of the body. While both forms are referred to as high blue, or simply “blue chondros,” they are not the same thing, and may not necessarily be genetically compatible for the production of high blue offspring. Let us look first at the color-shifted blue females.

When female chondros are cycled for breeding and begin to develop egg follicles, they frequently undergo a color change as a part of the symptoms of impending ovulation. Not all females do this and not all of them that change color turn blue, but the phenomenon is well-documented. The onset of the color change usually coincides with the refusal of food and a swollen appearance caused by the ripening follicles in the ovaries. The tone and depth of color can vary from a mild undertone to a complete color change. Some females will have a decidedly gray hue, some will turn an aqua color, and some can be sky blue.

This color change has long been assumed to be hormonal in nature, and such blue female specimens are often referred to as “hormonal blue.” This blue color is not exclusive to females developing follicles; the same symptom can be seen in chondros with a tumor of the kidney or ovary (Barker, pers. comm.). Some females will return to the normal green adult color following egg deposition (and after

incubation if maternal incubation is allowed), some will regress to a blue-green aqua color, and some will keep the blue color permanently. Most females that retain a semi-bluish color after the first breeding will keep more of the blue after the second, and will become permanently blue after the third.



Who says hormonal isn't beautiful? "Aquagirl" (TW-93-12) turned permanently blue after her third breeding season. Some of her offspring are well-known in the designer breeding community.

Females from PNG origins seem most prone to this color change, and blue Aru females are also fairly common. Blue examples of the Biak race are not common, in my experience. I have never seen a male color-shift back and forth like these females, or turn blue during the breeding season. My observation is that this blue shift is unique to mature females undergoing some phase of the reproductive cycle. Females do not necessarily have to have been bred or even caged with a male to turn blue, and although uncommon, I have seen this happen more than once.

“Angel,” reportedly an OS animal, takes on a decidedly bluish tone when gravid, but doesn’t retain it. She is seen here one week after laying eggs in 2003.

In contrast to these hormonally color-shifted females are the true ontogenic blue chondros of either sex. Such specimens turn blue as a part of the color change while they are maturing, and they do not return to a green color afterward. This adult blue coloration may take several years to develop fully, or it may appear when the animal is a young adult, even a yearling in a few cases. Many of these are truly spectacular animals, and excellent specimens of either sex are not prevalent and are always of great value. They are far less easy to produce than high yellows, and are available with much less frequency.

A lot of chondros have some blue on them, especially those of the Sorong race, with their blue dorsal stripes and triangular markings. While these animals can be very attractive, they are not blue morph specimens. True high blue chondros have blue over much or all of the body, not just nice blue markings. This blue color is found on the skin between the scales, as well as on the scales themselves, and can also be seen on the upper and lower labials as well. Even the best blue animals usually have some traces of green on them, usually light and faded and in the places where there were baby markings such as dorsal triangles and head stripes.

This attractive Sorong-type (GM-00-21) has typical blue dorsal and lateral markings. This is not a high blue chondro and should not be marketed as such.

Blue GTPs have had a place in captive breeding programs from the beginning, at least in the US. Alan Zulich started his best bloodline in 1984 with a wild blue female, and used another large, captive produced blue breeder female later in his breeding program. It is not known whether either female was hormonal or ontogenic blue, although it may be assumed that they were of the former type. Tim Morris of Maryland produced the first well-known ontogenic blue male. Tim was given a smallish twin neonate chondro as a gift, and this animal went on to sire a clutch for Morris that included the blue male (Walsh, pers. comm.). Although no longer owned by Morris, his name is still associated with this male and the bloodline. Now owned by collector John Holland, this male has been bred several times to various females, including his own hormonal blue mother. Some very attractive animals have been produced from this line, including a few blue and semi-blue animals, but it was not until Trooper Walsh used the male on loan in 2002 that the right genetic combination was discovered which produced the kind of results that were hoped for from this male. Bred to a female named "Carolina" (TW-98-02), the male sired a clutch of brown offspring, many of which developed into blue yearlings that were obviously going to be high blue adults. The young animals ranged from above average to truly exceptional. A friend of mine, a fellow chondrohead named Matt Murphy, acquired one of these as a hatchling and it turned into one of the best blue animals from the clutch. Matt named the animal "Mojo," and graciously agreed to drain my bank account in exchange for this fine

blue male. Sadly, the dam died soon after the eggs hatched, and this one clutch will be the only off-spring to come from the pair. It is hoped that Mojo and others from the clutch will carry the genetic potential for more blue offspring.

The Morris male, hatched in 1996.

“Mojo” (TW-02-21) is one of the spectacular onto-genic blue offspring from the 2002 Morris male x Carolina clutch.

My own work with a blue morph project began with an onto-genic blue male hatchling that I acquired in 1995. “Aquaman” (TW-95-05) sired four clutches over six years. His mates included a Sorong type female, two hormonal blue females, and an ontogenic blue female. It was while watching this chondro grow from a young male into a mature adult that I learned to be patient about blue animals. Aquaman began to show some blue potential in his third year, and he didn’t show his full colors until he was five. “Blue Max” (GM-00-18), an ontogenic blue male now in the collection of Greg and Michelle Gibbs, and “Alice” (GM-99-42), a hormonal blue female in my collection, are offspring from the first two Aquaman clutches.

“Aquaman” (TW-95-05) was purchased by the author as a hatchling and developed into a wonderful ontogenic blue male which sired some great off-spring. This male didn’t fully develop his blue until he was about five years old and actively breeding.

A new milestone in blue morph breeding was reached in 2001, when a pairing with a hormonal blue female produced a dark brown baby that became the first to morph directly to a blue yearling with no green intermediary phase. I named this young animal “Blue Frost” (GM-01-30) after it became covered with a dusting of blue scales. Aquaman’s last clutch was with a beautiful ontogenic blue female,”My Song” (TW-98-25, page 102.) A male that I kept back from that pairing (GM-04-02, page 109) is developing into a beautiful chondro, with more blue on him than his father had at the same age. Aquaman died in the spring of 2005 and will be missed, but his genes will live on!

Aquaman progeny: “Blue Max” (GM-00-18)

Another blue female in my collection, “Pepper” (AZ-96-14), produced in 1996 by Al Zulich, had an unusual amount of blue coloration prior to her first breeding, and developed even more after becoming a mother. (See her photo in the “mite-phase” section.) Pepper is from Al’s large blue CB female (now deceased), and she is the dam of two of the most attractive and unusual chondros I have ever hatched, and from two different males! The first of these is “Darth Maul” (GM-02-12), nicknamed by a ChondroForum member as a baby because of his red head with dark stripes that resemble the *Star Wars* character of the same name. Darth appears on the cover of this book, and while not exactly a high blue male, he has a lot of blue on him.

“Blue Frost” (GM-01-30) below, are two ontogenic blue males sired by Aquaman.

"Darth Maul" (GM-02-12) is, in the author's opinion, one of the most beautiful designer chondros ever produced. This snake traces his roots back to the Al Zulich blue line from the early 1980s.

The second animal was part of a unique and special clutch from the 2004 breeding season. Produced from a Merauke outcross x Pepper breeding, this female is surely one of the most extreme designer chondros ever produced. "Ella-Diablo" (GM-04-47) has ties to the albino project and you can read more about her later in this chapter.

I'm enthusiastic about working with both hormonal and ontogenic blue females, although many feel that ontogenic females may represent better chances for producing blue morph offspring when paired with blue males. I used to think this too, and I will continue to cross blue males with ontogenic females, but to-date, the best males I have seen and hatched have come from green or hormonal blue females. I do think that hormonal females tend to produce female offspring that will turn hormonally blue themselves after experiencing one or more pregnancies. (See the photo of "Alice" (GM-99-42) on page 18.) However, I have not seen conclusive evidence indicating that crossing a blue male with a hormonal female gives better results than crossing such a male with a normal female. I have done both, and to-date, outstanding F1 blue offspring have resulted from using both types of females. Plenty of green adults have also resulted from breeding blue adults together in several collections, despite the sometimes overstated sales claims. The evidence suggests that experimenting until the best combination of parents is discovered is important to producing reliable results. One thing is sure: this morph is not yet as established or consistent as the high yellow morph, although not for lack of effort. Certainly real progress is being made, and it appears that yellow is simply easier to reproduce and is more dominant genetically.

Blue chondros were considered very rare some years ago, and the difference between hormonal and ontogenic types was not commonly understood. It is now known that hormonal blue females, while beautiful and desirable, are not all that uncommon. Truly high blue examples of the second type are among the most sought after of designer chondro morphs and can command very high prices. This has led, predictably, to the same kinds of abuse, exaggeration, and hype that often accompany ads for high yellow animals. Again, while personal taste and opinion is involved in deciding what is "high" blue, it can be truly amazing what passes for a "high blue" chondro on some online classifieds boards or swap meet vendors' tables. I once saw a solid green adult chondro at a Pottstown, Pennsylvania, reptile show labeled as "true blue." I was both amused and irritated by this, because I originally used this play on words to separate real high blue animals from those that were the object of sales hype. Eventually, some keepers began to use the phrase true blue to distinguish onto-genic specimens from hormonal, and because this wasn't the original intent, I have since stopped using it. It bears repeating that the normal blue dorsal striping, triangles, and lateral spots seen on many chondros does not make them high blue specimens.

In my experience, both Sorong type specimens and true ontogenic blue animals often take a number of years to fully develop their blue colors, as was mentioned previously. Many individuals will need four to five years before they develop into their full potential.

This great male yearling is from my Aquaman x My Song 2004 clutch, and is already showing some nice blue coloration that will likely increase with age.

All chondros with blue on them will always look their best when seen in natural outdoor lighting or under a good full-spectrum fluorescent light. Normal white or yellow indoor light bulbs ruin the blue colors on chondros. GE Reveal bulbs are wonderful and will show off your chondros to full effect. Incidentally, there is no recorded instance of blue-colored neonates hatching. You cannot tell from looking at a baby whether it will be a blue adult or not. As always, the parents will greatly determine the color characteristics of the offspring, and parents with proven, documented, past results are the best bet when seeking to acquire unchanged babies that have potential for good blue coloration down the road. Buyers are well advised to insist on seeing accurate photos of past offspring and not simply go by verbal claims. There is some history to indicate that patternless

brown babies that are sired by a blue male are the best bet for obtaining a blue adult.

Calico Chondros

"The Computer Chondro" (TW-93-05) is the founder male for the calico project, and certainly one of the all-time best designer chondros ever produced.

Calico chondros exhibit a beautiful and unique blend of colors, and speckled and blotched patterns. Although two different color types (Yellow and Chocolate) have surfaced, the speckled pattern, comprised of many different colors, is what distinguishes this morph from all others. The visual effect of the many individually pigmented scales is similar to viewing up close the pixels on a computer monitor. Calico chondros have up to nine readily distinguishable colors, including orange and yellow-orange, light yellow, dark and lime green, dark chocolate and reddish brown, black, white, aqua, blue, and mustard. The project has also demonstrated a strong tendency to produce animals with the head and neck having a contrasting appearance with the rest of the body, as well as an abrupt color change at the base of the head lobes.

The calico project is very special to me, because I am the developer of it. For the record, I did not invent the term "calico," nor am I the first to apply it to a

reptile color morph. Probably the calico house cat is the most familiar application of the word to an animal, and reptile morphs of the same name do not share the tricolor trait or the fixed gender of the feline version. (All calico cats are females and have the same three colors.) There are calico morphs described for Burmese, Reticulated, and Royal (Ball) Pythons, among others. These calico python morphs are not the same as calico chondros, and do not share the same characteristics with them.

Unique Calico Traits: These photos show the variety of colors, the pixelated scale patterns, and the tendency of the head and neck to stand out in contrast to the body. These are much more than just speckled or mite-phase chondros.

The founder animal for this project was produced in 1993 as a brown baby from a January clutch, hatched by breeder Trooper Walsh from normal parents. As the young chondro began its color change, it soon became apparent that something different was happening. The chondro developed a yellow body color, but was heavily speckled with other colors including light green, dark green, black, yellow, yellow-orange, light blue, aqua, and white. Added to the interesting and attractive mix of colors was the unique way they were speckled and splattered evenly on the animal from head to tail. The only exception in this evenness of distribution was that the head was more or less green, with yellow-orange beginning on the neck immediately behind the lobes. In some places, individual scales of distinct colors occupied adjacent locations on the body, and in others, scales of similar colors formed small patches. The whole effect was similar to the grainy breakup of color on a computer monitor when viewed close up. I purchased this animal as a twenty-month-old male. At the time, “designer” breeding had not yet become a recognized pursuit, and I think everybody assumed he was a one-of-a-kind oddball. Gene Bessette called it “the popcorn chondro,” but I nicknamed him “The Computer Chondro” due to the pixel-like pattern.

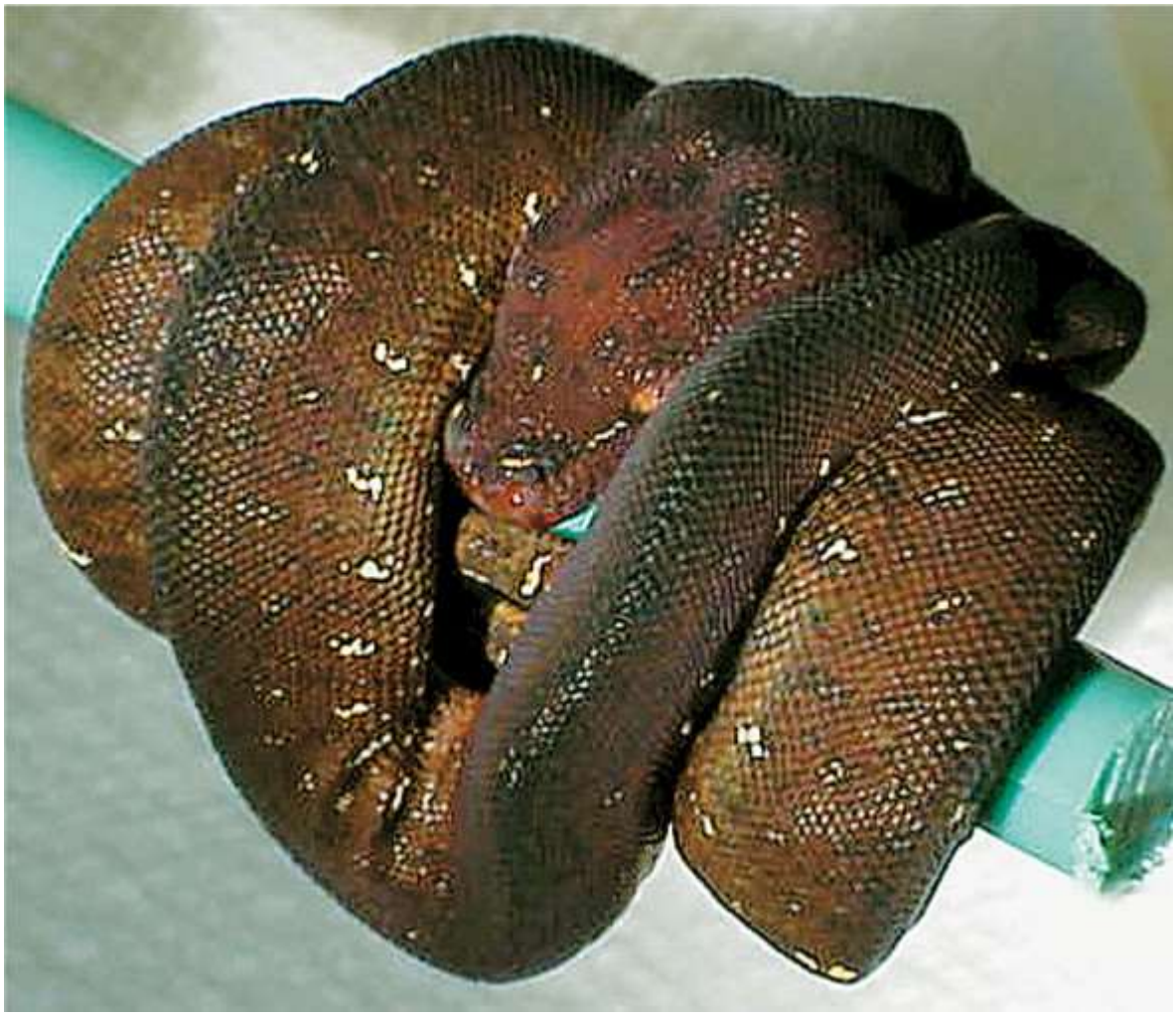
The Computer Chondro as a yearling at the 1994 Orlando Breeders Expo. I purchased him the following month. Photo by Tim Morris.

The founder male, showing head, neck, and body details with pixelated patterns.

By lucky coincidence, I had purchased a normal female that was a sibling to this male about a six months earlier. I decided to breed them in an effort to concentrate the possibilities for producing another calico animal, and after three attempts I succeeded in getting a viable clutch in 1999. Only three off-spring survived (that is part of another story) but one of them, a unique dark baby with few markings, showed unusual patterning and coloration at a year of age, and developed into the second known calico male, “Calico Junior” (GM-99-09). Junior has the same pixelated pattern and distinct head and neck differentiation as his father, but his many colors seem to be the reverse of the founder male. Where the Computer Chondro has yellow as the primary ground color, Junior has dark chocolate brown. Green, yellow, red-orange, yellow-orange, aqua, light blue, and pea green can all be seen on him. The animal almost looks like a photographic negative of his father. While I was ecstatic to have produced such a beautiful and

unique animal, I was equally enthusiastic to have demonstrated that the calico pattern was a heritable trait. Of course, this was the question everyone wanted an answer to. Although not a recessive trait, the pixelated, multi-colored calico pattern was a proven genetic reality. Junior's two surviving siblings were pretty animals, but looked nothing like him or the sire.

"Calico Junior" (GM-99-09) is one of the most unusual designer chondros ever produced. He verified that the calico traits were heritable.



He was very dark and almost patternless as a baby.

In the fall of 2000, I bred the founder male to a beautiful, mostly unrelated yellow, green, and blue female, and a clutch was produced that began to hatch on April Fool's Day, 2001. Eighteen offspring were produced, but not all survived due to a bacterial infection in the egg yolk that claimed several young when they were a few weeks old. About a dozen survived, and several of these offspring have developed into outstanding animals. One female in particular has turned out to be spectacular. "Delilah" (GM-01-15), owned by Tomm Phillips, will hopefully make a large contribution to the development of the yellow form of this morph. Another great female from this clutch is in the collection of Andrew Kelley, and several other standouts are owned by various collectors. My own holdbacks have proved to be less dramatic in appearance, and should serve to lay to rest the belief of some that I possess magical powers to choose the best chondros from among a clutch of babies! One of my female keepers started out with some nice coloration and speckling but has matured into a mottled green adult with only traces of the former colors. She does have the calico genetics and may prove a valuable breeder. A second and more attractive female encountered health issues and the decision was made to euthanize her to keep the bloodline strong. I was pleased with the overall results of this pairing, and arrangements are underway to acquire Delilah for a breeding loan in 2006.

“Delilah” (GM-01-15) is the standout female from the 2001 calico clutch.

Another fine calico line female from 2001. Photos by Tomm Phillips and Janet Hickner.

In 2004, both calico males were bred to one female each. The Computer Chondro's date failed to become gravid, but Calico Junior proved his prowess as a breeder in both zeal and genetic capability. The dam was the same female used in the 2001 calico clutch mentioned above, and twenty-two neonates were hatched that May. The results have been even more gratifying than the previous efforts, with several very special yearlings developing at the time of writing. One red baby has developed into a third generation calico male with full blown pixilation and the same multicolored pattern as his father and grandfather. And this time, it looks as though there are going to be several of them in the clutch. A fantastic looking green, blue, and black yearling has emerged (see page 117), and another male is looking very yellow with a nice blue dorsal stripe (see page 90). "Lemongirl" (TW-94-144) will hold a special place in my heart for her contributions to the calico project, and she is now retired to a place of honor in my collection.

“Lemongirl” (TW-94-144) is mother to two large clutches of calico babies.

The Computer Chondro impregnated a new female in 2005 (Hershey, BG-01-10), but only five eggs were fertile and hatched successfully. One of the babies is very dark with reduced pattern (see page 78). I have a very beautiful and unusual female on breeding loan for 2006, scheduled to mate with Calico Junior. Wonderful things are ahead!

“Hat Trick” (GM-04-20) is a third-generation calico male and a real standout from the 2004 clutch.

As with other valuable morphs, there have been those who have attempted to profit from the demand for the real thing by making false claims for animals that bear no resemblance to the actual bloodline. Half-changed Biaks are the most frequent animals advertised as “calico” in classified ads. Also, chocolate calicos are not melanistic highland animals as has been suggested. Occasionally, other unusual chondros will be called “calico,” but the term is not a catchall for any oddball or unusual chondro that may show up. While I don’t hold a patent for using the word to describe this morph, it is professional and ethical to respect the use of a term describing a unique combination of traits when used by the person who developed the line and gave it that name. For example, there are a lot of high yellow chondros out there, yet most of the chondro community respects the use of the term “Lemon Tree” as uniquely referring to the line started by Tim Turmezie. Calicos are what they are: a unique combination of pattern and color unlike anything else in the world of designer bred GTPs. The future of this morph looks very promising, especially in light of the results of the 2004 breeding. The Calico project is now firmly established and has gotten better with each successive generation.

I am always on the lookout for unusual females to outcross with my calico males. This stunning animal is from the Hudson "Dream" bloodline and is on loan from Brett Mazimann for the 2006 breeding season.

"MITE-PHASE"

This term was coined by a young keeper named John Romano to describe animals with black speckling. The name isn't popular with everyone, possibly due to the rather negative association with that bane of reptile collections, the snake mite. Also, strictly speaking, a "phase" is a temporary stage of development, not a permanent morph, and some of these animals retain heavy dark markings into adulthood.

“Pepper” (AZ-96) is a large blue mite-phase female which has produced some very high-end offspring.

This heavily pigmented 2004 calico yearling may or may not retain the black into maturity. Its father is Calico Junior, so the chances are good that it will, but one must be patient with such animals.

However, the name stuck and has come into wide usage, so we all better get used to it! A more correct name would be melanistic, but that isn't nearly as fun sounding! Mite-phase animals can be heavily peppered in black; some have reduced speckling, even limited to skin pigment between the scales on some specimens. It is not uncommon for the dark scales to disappear altogether as the animal matures. This happens frequently enough that the ownership of a mite-phase animal is always in doubt until it reaches maturity. Even heavily marked yearlings can lose the black flecks entirely by the time they are two or three years old. However, such animals may still pass on the trait to youngsters, and my experience is that this trait is easy to reproduce and strengthen by selective breeding. In fact, I have a green male that never had any mite-phase coloration on him even as a changeling, yet he has produced several nice mite-phase offspring with multiple females. This trait does seem to be fairly potent within a bloodline, and if one parent has it, odds are good that it will show up in a number of the off-spring. Extreme examples are very attractive and desirable, especially when

combined with a blue body color. Interestingly, I have never seen a high yellow adult with heavy mite-phase markings.

There is a myth that says highland animals lose the melanism and true mite-phase chondros keep it. While I am not sure if there is a solid case to be made for melanistic chondros from higher altitudes, I can state with surety that both highland bloodlines and selectively bred mite-phase animals can lose or retain the melanistic pigment. The truth is, mite-phase isn't really a specific bloodline or unique morph; it is a descriptive name for any animal with black flecking. A couple of designer bloodlines have produced animals that are so heavily pigmented with black or dark brown coloration that they go beyond the appearance of normal mite-phase chondros, which are generally marked with single black scales or tips of scales. Such extreme melanistic animals are different critters and should not be considered mite-phase animals.

Other Color Varieties

Given the high variability of green tree pythons, it is only natural that other color varieties will be developed as more animals are bred. Currently, there are several forms that are recognized by collectors, and a few breeders are working to reinforce the qualities that appeal to them. However, they have not been sufficiently established at the time of writing to qualify as recognized morphs with heritable traits, although it is probable that some of them will in the future. These include:

Mustard chondro, produced by Jim Devolder from Nicoli stock. Photo courtesy of the late Steve Gordon.

MUSTARD These chondros have the general color of brown hot dog mustard, and vary between a muted yellow and an olive yellowish green. While not a favorite of most collectors, mustard chondros do have their fans, and there have been a few attempts at breeding this color. Jim Devolder produced a clutch of them with good results reported, and Canadian breeder Craig Stewart hatched a clutch from Mustard parents in July 2004. I have not seen any photos of these since they began to color-change. It is probably just a matter of time before this color variety is more established.

A mustard female, produced by the author from a Biak outcross pairing. The maroon offspring developed into high yellow young adults, this was one of the yellow neonates. A maroon sibling can be seen on page 80.

HIGH CONTRAST These are multicolored animals with bright greens, yellows, and blues. Most of these chondros seem to have been developed by selective breeding rather than as unusual and unique offspring from dissimilar parents, although there are exceptions. My friend and fellow breeder Tomm Phillips has made high contrast chondros a focus of his efforts, and has some very nice animals to show for it. Often, very attractive animals that don't fall into other specific morph descriptions can be accurately identified as high contrast. This includes chondros with above average yellow coloration that aren't true high yellow specimens. Like the mite-phase trait, high contrast isn't a specific bloodline or one breeder's special project; it is a descriptive name that aptly applies to any chondro that has nice colors that stand out well from each other.

High contrast male “Kermit,” produced by Winslow Murdoch and in the collection of Tomm Phillips.

A wonderful high contrast chondro, produced by Helmut Sommerauer from a Sorong female and a white-flowered Yappen-type male. Photo courtesy of Marc van Eijnsbergen.

HIGH WHITE Predictably, these are usually high-end examples of the Aru race. It seems odd that the amount of white on chondros has not shown as strong a tendency to increase with selective breeding as have other color traits. I am aware of a few breeders who are working to develop high white bloodlines of Aru types which will consistently produce a percentage of high white offspring. One of these, a breeder with multiple generations of selective breeding, estimates that in any given clutch the high white expression is between 15 and 30 percent (Rouille, pers. comm.). There is evidence that males are frequently more heavily marked with white than are the females, but this is not always the case. The high white Yapen form of the Biak race seems even less established in captivity than are high white Arus. These have large white "flowers" consisting of several scales. At least one pairing of captive bred adults having these white flowers has been accomplished, and it was reported to me that most of the babies developed them too.

KEY LIME A relatively new color recognition, this variety is characterized by a solid green body with little or no white or other colors present. Some breeders have questioned the actual tone and brightness of the green as being a distinguishable and consistent variant. This is due to the fact that a few obviously overexposed digital photos of normal green chondros have been represented as being of "key lime" specimens. Aru type specimens with few white scales, and southern mainland animals with few or no white scales, may all be identified as

Key Lime at times. Nevertheless, there are some breeders, such as Rico Walder of Signal Herpetoculture, who are interested in developing this color variety, and it may well prove to be a trait that can be strengthened with selective breeding. Because of the highly variable nature of GTPs, the goal of producing solid bright green specimens with no other colored scales will probably remain an elusive one.

PARADOX This is a new project being developed by Damon Salceies, mentioned earlier as one of those working with locality specific Merauke chondros, and who produced of the first living albino chondro (see below.) The paradox animals originate from Houston Zoo stock and are noted for splotchy green, high yellow, and blue combinations in an illogical "paradox" pattern. These are an extreme deviation from naturally occurring morphs, but are fantastic looking, and there is early evidence to indicate that the traits are heritable.

Paradox chondro from Houston Zoo stock. Photo courtesy of Damon Salcieis.

ALBINO CHONDROS

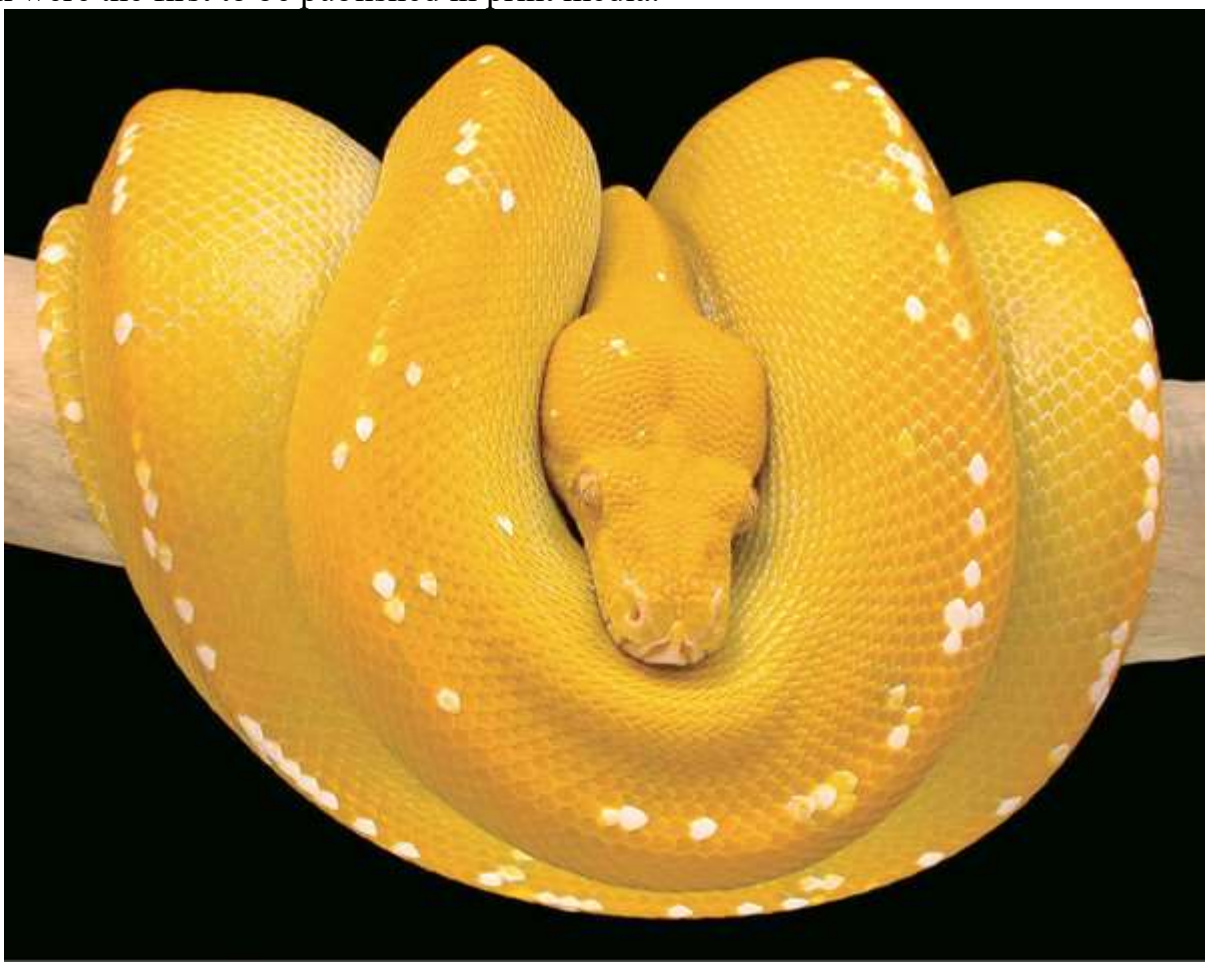
When I began writing this book, no one had yet produced a living albino chondro in captivity, nor were there verifiable reports of any being observed or captured in the wild. Speculation on the possibilities of the first captive bred albino chondro is something that had long stirred the imagination and interest of most people in the chondro community.

The first captive bred albino chondro, produced by Damon Salceies in 2002. The red pupil is clearly discernable, and even more so in the photo below with a normal clutchmate. Photos by Damon Salceies.

Prior to 2002, there had been a couple of questionable reports of albino hatchlings. One of these that received a lot of press was a photo published on the VPI web site by Dave Barker. The image is of a dead, under-pigmented neonate that died nearly full-term. The image was published as part of a web contest to find the animal on the site, and Barker later admitted that the animal was not an albino, and even confessed to coloring the eye of the animal to make it look more albinistic. The photo caused a lot of questions and stirred the interest in albino GTPs. There have been one or two other photos published that claim to be of albino hatchlings. In each case, the animals clearly appear to be dead, under-pigmented, nearly full-term neonates. The full pigmentation is the last thing to develop in hatch-ling chondros, in the last few days of incubation, and animals that fail to survive and hatch often look pale and much like an albino might. Such underdeveloped neonates never pip the egg, and I am highly skeptical of claims that are contrary to this. Trooper Walsh reported hatching a true albino, with red eyes and tongue, which failed to survive twenty-four hours. Unfortunately, there are no photos available of the animal (Walsh, pers. comm. 1999).

In an ironic twist to the Barker “albino” photo, two baby chondros produced by Tracy Barker in 1996, from locality-specific imported Merauke parents, ended up making history as the pair that produced the first known living albino chondro. Damon Salceies, a breeder of locality *alterna*, purchased some of the 1996 Barker clutch in order to work with some verified locality chondros. A pair of these siblings produced a clutch for him that hatched in January 2002 and included two albino yellow neonates. One of these animals succumbed to a bacterial skin

infection, but the other thrived and Mr. Salceies made his announcement about the remarkable event at the National Breeders Expo in Daytona, Florida, in August 2002. Damon graciously called me to let me know of the upcoming announcement, and his post on the ChondroForum about the albino set a new forum record for replies and hits to a single topic. His photos of the animal in the first edition of this book were the first to be published in print media.



Floyd the albino chondro, a truly spectacular animal. Photo courtesy of Damon Salceies.

Family Portrait: Floyd, with dam (far left) and sire (center), both F1 off-spring from the Barker locality Merauke group. Photo by Damon Salceies.

The young animal was difficult to distinguish from its normal siblings at first, with only subtle differences in the color of the dorsal markings being apparent to the careful observer. But the red pupil was a certain indication that the baby was, in fact, the long awaited first albino green tree python. The chondro, named “Floyd” by his owner, has developed into a beautiful and unique orange-yellow color, with white scattered dorsal scales in the typical Merauke chain pattern.

A few people have expressed disappointment that the albino isn’t white, or that it doesn’t look like they expected. There was initial skepticism about the final adult appearance of the animal, due to the lack of strong variation from the normal looking siblings. This has been shown to be unfounded, as the photo of the adult male clearly demonstrates. Even so, the project has been downplayed by those who feel the animal isn’t what they expected. This kind of thinking is very shortsighted and fails to grasp what the production of the first albino chondro will certainly mean for designer breeding. Each race and captive color morph will likely produce a different form of albino when outcrossed. These could take years to develop and establish, but what an exciting event each hatching would be! With other, far less marketable species of first-time albino pythons selling for many thousands of dollars, albino chondros represent a substantial and long-term investment.

As an owner of another of the 1996 Barker offspring, Trooper Walsh was understandably excited about the possibility of his male specimen being het for albino. Most people assumed that the trait was the result of a recessive gene, although this had yet to be proven. If in fact it was, any siblings to the albino’s parents would potentially be 50% possible hets. (When a het animal produces offspring with a non-het mate, all the offspring look normal, but approximately

half of them will be heterozygous and are referred to as 50% possible hets.) In the spring of 2005, Walsh proved his male by producing two yellow albino babies, one of which died in the egg. The dam was a 2001 offspring from the male, and the results verified the het status of both parents and gave further evidence that this albino strain was the result of a recessive gene.

As an owner of a male from Walsh's 2001 Merauke outcross clutch, I was quite excited to hear the news about the Walsh albino! The proven status of the Walsh sire means that all of his offspring are 50% possible hets, regardless of the mate. My male (see photo on page 70) sired a large clutch in 2004 with "Pepper" (AZ-96-14), producing one of the most unusual looking clutch of mixed phase babies I have ever seen. These are yearlings at the time of writing and are spectacular animals in their own right. One of them, a female I named "Ella-Diablo" (GM-04-47) is truly one of a kind and incredible. When I consider the possibility of introducing an animal such as this female into the albino project, it makes my head spin! If my male proves to be a het and is bred back to Ella-Diablo, all the offspring will be 50% possible hets. If both are het, the clutch should contain some albino babies. Other owners of Merauke outcross animals such as Tomm Phillips, Marcial Mendez, and Cathy Maynard are making plans for projects of their own. Lucky buyers of my 2004 and 2005 Merauke outcross hatchlings will also share in the potential of this project. These clutches were hatched before the status of the Walsh male was proven.

I share Damon Salceies' hope that the chondro community will appreciate these wonderful and unique animals for what they are and hold their high economic value as a real but secondary measure of worth. Any responsible breeder will seek to uphold the high monetary value of these animals, and Damon and I have discussed this aspect of the project. The usual reproachful comments will continue to be made by a few about individuals with expensive projects. Those who make such remarks are ignorant about basic elements of business and a free market. But the real excitement about the albino project should come from the magnificent splendor of these special animals.

“Ella-Diablo” (GM-04-47) is one special animal, even without considering the possible albino genetics involved with her sire.

CHAPTER 6. CHONDRO MYTHS AND MISCONCEPTIONS

"I shall try to correct errors when shown to be errors, and I shall adopt new views so fast as they shall appear to be true views."

Abraham Lincoln

Green tree pythons are mysterious creatures and can be inconsistent in their behaviors, personalities, and habits. Because of this, and the tendency of humans to draw conclusions based on incomplete evidence, some common misconceptions about chondros have become established in the minds of many reptile keepers and would-be chondro owners. As these mischaracterizations get repeated they develop into mindsets and myths. The Internet has been especially problematic in the spreading of misinformation around the world; but it has also made the correcting of some of these myths easier as well. Some of the following myths have been spread by those who have applied what they observed in a few specimens as being true for all. It must be stated that when seeking to discover the facts about chondros, large sample sizes must be used as the baseline for comparing data. Too often, firm conclusions are made by those with limited experience, or from observing too small a number of animals. Exceptions occur to every rule, especially with these snakes, and errors can be made when the exception is presented as the rule.

The following are some common but inaccurate claims about chondros, along with a brief explanation of the facts. Most of these topics are covered in detail elsewhere in this book. This list is by no means exhaustive, but it does cover all the common statements one frequently hears. The topics are arranged to address biological issues first, followed by husbandry and health concerns.

Myth #1: "GTPs are irritable, snappy reptiles that can't be handled without danger of being bitten."

This belief has its roots in the days when most chondros were wild caught. Such specimens are notoriously irritable. The fact is, most captive bred adult chondros are relatively calm animals and can be safely free-handled during the daylight hours. There are exceptions, and a few really psychotic specimens show up from time to time from captive bred origins. Others are very tame from an early age. My observation is that most captive bred chondros fall somewhere in the middle and prefer to be left alone, but will tolerate handling well. I don't make a practice of handling mine unless there is a need to, but many keepers do enjoy handling their animals and report that most specimens tame readily when gradually exposed to human contact. Tomm Phillips makes a point of beginning to touch his yearlings gently on the underside as they rest on their perches. He feels this helps to avoid any of them developing into aggressive adults. Neonate chondros are normally quite snappy, and even if they are not, it is a good practice to avoid handling them prior to a year of age, due to the fragility of the spine. Most CB chondros will begin to tame down on their own at about twelve to eighteen months of age with little or no taming required. It must be noted that a few specimens will never tame down, and I feel it is cruel to stress such animals by forcing them to endure human contact against their will. Also, it is risky to try to assess the

personality of a chondro at a reptile show. The stress of travel and exhibition often causes normally irritable animals to appear much more tame than they really are when acclimated and in a secure environment. Captive bred specimens of the Aru race are reported to be consistently tame; those of the Biak race are often irritable even when captive bred.

Myth #2: "GTPs have enormous teeth."

While it is true that chondros do have impressive dentals, their teeth are nothing like the huge front fangs possessed by Emerald Tree Boas. A bite from an adult chondro will result in a series of tiny punctures from the incredibly sharp-tipped teeth, which may bleed freely for a few minutes. The majority of bites are inconsequential, and in my opinion hurt less than getting stuck by rose thorns. Nonetheless, bites are to be avoided, and with proper handling and feeding techniques, they should be rare. Most bites occur during feeding time and are non-aggressive in nature, resulting more from a feeding response to heat or movement than from fear. The greatest danger is from sustaining a bite to the face, and it is important to always avoid exposing your face to a potential bite.

Shed tooth from *Morelia viridis*. All snakes regularly shed and replace teeth.

Myth #3: "Wild GTPs eat a lot of birds."

Longer than average teeth and the arboreal habits of chondros have led to the speculation that birds make up an important food item in the diets of wild chondros. Some field research seems to indicate that this is not so, and the fecal matter of wild chondros does not seem to contain evidence of a lot of birds being eaten. (See Chapter 1.) Certainly it is a safe assumption that a few birds are taken as prey, and it is likely that baby birds still in the nest may be the most frequent avian prey item. This may account for the fact that captive neonates can often be enticed into feeding on baby mice by scenting them with chick down. Caudal luring may entice birds in close enough to be seized, but there is a reason that the typical hunting posture of an adult chondro is head down. The mental image of the tree-perched chondro snagging birds out of the air is likely erroneous.

Myth #4: "You can tell the locality of a chondro by looking at it."

You cannot. I have been told that this statement is "just an opinion," but it is a fact regardless of the opposition expressed by some. The reason I can make such a dogmatic statement is because collecting data is what makes a locality specimen, not its appearance. This is true regardless of the species in question. The details about locality typing can be read in Chapter 3. Some chondros can be identified as typical geographic specimens based on outward appearances, but this is not the same thing as making locality identification. With the extreme variability of chondro coloration and patterning, and the almost complete lack of verifiable collecting data available for founder stock, it is rather silly to believe that most chondros can be sight-identified as belonging to a specific locality with anything approaching scientific accuracy.

Myth #5: "If you treat a wild caught chondro for parasites, it is as good as buying a captive bred animal."

From a health standpoint, captive bred chondros are superior in every way to wild collected animals. Wild caught animals, even when treated for internal parasites, will never be the robust and vibrant animals that captive bred GTPs are. WC chondros seldom have the vigor, muscle tone, reproductive ability, tractable personalities, or life span that their captive bred (CB) counterparts have. They are far more susceptible to disease and stress-related issues. The money saved by buying cheap imports is more than offset by the potential veterinary bills and disappointments. Furthermore, you will be supporting an industry that is filled with a history of unscrupulous dealers and inferior animals, and you will probably be breaking the law and supporting others who do so. It is illegal to export wild chondros. True farm bred babies are better than WC animals, but are often harboring parasites. They are also subject to stress from overseas shipping as well as from being kept in less than ideal conditions by some dealers and show vendors. Some of these animals will survive and become healthy adults, but no import will ever be a match for a domestic captive bred animal.

Myth #6: "GTPs are way too expensive."

This statement begs the question, "Too expensive when compared to what?" Chondro prices are set according to the free market principles of supply and demand. So are baseball cards. A Babe Ruth card is worth a lot because of high

demand and low supply. Well-established baby chondros cost more to produce than non-established babies with no history or records, and they aren't cranked out in huge numbers like colubrid snakes are. Many designer morphs are in especially high demand and low supply. It is amazing how many people expect breeders to sell their best stock for normal market prices, and make disparaging comments about greed and selfishness when breeders charge high prices for exceptional bloodlines, or hold back keepers for themselves. The fact is, CB chondros are expensive for valid reasons, just like other fine products offered to consumers. You don't buy a Mercedes for the price of a Chevy, and there are reasons why! Personally, I will never buy a Mercedes because my value system will never allow me to spend that kind of money for a car. But, I will never go to a Mercedes dealer and whine that the cars should be priced like a Chevy so I can afford one. Nor will I tell the Mercedes dealer that I'm tired of being told, "You get what you pay for!" Healthy, selectively bred chondros, especially the best designer bloodlines, represent some of the most desirable and valuable reptiles being offered in the pet trade. All of these, whether top end or entry level, represent the hard work and dedication of breeders who are committed to the species and their customers.

Of course, we all must conclude at some point that something we want is beyond our level of fiscal responsibility. But unless a thing is priced well beyond the market value of comparable items, in my opinion there is little justification for stating that an item is too expensive.

Myth #7: "Chondros are difficult to keep and are only for highly experienced keepers."

The truth is that, while chondros are more delicate than many other boids, they are not difficult to keep successfully. They have some specialized needs that must be understood and met for them to thrive, and they are not as tolerant of husbandry mistakes as some other species. Because of this, some reptile-keeping experience is highly recommended before acquiring your first chondro. Carpet Pythons make a good starter species. They are from the*Morelia* genus, but are hardier than chondros. Successfully keeping less delicate kinds of snakes will help to develop a familiarity with the daily care of these animals along with some of the observational skills and instincts that are important to keeping chondros. It bears repeating: GTPs are not difficult to maintain once their needs are understood and met, and they will do very well for those who are willing to learn and listen. There will always be those whose skills and abilities are such that chondros are not the best choice for them. No truer words have been spoken than those commonly uttered by veteran keeper Trooper Walsh: "Chondros aren't for everybody."

Myth #8: "GTPs need 100% humidity."

Chondros, being tropical in origin, need higher levels of humidity to thrive and to shed properly than do many other kinds of snakes. I am frequently asked questions about how precise the relative humidity needs to be, and it is common for new keepers to believe that the animals require nearly 100% humidity. I have sometimes seen cages kept dripping wet. In actuality, the animals will benefit from a cycle that includes a drying-out period, and they can suffer problems from living

in a stagnant, wet environment. Further, except during shedding cycles, the level of humidity is not critical as long as it is within acceptable parameters. This is covered in detail in Chapter 10.

Myth #9: "GTPs are very prone to rectal prolapse."

It is true that anyone with a large collection of chondros will experience a prolapse sooner or later, and even a keeper with just one animal may encounter this health problem. But to say that prolapse is a common occurrence with chondros, in the same way that regurgitation syndrome plagues Emerald Tree Boa keepers, is simply not true. Prolapse is usually very treatable, and in collections where the husbandry and cage environment is correctly administered and provided, prolapse problems are not common. Prolapse can occur even under the best conditions and to the most experienced keepers, and it does not seem to be caused by small errors in husbandry. Fear of prolapse should not be sufficient to keep anyone from working with the species. It is simply one more challenge to be dealt with as the need may arise. If potential for problems and challenges is not something you wish to deal with, then another kind of snake is recommended. For information about treating prolapse, see Appendix A.

Myth #10: "GTPs should be fed only after they defecate."

With the exception of obviously constipated animals, you will under-feed and stunt the growth of your chondros if you follow this commonly given advice, which is mostly based on an unfounded fear of rectal prolapse. See Chapter 11 for the scoop (no pun intended) about feeding and defecation cycles.

Myth #11: "Breeding two (ontogenic) blue adults together will produce blue offspring."

You can substitute any color you like for "blue," but it won't make the statement any less incorrect. The fact is, chondro genetics are complicated, and adult colors are not the result of simple recessive, dominant, or co-dominant genes as they are in so many other reptiles. Your chances of getting offspring that will develop into adults with blue on them are higher when the parents have the trait, but what you are paying for with unchanged neonates is an *increased opportunity* for a blue adult. The better the past breeding results of specific adults, the better the chances are for getting desired results with current offspring. If chondro genetics were certain, the prices for some offspring would be much higher. (From the prices a few charge, you would think they *were* certain!) Buying changed yearlings (at commensurately higher prices) is the way to go if knowing exactly what you are getting is very important to you. For most of us, watching the babies change and develop into a beautiful adult is a big part of what fascinates us about chondros.

Myth #12: "You can get high-end designer chondros from average parents."

There is a nugget of truth behind this inaccurate statement. It is true that a very few unusual chondros have come from average parents or those from an unknown background. However, this myth is usually repeated by those who have an axe to grind, so to speak, with the market prices that high-end designer chondro morphs often fetch. To hear these folks tell it, any baby from average green parents is just

as likely to develop outstanding coloration as it is to look like the parents; and any baby from designer bloodlines is just as likely to turn green as it is to develop into something special. Of course, a long history of reproduction with both kinds of chondros proves such claims to be nonsense, and the agenda behind these kinds of remarks is rather obvious. The odds of getting anything from green parents other than green offspring are extremely low. There is nothing at all wrong with having or producing green chondros! But there is something dis-honest about making inaccurate and misleading claims that seek to discredit the hard work of others.

Myth # 13: "Chondros are a sound financial investment."

Well, this depends on what is meant by investment. If your goal is to spend investment capital on something that will multiply rapidly for an early retirement, then chondros are not for you! Breeding chondros consistently is incredibly challenging, and results vary from season to season. To really make a long-term profit, you will need to reinvest most or all of what you earn back into the enterprise. Caging and supplies, plus overhead, make up a substantial cost when setting up a breeding operation. There are always improvements to be made, and fresh stock to acquire. Starting the new hatchlings is something that must be experienced to be understood, and this difficulty alone weeds out many would-be breeders. Furthermore, a get-rich-quick mentality will never carry you through all that is needed to be a successful commercial chondro breeder…passion is needed for that.

However, if by "investment" you mean that you hope to be able to enjoy a hobby that has the real potential to pay for itself, or that you hope to enjoy some side income, then I would say that yes, chondros represent one of the best investments of money, time, and effort that one can get involved with. Chondros are not only holding their own commercially but are increasing in value, which is very rare in the reptile business these days. The best rewards of working with chondros are not measured financially, but they can make you rich in personal achievement and satisfaction.

SECTION II.

CAPTIVE HUSBANDRY

CHAPTER 7. ARE CHONDROS RIGHT FOR YOU?

"The whole secret of a successful life is to find out what is one's destiny to do, and then to do it."

Henry Ford

Chondros are definitely not for everybody. A better way to phrase the title to this chapter would be, "Are you right for chondros?" While there are some who may take offense to this statement, no offense is intended. While it is my opinion that green tree pythons are not difficult to successfully maintain in captivity, they do have special requirements that must be understood and met. This requires both aptitude and ability on the part of the would-be GTP owner if the new snake is to thrive under his or her care. To make such a resolute statement as the one that opens this chapter is not a put-down; nor is it one of smug superiority: it is a fact that should be accepted. Every person has strengths and weaknesses, gifts and shortcomings; an important part of maturing as a person is learning those areas of personal strength and exploiting them for good, as well as accepting that there are pursuits that don't fit well with our personal shortcomings. For example, I'm a big fan of Lance Armstrong, the seven-time American Tour de France champion, and I enjoy riding racing bikes myself. But I am at peace with the reality that I will never be a professional cyclist. Lance was expected to win his seventh and final Tour in July 2005, but I am expected to collapse if I ride more than fifty miles in one day. Being a pro cyclist has made Lance very popular and financially well off, but I will never be one. I may have a burning desire for the money and prestige that pro cyclists have, and I may imagine myself trouncing all competitors as I climb the hills of Knox County, Ohio, but I will never excel in the sport of professional bike racing. Why? Because I do not possess the skills necessary to succeed. There are many skills required to be a successful pro cyclist, and I have almost none of them!

Likewise, there are some important skills needed to be a good chondro person. Some of them can be learned and developed, and some are inherent to specific personality types. Most are essential to initial success, and a few can be developed along the way. "Desire" is a good place to begin, but like my example of professional athletics, simple desire is not nearly enough to successfully keep or breed chondros. I've known several individuals with a strong desire to work with chondros who came up short of success because they lacked one or more of the essential qualities needed. Along with the right skills, it is important to approach potential chondro ownership with the correct motives. We will discuss both issues in this chapter. It is hoped that the information will be a real help to those considering the purchase of a GTP, and will allow potential owners to assess themselves as a keeper of these wonderful and challenging pythons. Judging from the frequent number of questions I am asked by those considering the species, this issue is an important one in which many people are interested. For new owners who already have purchased a chondro, studying and acquiring these characteristics of good keeping will go far toward insuring success.

MOTIVES

There are many motivations for keeping and breeding chondros, or reptiles of any kind. Some are good and honorable, and some are not. The hobby of amateur herpetology has always attracted a wide range of personalities with many different motivations. Before the days when captive breeding, reptile shows, and the Internet were setting the pace, most amateur herp people were dedicated naturalists and field collectors. There were some odd fellows involved to be sure, but a lifelong fascination and love for reptiles and amphibians was the overwhelming motivation for the majority of herpers.

Sadly, that has changed a lot in recent years, and far too many young hobbyists have had no exposure whatsoever to reptiles in the wild. Indeed, it is now illegal to collect wild domestic herps in many states, and in some cases even photographing wild specimens can get the photographer charged with harassing wildlife. Kauffeld's classic *Snakes and Snake Hunting*, once a how-to primer for every budding herpetologist, is now an antiquated collection of stories from another era. While my friends and I spent our summers combing local fields, ponds, and marshes for whatever life we could find, newcomers to the hobby today are more inclined to have made their "discoveries" by pointing and clicking with a computer mouse. In my opinion, the passion for chondros is best experienced in the context of a love for all wildlife, and an appreciation for the grandeur and infinite beauty of nature. Let us ponder a few of the things that motivate people to keep chondros.

PRESTIGE There is no denying that a certain amount of prestige and status is often associated with the keeping and successful breeding of GTPs. I suppose this is a natural part of owning any fine thing, whether it is a luxury car, an expensive musical instrument, a nice home, or whatever. People are funny; often the only requirement for possessing such things is a lot of money. While it may be natural to feel some pride in the ownership of expensive or desirable things, those who turn such possessions into trophies out of some misplaced sense of personal exaltation are to be pitied. When a living animal becomes the means to accomplishing such a purpose, pity can turn to disgust. Chondros are not appropriate playthings for those in need of a status symbol. Every once in a while, some new keeper emerges with grand announcements about his or her superiority over what everyone else is doing. Such attitudes are a clear signal as to the true motives of such persons, and they are best ignored. Chondros have a way of teaching humility to the proud, and those who enter the world of the chondro with the intent of exalting themselves usually aren't around too long.

SELF ATTENTION Akin to those who seek status from the things they own are those who must always be at the center of attention and use the allure and appeal of some thing to draw and keep the attention of others directed to themselves. Some snake keepers seem addicted to the public reaction they get when parading their animals openly. I was at an Independence Day parade a few years ago and spotted a man along the crowded parade route wearing a large constrictor around his neck. I confronted him about the danger, and the foolishness, of such an act. When he

refused to contain the animal out of sight, I notified a local authority to deal with the man. This same immature need to use reptiles for individual egocentric agendas can be seen at many swap meets and on Internet reptile forums.

FINANCIAL GAIN Those who begin building a collection of chondros with the goal of making a sizeable and rapid financial profit will almost certainly be disappointed. It takes a large operation and the dedication of much time and energy, to say nothing of the initial investment for livestock, cages, equipment, and facility, to make more than a break-even income. It is true that chondros are one of the few reptile species that are maintaining and even increasing in value, but any financial rewards must be secondary to the fulfillment gained from working with these animals and the sheer enjoyment experienced from them. I have often said, and truthfully so, that I would keep and breed chondros if they lost all commercial value. I admit that I would not be able to enjoy keeping them in the numbers I do if I were not able to make a living from them; but I would certainly have a nice collection, and work to produce some nice offspring. They are one of my life's passions, and were so for several years before I made any money from selling them. Don't get into chondros because you think you will make a lot of quick money. The odds are against it, and you will eventually get frustrated and quit. I tell prospective breeders to plan on at least three to five years before seeing much success, and to assemble a group of at least a half-dozen animals.

Now that we have examined some poor motives for keeping chondros, let's look at some good reasons to have them.

PASSION I feel that passion is the best motivation for working with any reptile species. Keepers who are the most passionate about the species they work with are usually the ones who make the breakthroughs; they are the ones who inspire passion in others; they are the ones who keep the focus on the animals and not themselves.

An amazing white female chondro, owned by Greg Schroeder and on breeding loan to Rico Walder, who supplied this photo. This animal reportedly was captive hatched in the US from a gravid Wamena-type import. Passion for this kind of exotic beauty is what fuels the chondro obsession in many of us!

Passion is what brings out the fullness of the enjoyment, the richness of the experience, and the depth of fulfillment. Passion is also the thing that makes you change the water bowls when you don't feel like it, get up in the wee hours of the morning to check the nest box, spend hours working with new hatchlings, and clean cages instead of going to the movies. Passion is what allows you to continue to be enthusiastic when there isn't much to be enthusiastic about. Life with chondros certainly has its high points and low points, but if passion is your primary motivation for having them, you will never go wrong. Passion is not preference; preference is simply choosing one over another. Passion is the thing that grips the heart and mind and says, "I must do this!"

CHALLENGE Many of us need challenge in our lives, and a difficult goal is that much sweeter when it is finally obtained. While I don't consider the challenges of chondro keeping and breeding to be a proper motivation alone, there is no denying the appeal of stepping up to chondros from less exigent species. For me, the challenges of chondro keeping complement and heighten my passion for them. When we undertake to conquer a challenge, we may fail before we succeed. Those who have a hard time experiencing disappointment, or tend to give up easily, or get quickly frustrated at the first sign of a problem, should probably seek an easier kind of snake to own. For those who patiently strive to overcome all obstacles and desire to experience the kind of achievement that comes from

stretching one's self to new levels, chondros can provide a unique and rewarding challenge.

BEAUTY Nature is beautiful, and the green tree python is one of the most elegant, graceful, and colorful snakes in nature. Their bizarre dragon-like faces, slim yet muscular bodies, and prehensile tails that can wriggle like a worm, all combine with a diversity of colors and markings to make chondros the quintessential snake species. Many keepers find themselves attracted to their exotic beauty with a compulsion that borders on an addiction. (I am not one of these; I am not an addict. I just like chondros very much.)

COMMUNITY Few reptile species have inspired the kind of community that has developed around GTPs. Although I don't always prefer the company of people to animals, the friendships and relationships that I have made as a result of being a "chondrohead" are many and valuable. Some of my closest friendships are those I made as a direct result of a mutual obsession with these green snakes. I have worked with many kinds of reptiles for most of my life, and never have I experienced the kind of unity, camaraderie, and shared enthusiasm centered around a reptile that can be found in the worldwide chondro community.

In July 2001, almost one hundred GTP aficionados from all over the US and Canada converged on Maryland to participate in the first annual "ChondroFest." Hosted by Buddy Goetzger and Trooper Walsh, and dubbed the "Woodstock of Chondros" by those attending, ChondroFest provided a place for people of all backgrounds and levels of experience to enjoy sharing fellowship, food, and passion for GTPs. The event was held in Mount Vernon, Ohio, in July 2005 following a two-year hiatus, and was hosted by the ChondroWeb staff. I have met some wonderful people through my work with chondros, and the support and encouragement shown by many within the chondro community can be inspiring. A lot of chondro people, like chondros themselves, are special.

ChondroFest 2005 was held in July at the author's home in Mount Vernon, Ohio USA. Chondroheads from all over the US attended.

From left to right: Ben Whitaker, Erin Wilson, Mary Graichen, Dr. Ann Crafton, Tim Graichen, Mike and Karen Wood, Tomm Phillips, Jessica Gnoft, Justin Englund, Jamie Pail, Mikaela Lampman, Dan Barten, Aaron Simpson, Kathy Weeks, James Barten, Phil Black, Grace Maxwell, John Carpenter, Cathy Maynard, Christy Carpenter, Larry Hammel, Kristina Anderson, Greg Maxwell, Dan McCrary, Max Moro, Kevin Obrien, Brandon Osborne, Randy Land, Shiloh Hawkesworth, Kimberly Burge, Steven Roberts, and Christian Burge.

Qualities of a Good Chondro Person

The following attributes are those I consider important, even essential, to the successful keeping of GTPs. These qualities are also important if you are seriously interested in breeding the species. The list is intended to be a guide to the qualities you will need, and the better you are at developing them, the higher your chances of success with chondros. Chondros can teach all of us a lot about ourselves.

Experience The amount, and quality, of your experience with keeping and breeding herps will directly impact your success with chondros. A frequent question asked by those considering the keeping of arboreals is, "How much experience do I need?" The answer is relative, and difficult to phrase in terms of exact measures, but in general I would recommend several years of successfully keeping a variety of reptiles, snakes in particular. Three years would be a good minimum to start with, and if you have worked with something a bit more demanding than entry level colubrids such as Corn snakes or California Kingsnakes, so much the better. It has been observed by several keepers that perhaps the best "trainer" species for working up to chondros is the Carpet Python (*Morelia spilota*). These pythons are hardier than their green relatives, but share some common habits and needs. Being more tolerant of husbandry errors, and a lot less expensive, they are an attractive and effective bridge to chondro keeping. Those having some experience with the Emerald Tree Boa (*Boa caninus*) will find

green tree python keeping to be similar, and such keepers should be able to make the adjustment to the higher metabolism and resulting increased feeding and activity levels of chondros without much difficulty. In fact, they may come to prefer the variety of colors and obvious personalities of *Morelia viridis* over the more predictable coloration and stoic affect of the tree boa.

Why is experience necessary? Largely because experience develops other qualities, detailed below, that you will need. There are many things an experienced keeper just knows – things that are difficult to put in writing and that may even be subconsciously understood – that make up an important part of daily husbandry. A general familiarity with captive reptiles – how they act when they are happy and content, how they look when something is not quite right – will be of enormous advantage when learning to care for chondros. Any trouble that you may have encountered and problems you have solved while working with less demanding species will be helpful in building your confidence and troubleshooting abilities.

It should be noted that simply having a long list of reptile species under one's belt is not necessarily the same thing as having good experience. By the time I was seventeen, I had kept a large number of different herps from many taxa. But this did not mean I was ready for chondros, because much of my early years was spent with my collection in a state of flux, and as a result I did not develop much of a familiarity or level of expertise with any one group. I am frequently contacted by young enthusiasts, asking me if they are ready to keep GTPs, and invariably they say, "I have a corn snake, an iguana, and a Boa constrictor." I always encourage such young people, for they are the future of our hobby and deserve to have their enthusiasm encouraged, not squelched. But chondros are a species that will do best under the care of those who have a bit more hands-on training than a brief career with common snakes.

TEACHABLE Willingness to learn and to accept correction is extremely important to becoming a knowledgeable and experienced chondro keeper. I am called on to give advice on a daily basis, often spending several hours a day answering e-mail and forum questions, and I am always encountering those folks who want to do things their own way and are simply looking for my endorsement. When I tell keepers to house chondros individually, or to feed dead prey, or to provide a horizontal thermal cage gradient, or to avoid buying chondros from general reptile dealers, I am trying to get them in a position to experience the best chances for success. So much of the time, when they do the opposite of what I suggest to them, I wonder why they bothered to ask! Some of us invest an enormous amount of time in helping inexperienced keepers extricate themselves from problems that are easily avoidable, and it is often very apparent that some individuals have a problem listening. I spend far more time helping these people than I do my own customers, so I know what I'm talking about! A friend of mine, also a knowledgeable keeper, recently estimated that about 50% of the advice he gives out is ignored, with predictable consequences.

Chondros are not like most other snakes, and they pose unique challenges to even experienced keepers. The time to experiment and deviate from established

and proven techniques is after you have some years of chondro experience and have gained a deep familiarity with the needs and habits of these animals. Because Chondro husbandry is best approached with an open mind and a willingness to set aside preconceived ideas and personal tastes, or a need to prove you can do things your own way, be willing to listen and learn from those who have already been through the learning curve. With the abundance of good information available these days, there is no need to make major errors, yet seemingly every week new chondro enthusiasts make the same mistakes and encounter the same pitfalls.

Those contemplating becoming chondro keepers should spend considerable time discovering all possible resources about caging, husbandry, and other related issues, and should begin building relationships with experienced keepers and breeders. One of the very best ways to introduce yourself to chondros and chondro keeping is to visit an experienced person, spending some hours observing, asking questions, and learning. Often there are several effective ways to approach a technique or problem, and you will gain a good understanding of the principles of basic GTP care by seeing how successful keepers do things. Make sure the person instructing you knows what they are talking about and has the proven experience and the kind of results you would like to have yourself.

OBSERVANT If you are the kind of person who is not given to making intelligent and analytical observations about your world, then chondros may not be the best choice for you. This does not mean that those not keeping chondros are stupid or dull! Rather, I'm simply recognizing that some people are observant and some tend not to be. Things that leap out to one person are completely ignored by another. "Didn't you notice this?" is a question I frequently want to ask when aiding a troubled keeper. Good keepers notice everything, don't tend to blow off small details, and take pains to document and follow daily events and changes for possible importance. Good keepers also make frequent checks of their animals, as time allows. It is difficult to imagine a responsible chondro keeper who, having been absent for the better part of a day, doesn't make a prompt check of the chondros upon his or her return. Here is a true story: One time I was visiting the collection of a chondro person and saw a female ovulating. The animal was covered with a dried-on shed and had no visible cage humidity. I knew for a fact that this person had been around the animal for several hours prior to my arrival. When I pointed out the ovulation taking place, this person told me that they hadn't noticed the large swelling all morning, and that they weren't sure how many times the female had been bred. Chondros belong in the care of a more observant and careful person than this kind of keeper.

DETAIL-ORIENTED I admit it – I am a compulsive, obsessive person – and a prime candidate for both stress management counseling and chondro keeping! Seriously, GTPs are not good animals to keep if you tend to be sloppy, cluttered, and carefree. Good chondro keepers don't need to be told that water bowls should be scrubbed rather then simply refilled…they already do that out of habit. They change the substrate in tubs when it becomes stale, whether it has been soiled or not. An attention to detail, and the development of good habits, is a part of the

makeup of excellent keepers, and it shows in their collections and breeding results. This doesn't mean that only neurotic individuals and fanatics can successfully work with chondros…but it helps! At a minimum, successful keepers must be willing to pay strict attention to proper hygiene and to develop good and consistent care habits and routines.

INSTINCTUAL The dictionary defines instinct as, "The innate aspect of behavior that is unlearned; a natural aptitude." In everyday terms, this means that a person with good instincts can assess a situation and, without being told, make a basic judgment of the situation and take some action which is more correct than incorrect. On the basketball court, I have no instincts other than bad ones. I will do the wrong thing almost every time. My peers learned this fact early in my academic career, resulting in my always being chosen last for basketball! But put me on a lake with a bass rod, and chances are we'll not go hungry, because I have good instincts about where to find bass. In the same way, there are some people who just don't have good instincts with chondros. This may sound elitist, but it is the truth just the same. I have seen chondros that were nearly dead from horrible care and poor decisions made by the owner which were quickly salvaged and restored to health by someone who knew what they were doing. Such owners lack much more than simple know-how; they have no basic instincts for the care and nurturing of such a delicate animal as a chondro. Some instincts can be developed along the way, and nobody starts out as an expert, but those wishing to enjoy healthy and thriving GTPs must possess good instincts about the task. This is perhaps the most important attribute I look for when helping new keepers. Some refer to this as having "Chondro Zen," but whatever name you put on it, it needs to be present in some degree.

PATIENT People tell me all the time that I am patient. I do not think this is so. To me, patience implies a rare kind of saintliness that genuinely embraces hardship and smiles through trials and adversity. This is not me! What I do have is endurance, which I define as an ability to stick it out to the end and never give up or quit until the objective is reached. Most people think this is patience, so that's what we'll call it. But regardless of the word used, a chondro keeper must possess some of it. Chondros are prone to frustrate us with a wide variety of behaviors, carefully calculated to push us over the edge. Males (and sometimes females) go off feed; animals of both sexes can act constipated, experience bad sheds even in ideal humidity, lie on the floor, and undergo personality changes. If you desire to breed these snakes, you had better quadruple your level of patience, because you have never experienced anything like starting up a dozen or so little worms that refuse to eat anything you offer them. Patience also carries with it an implied quality that we might call stick-to-itiveness. Too many people are always getting in and out of various reptile projects, or are constantly trading, buying, and selling animals without establishing a stable group of animals. Chondros do best and breed more successfully when they are in a consistent, stable environment.

This is an age of instant gratification. We microwave our frozen food, get cash out of a box in the wall at the bank, send instant messages electronically around the

world, and flip through two hundred channels without moving more than our thumb. Chondros are a reality check in this fast-paced, high-tech world. They live in their own time zone, at their own pace. They mature slowly and gradually become parents…maybe. You don't power feed chondros and crank out babies from young, accelerated females, and when males go off feed, they resume eating when they are ready…not when you are. They are not a hurry-up-and-do-it kind of animal. I have been privileged to spend some time in the tropics, in so-called third-world countries, and one thing you notice right away is that life is much slower in these places. There is time to breathe, to hear, and to slow down and really listen. Chondros seem to bring that kind of relaxation and peace into my life, and they have not forgotten the slower pace of the quiet rain forests from whence they came. You are not going to change them…but you can allow them to change you.

ABLE TO DEVOTE SUFFICIENT FUNDS This last keeper characteristic can sometimes be a bone of contention with those who seem to think that they are owed anything they want, especially some members of the younger generation. Chondros are not inexpensive, and for good reasons. Even entry-level animals, if captive bred and well started, are outside of the means of most teenage incomes. Besides the cost of the animal itself, there is the matter of a proper cage. This should be based on what the animal needs to thrive, not what you happen to have on hand or what is most economical. You will also need a heater, thermostat, cage lighting, and other basic cage accouterments. You will need a good thermometer, spray bottle, hook, feeding tongs, and disinfectant. It is often common to have as much money invested in equipment as in the chondro, and if a person can't or won't make this investment, then it is the wrong time for the acquisition of a species that requires a considerable outlay of cash. Many people, young people especially, want what they want now and often will skimp on caging and equipment, trying to cut corners while providing the animal a home.

Chondro owners should also be in a financial position to get veterinary care for their animals if and when they need it. Even healthy chondros can suffer a prolapse or a respiratory infection that requires professional treatment, and a routine visit and the medication needed can run a couple of hundred dollars. If you can't afford that, then you have a responsibility to refrain from taking an animal into your care for which you may not be able to get adequate medical attention.

This does not mean that chondros are only for the wealthy – I am not wealthy. Most of us can find a way to afford what we want, and in the US there are wide-open opportunities to earn what you are worth and to become worth more if you choose. Often, the financial rewards that result from hard work and time spent paying your dues aren't realized until adulthood. It is best, and well worth your while, to become established financially before making a commitment to work with chondros. The hobby is much more enjoyable, and the animals' needs better accommodated, when the keeper can afford to spend what is required to do the right things. It can be offensive to be repeatedly asked, as most breeders are, to sell our beautiful and carefully produced offspring for half of what they are worth, because "that is all I have to spend." How many people would walk into a

Mercedes dealership and demand half price because that is all they have in their checkbook?

Are You Ready?

This chapter may seem to be overly negative in tone to you. I hope this is not the case, but if so, I can only say that everything I have written here has come from the direct experience of years of serving keepers from all levels. This is the one chapter of this book that may have been written more for those who should not have chondros than for those who do, and some of them (as I am all too familiar with) do not like to be told what they need to hear. Many people seem destined to learn things the hard way; I have endeavored to honestly and clearly spell out what you should expect of yourself to have success with GTPs. It is sincerely hoped that the information in this chapter will turn more people into candidates for chondrohood than it will turn away. Anybody who is willing to listen and learn and has basic skills with reptile husbandry, can be a successful chondro person. Are you such a person? In the next chapter we will discuss what you need to know to get started with a quality, healthy animal. Good luck!

CHAPTER 8. BUYING A QUALITY CHONDRO

"It's unwise to pay too much, but it's worse to pay too little. When you pay too much, you lose a little money…that is all. But when you pay too little you sometimes lose everything, because the thing you bought was incapable of being the thing it was bought to be. The Common Law of business balance prohibits paying a little and getting a lot, it can't be done. If you deal with the lowest bidder, it is well to add something for the risk you run and if you do that you will have enough to pay for something better."

John Ruskin

These days, there is no shortage of green tree pythons for sale, and no lack of sellers either. The spectrum of animals and those offering them runs the gamut, from excellent to abysmal. You can buy outstanding captive bred young animals with records and follow-up service, imports that are little more than death waiting to manifest itself, and everything in between. As I write this, I have just returned from visiting a friend who lives near one of the larger reptile shows. While at the show, we saw a small, clear box with maybe six or eight obviously imported adult chondros. The animals were dehydrated and thin, with such poor muscle tone that I doubted if they could have perched even if perches had been provided. A sign on the table read, "Where Quality Is King!" Anyone purchasing such an animal is in for certain loss and disappointment, and will probably help to spread the idea that chondros are just too difficult to keep.

Absolutely the most important ingredient to happiness and success with your new chondro, aside from your own responsibilities, is obtaining the right animal for you. Making a wise choice will usually mean long-term satisfaction and help when you need it; choosing poorly almost always results in frustration, disappointment, and little or no follow-up service. It is imperative that the most important choice you will make – from whom to buy – is made with a full knowledge of the facts and is based on a firm relationship of trust.

QUALITY

First, let's define "quality" in the context of this discussion. A quality chondro is any captive bred, honestly represented, healthy animal that can be reasonably expected to thrive when given proper care by the new owner. It may be from the most exotic designer bloodline and cost many thousands of dollars, or it may be an average green animal from the first clutch of a proud new breeder. Quality does not imply that animals from "big name" breeders are better than those from someone few have heard of, or that very costly animals are superior to less expensive ones. Some bloodlines are more attractive than others in terms of color and history (and personal taste), but any healthy captive bred chondro, backed up with service after the sale and having hatch and feeding data, is a quality one.

Amazingly, there is resistance from some to the idea of defining and promoting quality. It is not surprising that vendors such as the one described above take offense at discussions about quality, because an educated buyer is a lost

customer for them. But occasionally I see the idea of quality getting dismissed by chondro owners. This usually comes from those who have purchased imports and resent the inference that their animals are inferior. They defend their position with an argument that says, "Quality is relative and can't be defined." While defining quality may be subject to some variation of perspective, it is silly to suggest that such variation nullifies the concept and application of this important aspect of chondro buying. Beauty is in the eye of the beholder, quality is not. Although there are degrees of quality based on the criteria being used to measure it, the definition given above is the standard I use when discussing which kind of chondro a buyer should look for. This is exponentially true for new buyers. The element of quality is so important to long-term success that I bang that drum loudly.

Quality is never raised as an issue in order to make anyone feel bad, or to make inferences about animals that are already in someone's collection. This book, and everything else that I do, is intended to help all chondro owners regardless of the source for their animals. But it is impossible to advise potential buyers without making quality the first and most important issue.

Buy Captive Bred

The one thing that must be firmly established at the outset is to buy only domestic captive bred chondros. Let me repeat this, because failure to do so is the single greatest cause of problems for new owners: Buy only documented, domestic captive bred animals. The importance of this cannot be overemphasized. Captive bred chondros are superior in every way to imported specimens, including farm-raised animals. They are more robust, are better able to resist diseases and stress-related difficulties, and they are generally free of parasites and blemishes, both of which are common with imports. They have better muscle tone, greater longevity, make better breeders, and acclimate much more readily to captivity. There is no valid reason for most chondro buyers to even consider buying anything other than a captive bred animal. Buying an inferior, inexpensive chondro with the hope of "making it work" is simply not wise…the odds are against success. Commit to buying CB chondros only, and learn how to spot and avoid impostors. Equally important, make sure any CB baby you buy has been well-established, or you will probably be disappointed…more on this shortly.

Imports do have a small, legitimate role in the chondro market. Experienced breeders may wish to work with imports for a number of reasons, including the opportunity to acquire wild blood or to obtain animals that are not available from captive bred bloodlines, such as pure specimens of geographic races. However, the majority of imported animals in the US are sold for no such purposes; they are sold to unsuspecting customers who often buy them as impulse purchases at swap meets or from Internet classifieds. Most of these are priced far below the normal market value for a captive bred animal, and appeal to those who place a low price at the top of their criteria for buying an animal. With chondros, you absolutely get what you pay for and you don't get what you don't pay for. A few vendors, realizing that an educated buying public is beginning to get that message, are hiking their

prices to the level of captive bred stock in an apparent effort to add credibility to the animals. This means that price alone cannot be used as a guide to getting a good chondro.

Selecting a Source

Almost as important as buying captive bred is from whom you decide to buy. Again, the rule to follow to stay out of trouble is to only buy from a reputable breeder. Such a breeder is dedicated to his or her animals and to your success. He or she can provide you with a well-started, established animal with a history (or at least with hatch and feeding records), and can answer your questions and help you get off to a great start. More importantly, a reputable breeder will stand behind the sale and will be there for you if there is a problem. It is truly amazing how many new GTP owners require help each year with non-feeding babies or other beginner trouble, and yet don't hold the seller of the animal to any standard of accountability.

Swap Meets and Expos

Avoid buying any chondro from a swap meet or expo vendor, unless you have a relationship with them that includes references. While there are some legitimate reptile show vendors selling good quality animals, there are also large numbers of them who will look you in the eye and tell you anything you want to hear. I made my living for years selling reptile cages with my company, CageMaster, at reptile shows and expos. I have in-depth experience with what goes on at many shows. and the stories I could tell about misrepresentation and sales hype are legion. When it comes to handing out advice about buying from show vendors, I know what I am talking about!

A small part of the North American Reptile Breeders Conference (NARBC) and trade show in Chicago. The annual NARBC trade shows are among the best in the US and feature many top-name breeders. The shows are clean and well run, and provide a high quality environment for both sellers and buyers. There are shows in Anaheim, CA, and Philadelphia, PA, also.

Even so-called breeders expos are often full of imports and misrepresented animals. I know of two different reptile dealers that were temporarily banned from participating in a breeders expo for selling imported chondros. At one of these events, the rules of which clearly prohibit selling imports of any kind, I asked a dealer who was displaying what were obviously imported, yearling-aged Biaks at his table, "Who produced these animals?" "I don't know," he told me. "We just got them in last night." Not only is this practice deceptive to the buyers, it is a slap in the face to any of the legitimate breeders in attendance who worked hard to produce and establish healthy captive bred stock. A chondro is a bad item to purchase on impulse or from some guy at a show table who is trained to sell, sell, sell. Most inexperienced buyers are not qualified to discern an import from a captive bred animal. Many of these vendors have dozens of chondros on the table along with large quantities of other herps. Quite frankly, it isn't possible for these individuals to have produced the numbers of chondros they claim are captive bred. Even large-scale private breeders usually have waiting lists, and seldom have dozens of animals of all different ages sitting around. Such venues are a poor choice as a place to shop for a new chondro.

If you do buy from a show vendor, make sure you know with whom you are dealing. Shows and expos can be a good place to meet breeders and form relationships for doing business in the future. And, of course, there are legitimate breeders who display at shows. Just be sure you thoroughly investigate all claims, and ask to see photographs of the parents, eggs, hatch data, etc., for any animal you are considering buying. A first-time buyer should not, under any circumstance, buy from a seller who can't or won't supply this information. With the availability of cheap digital cameras, there is no excuse for any vendor to not have some documentation of the captive bred status of his or her animals…unless there is none.

Internet Classifieds

Also to be avoided are Internet classifieds. Some of the larger classified sites are chock full of highly questionable animals, some so bad they become the brunt of jokes on other boards. Like the swap meets, there are some legitimate animals produced by true breeders, but Internet classifieds are the venue of choice for most of the established import dealers today, and the novice is usually not qualified to sort them out. Even on the Chondroweb Classifieds, where experienced breeders moderate the submissions and strict rules govern what may be advertised, it is "buyers beware." As always, know who you are buying from, and avoid giving in to the temptation to buy from an unknown source. Price should be one of the last considerations when looking for a breeder, not the first one. You get what you pay for, and recently, many less-than-reputable vendors have shifted to selling online via classified boards. In some ways, buying this way is even more risky than buying at a show table, because you are buying sight-unseen with nothing but the seller's word to go on, and possibly some distorted, color-enhanced digital images.

Down on the Farm

I would like to include a few thoughts about farm raised green tree pythons. This can be a touchy subject, and I have friends and fellow chondro lovers who sell and/or own farmed chondros. Any honest and thorough treatment of the subject of chondro shopping must include some comments about this group of chondros. A fair and balanced assessment of farm raised animals requires me to report it is true that legitimate specimens are much better bets as captives than wild collected ones. Also, younger imports, as most farmed chondros are, will adapt more readily to captivity and will probably breed better than older imports. It is undeniable that chondros can be farm bred in larger numbers and for less cost in their native climate using cheap local labor. This keeps the consumer cost lower than breeder-produced animals. Farming is a high volume, low cost operation by nature. Also, farmed animals appeal to those who prefer more natural looking stock compared to US bred specimens of mixed ancestry. This is not to say that farmed chondros are truly locality specific, but they are certainly closer than most selectively (or randomly) bred captive bloodlines.

There are a couple of serious tradeoffs for getting a low price and wild founder stock: possible health concerns and a decrease in customer service. Let's look at these in that order.

It's a known fact: Many imports harbor parasites. Whether this is from drinking contaminated water, eating parasitized prey, or from other sources is not always known; but imports have parasites so frequently that it must be suspected that any import is a potential carrier and should be tested, and then treated for them if necessary. Parasites can be serious and can cause organ damage, in addition to having an overall deleterious effect on an animal's health and longevity. They are not a mere nuisance as is often the attitude about them. In addition to potential parasite infestations, farmed chondros have had to sustain overseas shipping and handling, and many are then further shipped or driven around the country. Those displayed at reptile shows are under even more stress. None of this is a good thing, especially for neonates.

Lack of service, compared to the level of customer commitment most private breeders offer, is the other major consideration when thinking about buying farm raised GTPs. This is not the biased opinion of a breeder trying to steer customers his way; this fact was admitted to by a well-known exporter of farmed chondros in a recent Internet discussion about these issues. This is not a slam on anybody. It is just a part of the equation. It is usually not possible for a large scale operation, focused on quantity, to give the kind of personal service that a breeder is able to provide. The same can be said of most middleman dealers and brokers of these animals; they are often too busy with running a large business, traveling to shows, bringing animals in and sending animals out, to give very much attention to customers after the sale. This is not true of all of them, and some dealers are service-oriented, but they are the exception. Also, nobody is as qualified to give you the in-depth kind of help you may need, as someone who specializes in the care and reproduction of one species.

The whole issue of farm bred chondros is further clouded by the reality that many so-called farm raised animals are nothing of the sort. It is illegal to export wild collected chondros from Indonesia, so many animals are labeled "farm raised" to make them appear legal. Furthermore, most dealers will tell you that the chondros they are selling are "captive bred," failing to mention that they are also imported. While farmed chondros are technically bred or hatched in captivity and are better suited to captive life than a wild collected animal, they are not captive bred using the common application of the term in the US.

Can farmed chondros do well in captivity? Yes, some of them will. A lot of that depends on the skills of the owner and how the animal was treated prior to the sale. A percentage of imports, including farmed imports, die. Most of the health issues that I assist other keepers with involve farmed and imported chondros. I stand by my conviction that farmed chondros are not the best choice for inexperienced keepers. Sadly, these people seem to make up the majority of buyers of farm bred GTPs.

DEDICATED BREEDERS

The very best source for your first chondro is a well-known, reputable breeder who can give you references of satisfied customers. There are more such breeders now than ever before, some big and some small, but all dedicated to your success. It is best to establish a relationship with several breeders when looking into buying your first chondro, and then choose the one you are most comfortable with. Ask a lot of questions and avoid breeders who don't seem interested in helping you. Find out what guarantees, if any, the breeder may offer about the health of the animal. While most breeders, including me, will expect you to understand that sales of live animals are final, a reputable breeder will stand behind his or her animals and will do what he or she can to help you with any problems that may arise. You should expect nothing less than excellent service after the sale, so discuss this with the breeder, and take your business elsewhere if you aren't comfortable with the attitude or answers you receive. The better breeders will supply you with feeding and shedding records, and hatch data that includes hatch date, hatch weight, and sire and dam information. A few breeders will even have a bloodline pedigree, showing your animal's bloodline history going back to the wild founder stock. The breeder should be willing to show you his or her collection, the parents of your animal, and discuss with you any questions or problems you may have about your setup. With resources such as the better shows and expos, ChondroWeb and the ChondroForums, and other online sites, it is not difficult to meet and get to know some of the best breeders around. See Appendix B for a partial list.

The most important thing a prospective buyer should do is establish a relationship with a dedicated private breeder. Here, the author discusses the

purchase of a yearling with an excited new chondro fan. Breeders should always be willing to spend time with new buyers and allow them to see how the animals are set up and cared for.

Most breeders producing selectively bred chondros are quite popular, and many need to keep waiting lists, or "first-refusal" lists, for upcoming hatches. Producing true captive bred, established babies is a time-consuming process, and both the breeder and the buyer will need to exercise some of that patience we talked about in the last chapter. Often you will be fortunate, and there will be some good animals available when you first begin looking, but sometimes you may have to wait. Use this period to establish a relationship with the breeder, and if possible, make a visit and see the facility and animals in person. Many breeders respect this show of desire and commitment on your part, and will respond accordingly. Avoid the common temptation of losing patience and deciding to "try" an animal you know is inferior.

Selecting Your First Chondro

For your very first chondro, you would be wise to consider a slightly older animal over a hatchling. While little baby chondros are without a doubt one of the most appealing creatures around, and the anticipation of watching yours grow and go through its color change may be strong, you will be safer cutting your chondro-keeping teeth on a yearling, or at least an older baby six to eight months old. Such an animal will be very well-established, its immune system will be more developed, and it will be out of the more delicate baby stage. This also means it will tolerate slight handling errors better, errors which might damage a fragile hatchling, causing spinal damage that often shows up later. Buying a yearling also means you will have a much better idea of how it will look as an adult, and it may possibly be sexed as well. Never buy a sexed hatchling under a year of age! See the comments below.

If you do decide to buy a young hatchling, make sure that it is very well-established. This means that the animal will be at least three months old, will have shed at least twice, and will have eaten on its own at least ten to twelve times. Sellers that represent babies as having "eaten three times" may be truthful, but three meals is nothing when it comes to establishing baby chondros. Most need at least ten meals before they are really feeding aggressively. There are exceptions to this, and some babies will eat aggressively right out of the egg, or after a few meals. It is important to establish a trust relationship with the seller, because you can't tell until it is too late that you have been sold a slow or non-feeder. Even babies that have voluntarily eaten a few meals may go off feed from the stress of being moved or shipped, and will need to be started again, virtually from scratch. It is therefore extremely important that you buy an established baby that has put on some growth.

When picking out your baby or yearling, look for an animal that appears filled-out and with good weight. Avoid a thin animal with the ribs accentuated, a bony spinal ridge, or any skin wrinkles, other than normal folds of skin where the

body bends. Be especially wary of any horizontal folds in the skin, as these can indicate dehydration or malnutrition. Stay away from any animal that has bumps or lumps under the skin, as these are not normal and usually indicate the presence of subcutaneous parasites. The animal should look sleek and glossy, with good muscle tone, not dry looking or flaccid. Avoid animals that have dried pieces of shed stuck on them. While this can be remedied and is not an immediate health threat, it may indicate the animal has been kept too dry and may suffer dehydration problems or kidney stress. Likewise, avoid puffy or bloated animals that appear to be full of fluid, as this usually indicates kidney problems. If the animal is large enough to be safely handled, ask to hold it. Let it slide through your hands, and feel the dorsal area with your thumb as it moves, checking for any kinks, lumps, or indentations. Babies should not be handled this way by you or the seller, but they can be visually inspected as they perch or crawl. Look at the eyes, nose, mouth, and labial pits, and make sure they are free of matter. Ensure the tongue flicks normally, and that the animal moves with confidence, and has no hint of neurological disorders which may cause it to quiver or hold itself in an odd way. The time to discover a problem is now, not after you have had the animal a few days. Chondros are fragile creatures as babies, and they can have small defects that not even the breeder has noticed, so inspect your potential purchase carefully.

Chondros have many different personality types, just like people, and you may not be able to tell much about yours from interacting with it during the daylight hours. If the animal is resting on a perch, ask the breeder to lightly prod the animal. Most young chondros will become agitated and snappy when pestered this way, and this will show you how alert the animal is. Listen carefully as it breathes heavily; respiratory infections can often be heard as wheezing. Note: Some babies make a little clicking or popping sound when disturbed, but this is normal. Not all chondros will react when prodded, and some will bury the head in their coils. This is especially true of yearling and older animals and is also normal. Most snappy babies will begin to calm down on their own as they mature, usually beginning at around twelve to eighteen months of age, and snappy babies are often good feeders, so don’t be alarmed about buying a baby with an aggressive personality. You should not be handling babies under a year in age anyway, until you gain some experience. It is important to realize that a chondro on display at a reptile show is under stress and probably is not exhibiting its normal personality. An animal that appears calm at a show may become much more aggressive once it is acclimated at your home. This is one more reason to buy your animals from a breeder, inspecting your potential purchase in person if possible.

The parents of your chondro, and to a lesser extent the other animals in the family tree, will largely determine the potential adult colors. Choosing a healthy animal, and a reputable and honest breeder, are much more important than the potential colors of the animal when it comes to selecting your first chondro. Maroon and yellow babies alike can make attractive adults, and there is no difference in temperament, gender, or any other important factor between them. You will probably pay more for a dark baby, and yearlings generally cost more

than hatchlings. For those interested in my thoughts about grading babies for potential adult colors, see Chapter 16.

A frequent question is which locality makes the best captive. First of all, the vast majority of chondros being offered are not locality animals. A more meaningful way to phrase the question is which geographic race is best for new keepers. As a generality, all of the various groups make good captives as long as they are captive bred. (If they are, it is likely that the animal you are considering is of mixed ancestry anyway, even if it is advertised as a "Sorong" or "Jayapura" specimen.) The exception to this generality is chondros of Biak ancestry, and this island group is noted for being snappy and irritable. Biaks often have a distinct appearance and can be recognized visually; see the description and photos of this race in Chapter 3. Biak types are usually good eaters and hardy captives, but beginners may want to avoid starting out with an aggressive animal that attempts to bite them when disturbed. In contrast, Aru Island types are often the most calm. In fact, Aru neonates have a reputation for being the most difficult to start feeding because they are so sedate, a fact that you may wish to consider if you plan on breeding later on.

If you are buying an animal over the Internet without seeing it first, make sure you know and trust the breeder. It makes sense in this age of mass communication and air shipping capabilities that honest and legitimate transactions will take place between people who live far away from each other, possibly even in different countries or even continents. Again, a trust relationship is the foundation for a wise purchase when acquiring animals this way. For a first chondro, it is strongly suggested that you buy from a breeder who is close enough to visit and to get to know.

NEONATE SEXING

Here is another rule for new buyers: Never, never buy a sexed chondro that is under one year of age. This is because the fragile spine and vertebrae of baby chondros are not developed or strong enough to safely withstand the technique of probing the tail to determine the sex of the animal. Even worse is the practice of "popping" the animal to determine sex. This involves the forcing out of the hemipenes of males with thumb pressure. This is a common and safe practice with hatchling colubrids and some boids, but should never be done to chondros of any age. I need to emphasize that no reputable breeder these days sexes baby chondros because of the risk of damage to the baby. Such sexed offspring may develop spinal kinks as they mature, kinks that used to be assumed to be genetic flaws but are now known to be the result of damage from sexing. Even if most of the babies sexed by a dealer are not damaged, the practice is cruel to the few that are. Do you want to risk being the customer who ends up with a kinked animal, even if it is one out of twenty or thirty that are okay? Understand that damage from sexing young chondros often does not show up until later. I have seen kinked animals in private collections that came from dealers who insist that "they are experienced enough to do it right." Don't do it! Waiting until chondros are a year or so in age, and at least

100 grams in weight, before sexing them is something that responsible keepers and breeders (and buyers) understand and accept. Unless you are buying an animal specifically for breeding, gender is not that important, and if you simply must know the sex of your animal before buying, stick to yearlings or young adults.

Chondro breeder and ChondroWeb.com webmaster Tomm Phillips (left) and Phil Black enjoy chatting with customers at the Mid Atlantic Reptile Show (MARS) in September 2003.

Supporting Captive Breeding

When you spend your hard earned dollars on any product or service, you are voting with your checkbook. The restaurants we choose to eat at, the businesses we buy our gasoline, our clothes, and our groceries from; the make of automobile we drive and the dealership we buy it from; all these decisions serve to sustain a business model and level of service we prefer, while contributing to the decrease and possible failure of others. In the same way, we make a critical judgment when we spend money on our hobbies and leisure pursuits. Dedicated breeders are responsible for the incredible wealth of heritage, information, and wide assortment of exceptional and healthy chondros available today. Without them, chondros would mostly be regarded as an exotic and misunderstood species that few could or would work with, and the heavy losses and failure rates of years gone by would still be the norm. Breeders have established a genetically diverse, thriving population of chondros worldwide, have developed and published the techniques

and methods that have allowed many others to enjoy the same success in both long-term husbandry and breeding, and have funded and developed the beautiful color and pattern morphs we all thrill to. Contrast these achievements with the cruel treatment many imported animals suffer, with the hundreds of frustrated and disappointed first-time owners who have failed to get their animal to thrive and have possibly even quit the hobby; and with the misinformation and deception practiced by many of those who compete with the breeders who have worked so hard to raise chondro keeping to the level it has achieved. Which of these two groups deserve to be supported and perpetuated by you? And which group do you wish to be a part of?

CHAPTER 9. PROPER CAGING

"Efficiency is concerned with doing things right. Effectiveness is doing the right things."

Peter F. Drucker

I have remarked at times, only half facetiously, that I could keep a chondro healthy in a five gallon plastic bucket if I had to. Don't misunderstand me, I certainly am not recommending anybody try that! My point is this – if the fundamental requirements for housing chondros are understood, then meeting them is not difficult, and there are many ways of accomplishing this important goal. As a reptile cage specialist, I can categorically state that there is no perfect reptile cage. I have been building snake cages since I was about eight years old, and I have made them using a wide variety of materials and incorporating all the design factors you could think of. I have housed chondros in tubs, racks, wood cages, plastic cages, and Melamine cages.

CageMaster “Chondro Condos” from 1994, still in use by the author for cycling and breeding.

I founded the very successful cage manufacturing and distributing company CageMaster, and even marketed one of the first commercial units specifically for arboreals. At the time of writing I still have some of those original “Chondro Condos” in everyday use. In fact, I used these units exclusively to successfully

breed my chondros for seven years. However, learning and technology march on, and today there are even better designs and equipment. Many types of cages will work, but a few are much better than others. In this chapter I will give in-depth analysis of the range of cage materials, designs, and some of the commercial cages available, as well as a description of the cages I make and use myself these days. The first part of this chapter provides information specifically about caging for adult GTPs. Housing for yearlings and neonates will be covered in the latter part of the chapter.

Cage Materials

Several kinds of materials are currently used to construct chondro cages, both by those making their own cages as well as commercially manufactured units. There are advantages and disadvantages to most cage building materials, and a few that are just not well-suited to the humid environment chondros need. The most important qualities for chondro cage materials are thermal efficiency (the degree with which the material resists heat loss) and moisture imperviousness (the ability to have sustained contact with a humid environment without deteriorating). Also of importance are cost, weight, durability, and workability. I'll begin with the least suited materials and work toward the best.

Screen There are cages available that are basically a frame of some kind, covered on all sides with screen. Most of these are designed and intended for lizards. Unless you live in a humid, tropical environment, such cages are nearly worthless as chondro environments, because the screen construction makes it impossible to maintain a heated and humid interior. Also, there is the danger of your chondros rubbing their noses raw on the screen, especially males during breeding periods when they can be quite active. In fact, it is best to avoid using metal screen or hardware cloth in cages made of other materials, unless it is covered with soft fiberglass window screen to protect the noses of roaming animals.

Glass Once upon a time, glass aquariums were the only enclosure commercially available to snake keepers, and some enthusiasts still use them for housing chondros. To be sure, aquariums can be made to work and they are used successfully by a number of keepers and at least a couple of successful breeders. However, they have some distinct disadvantages and are not the best choice, especially for beginners. Unfortunately, because they are cheap and readily available, beginners are most likely to use them, but cost and user convenience should never be the primary consideration when choosing chondro caging. However, the low price, availability, and clear view they provide of the occupants, all combine to make aquariums an appealing choice to some keepers.

One problem with using glass to house chondros is that its thermal efficiency is relatively low, making aquariums more difficult to heat than cages constructed of better materials. The fact that aquariums are open on top is of further disadvantage, because even a small amount of ventilation can allow an excessive loss of heat and humidity. A suitable lid must be purchased or constructed, and

when this is opened or removed, there will be considerable heat loss no matter how well the design works otherwise. Working out the balance between adequate ventilation without too much heat and humidity loss can be tricky. This, along with needing the skills and tools to construct a top, combine to make aquariums a less than ideal choice for many. A few keepers have turned the aquarium on its end or side, making the top into the front of the enclosure and fitting it with a partially screened frame. This seems like a lot of trouble to make something work in a way that it really isn't designed for. Aquariums are also prone to breakage, can't be stacked because of top access, and can't be drilled for installation of heaters, perches, etc. I also feel that chondros are more secure when housed in a solid cage and not exposed to 360 degree visibility. Some like them, but I think aquariums are best suited for what they were designed for…fish.

WOOD Wood has several advantages that make it a popular consideration for those making their own cages, and for home-based small commercial operations. Wood is readily available in a variety of natural and manufactured products, it holds heat fairly well, and it's relatively inexpensive. It can be worked with using common home workshop power tools. All of these qualities make it the material of choice for many cage builders.

The biggest disadvantage of wood and wood byproducts is that they are porous, which means they absorb moisture and odors. This can cause staining and discoloration, and eventually the product will swell and degrade or even rot. Absorbed odors provide an unpleasant stink when the cage is opened. Because of these problems, all interior exposed wood surfaces must be sealed against moisture. Even wood materials rated for exterior use must be sealed or covered and will suffer if continually exposed to moisture. Laminating the wood with some kind of impervious covering solves this problem. Applying a commercial laminate such as Formica works very well, but this option is time-consuming and expensive. However, this type of surface will stand up to years of moisture and scrubbing. After all, this is more than likely what your kitchen countertops are covered with. These laminates must be installed with contact cement and trimmed before any of your cage panels are assembled, and require skill and the proper tools for a good job. Because of these considerations, most weekend cage builders opt for painting or sealing wood with a film finish such as polyurethane. These film finishes consist of solids sus-pended in a carrying agent that evaporates after you apply it, leaving the solids to form a semi-protective film if enough coatings are applied. Notice I said "semi," because all film finishes eventually degrade and must be reapplied. The fumes from the evaporating carrying agent can be dangerous to you and your animals until completely cured, which can take days. Because of all these factors, I consider wood a poor choice for a humid cage, unless the builder is able to apply an appropriate laminate.

MELAMINE Melamine is a laminated wood byproduct, and would seem to be a good material for use in chondro cages. I have made many hundreds of cages and tub racks out of Melamine, including some chondro cages which are still in use at my facility and have seen over nine years of daily use. (I might add that these have

seen better days and are being replaced with the cages described below that I now build and use.) And while I can honestly say that there are worse materials to use than Melamine, it is not an ideal board to use for wet environments. The laminated surface of Melamine is the same stuff that commercial countertop laminate is made from, but it is much thinner. The thickness and quality of this laminate is what determines how well a particular brand will hold up, and not all Melamine is created equal. The stuff you can buy from home improvement stores is normally not the best grade, and some brands are even laminated with a paper face. These kinds of Melamine will degrade quickly when subjected to moisture. The cage builder will need to obtain a heavy grade of commercial Melamine if the cages are to last for very long, and this board is often not readily available to retail consumers. Even the best grades and brands will eventually show discoloration, surface dimpling, or swelling. With reasonable care, proper sealing of corner seams, and using a high quality board, you can expect to get several years of service out of your Melamine cages, but my idea of an ideal material is one that does not have a built-in failure rate after a certain length of time. Melamine cages hold heat very well, but are quite heavy. An expensive specialty saw blade is needed to cut Melamine without it chipping badly.

ACRYLIC In recent years, cages made of acrylic have become somewhat popular, and were brought to the attention of the public by Tony Nicoli, a collector who had a number of these cages made for housing his Emerald Tree Boas and chondros. This is the only type of cage material discussed here that I have not had any hands-on experience with, so my comments here are theoretical. Being thicker than some kinds of plastic, acrylic cages probably hold heat fairly well. The cages certainly are impressive visually (at least when new), and make an artistic display. Since acrylic can be drilled and cut, these cages are more functional than aquariums because ventilation and access doors can be incorporated into the sides while allowing a solid top. Of course, acrylic is resistant to moisture and should last indefinitely when exposed to moderate or high humidity. And it is lightweight, making these cages easy to move. Three things would concern me about these cages, assuming that the heat and humidity issues were not a problem: Lack of security for the animals from being exposed on all sides; the scratching of the acrylic from cleaning; and the problem of water spotting and mineral deposits from misting. (Using filtered water to spray the cages will reduce this problem.) I think I would tire quickly of the very modern look of acrylic enclosures, but this is purely due to my own tastes. There are breeders who use and like this type of cage. It is safe to say that acrylic cages will require some maintenance to keep them looking nice.

Maryland Custom Caging, started in 2002 by signmaker Paul August, is one of the best known manufacturers of acrylic arboreal cages. August uses CNC technology (a high speed, computerized routing method) to manufacture his units, which are made from acrylic ranging from 1/4” to 3/8” thick. This milling process gives a polished cut and ensures tight-fitting seams. The doors are made from 3/8” material to resist warping, and the units feature acrylic hasps, hinges, and

turnstops. August says the acrylic cages must be handled and cleaned carefully to prevent scratches, but do not scratch from contact with the animals. Water spotting and mineral deposits can be removed with soapy water if cleaned regularly; deposits left for long periods can be tough to remove. August uses vinegar on these. Acrylic has a 10% lower heat transfer rating than tempered glass, making it slightly better at retaining heat.

PLASTIC As a material, plastic has one huge advantage over others for use in a wet environment – it is waterproof. Because of this fact alone many keepers will use nothing else, and I can see their reasoning. Plastic is also light in weight, another big plus. However, not all plastics and plastic cages are ideal. And many home cage builders do not have the tools and skills to make their own plastic cages.

Acrylic cages excel at showing off the inhabitant and make an attractive display. Not all chondros will thrive in such an exposed environment, and opaque sides are available. Photo by Paul August.

The biggest downside to using plastic for chondro cages is that some types of plastic materials are not thermally efficient and thus allow too much heat loss. This defeats the purpose of using such material for durability. After all, if you have trouble keeping a cage warm, then it really doesn't matter how waterproof it is. Some plastic cages require the entire room to be kept to a certain level of warmth or they will not hold heat well, and this can make it difficult to establish a thermal gradient in the cage, which is preferable to a single cage temperature. (More on this in the next chapter.) Furthermore, some plastic cages are prone to cracking over time, while others will melt if exposed to excess heat. Many commercially available plastic cages are too open in construction, requiring owner modification to get them to hold humidity well. Some also have built-in lips and ridges where snakes can hang, hide, and defecate, which makes husbandry more difficult than it needs to be. Some plastic cages are designed in a way that prevents stacking. Because of poor heat retention capabilities, some plastic cages lose heat rapidly and re-heat slowly when the heater is turned off and on, making them a poor choice when cycling for breeding in colder climates. All of these problems can be a lot to trade off just to get a waterproof surface and a lightweight cage.

Vision is one popular brand of plastic cage. These will need to be modified to function properly for chondros, as the stock cage won't hold humidity well. This

one has had the screen opening covered, and has been fitted with a heat panel, perch, fluorescent light, silk plants, and thermostat.

Some of the observations above have been challenged by users of some brands of commercial plastic cages. It must be noted that those living in warm, humid climates such as are found in the deep south of the US will encounter different cage dynamics and performance than those living in more temperate and less humid areas. Most plastic cages can be adapted for use as general enclosures in most climates, but cycling difficulties may be in store for those using inefficient kinds of plastic cages as breeding habitats. Tomm Phillips, a breeder from Ohio (an area that experiences cold, dry winters), saw his breeding success rise exponentially when he switched from using Vision brand plastic cages to a more solid cage with much better thermal efficiency. Mr. Phillips reported that the plastic cages cooled too quickly and heated up too slowly, and that he experienced a lot of trouble getting the cages to cycle the way he wanted them to.

Happily, several commercial companies (including some small but popular enterprises) have entered the plastic arboreal cage arena in recent years and are using materials that reportedly solve the shortcomings of older brands of plastic cages. Habitat Systems was the first to introduce a new type of plastic cage with noticeably superior performance over its competitors. HS uses a double-walled, hollow plastic panel that is very heat efficient. Ventilation is adequate but not excessive, and the cages hold humidity very well. They are available with lights, heat panels, and synthetic wood perches installed, ready to use except for a thermostat. In my opinion, they are an ideal commercial chondro cage. Adding some silk jungle plants will dress up the rather spartan white interior, and you will have a very serviceable cage that will last for decades. These cages (and most plastic cages, in my opinion) have visual shortcomings and are not the most attractive way to go, but much of this can be overcome with tasteful cage decor. HS cages are not inexpensive, but in my experience with them, they are worth every penny and are a lifetime investment. Cost should not be the primary consideration when choosing chondro caging.

Arboreal keepers who are seeking good caging now have several choices when considering plastic enclosures. While I do not have any hands-on experience with many of these cages, I have heard some good feedback from other keepers using them. Herpcages.com

A Habitat Systems cage with built-in heat panel, fluorescent light, and synthetic perches. Mulch and silk plants add to the function and appearance of the cage. Condensation from humidity is visible on the inside of the glass.

(B.A.R.R.s) and Boaphile are two popular makers of plastic cages. Keepers should be thoroughly familiar with the important design elements of arboreal cages outlined later in this chapter before making decisions about plastic cages. In my opinion, many stock plastic cages are too small and may not hold heat well unless the entire room is heated…not the best idea, as we will see.

One maker of plastic arboreal cages has received some especially good reviews from users: PVC Cages.com. These are nice cages made from expanded PVC and are available in two thicknesses and several different colors. Owner Jim Scharphorn, of Michigan, chemically welds the cages, and says that the PVC material holds heat and humidity well and will last forever. Rack systems are also available. This list is not exhaustive, and new cage makers are entering the herp cage market all the time. For contact information about any of the cage builders mentioned in this chapter, please see Appendix B.

My Cages

Those of you who are familiar with my web site are already aware of my cage designs, and that complete plans for building them are published there. As mentioned at the beginning of this chapter, there is no perfect chondro cage, but

the cages I make and use myself come as close, for my taste and purposes, as I have found. Making your own cages can save a lot of money if you have access to the right tools, and you can also tailor the specs to your exact needs.

A multi-cage unit manufactured from PVC plastic by Jim Scharphorn, who supplied this photo.

I have combined the benefits of a wood byproduct (Medium Density Fiberboard, known as MDF) with an easy, safe, and inexpensive way of waterproofing, and that is to cover all the interior cage surfaces with peel-and-apply waterproof contact paper. I use Contac brand paper in Hunter Green, but any covering will work so long as it is totally waterproof. Contac paper is actually thin plastic that stretches rather than tears when pulled. If you have any doubts about a particular brand or material, use some to line the interior of a bowl or tub and let it set overnight full of water. If the paper holds the water without discoloring or softening, then it should work for you. The paper I use is pretty tough, resisting abrasions and holding up well to mild wiping. If it is accidentally cut or abraded, a small patch can be cut and applied over the area and is almost invisible. Waterproof seams can be made by overlapping the joints an inch or two. I have also come to prefer the dark green interior of these cages to the white interior of some Melamine and plastic cages, and I feel the animals are more secure. Building my own cages gives me complete control over many important factors, and for many chondro keepers it is an option that pays off well.

One wall of the author's main chondro room showing his custom homemade cages. There are many benefits to making your own cages, or having them made for you.

Note: Recently some of those making cages using my plans have reported some bubbling of the contact paper. Upon investigation it was discovered that Contac has recently reduced the amount of adhesive on the back of the paper. (Thanks a lot!) The bubbling is cosmetic and does not affect the function or waterproof quality of the paper, but those making cages of this design may wish to investigate other adhesive-backed plastic products. Tim Graichen and I have experimented with commercial adhesive-backed signmaking vinyl and the results have been mixed. It is waterproof, but it is very glossy and the adhesion to MDF seems to be inconsistent. I am sure that other products are available, but I am completing my facility using the Contac paper so all my cage interiors match.

I have been using these MDF and contact paper cages continuously since 1999, and I find that they are the perfect blend of function, cost, and appearance. The MDF has more thermal efficiency than plywood or solid wood, and costs less than either. I spray heavily once per day, and the interiors of my cages are as new looking as the day I put them into use. The only moisture concern for these cages is from excessive condensation on the front glass, which can overflow the bottom glass track and stain the corners of the wood frame. This is easily prevented by not over spraying. I used these cages for breeding during the 2004-2005 winter season and hatched babies from six clutches.

A corner of the author's main room showing custom corner units. One very big advantage of making your cages is the ability to tailor them to your available space, which is often far more efficient than trying to make stock cage sizes fit.

Cage Design

When it all boils down, a snake cage is a heated box, and that box must include consideration for the kind of heater that will be used. The introduction of heat panels has greatly simplified this. In addition to the construction materials and heater type, design factors such as size, shape, access, ventilation, visibility, and appearance all affect cage performance and impact the needs of the snakes and keepers in various ways. I divide these into three areas: The needs of the animals, which obviously must come first; the ease with which the keeper can provide these needs; and finally the personal preferences and tastes of the keeper. I am a person who needs things to look a certain way before I am satisfied, and this often makes me the butt of jokes from my less aesthetically minded friends who care only for function.

However, I would never compromise or sacrifice the well-being of my chondros to satisfy a personal preference. I see too many keepers reverse the priority of the design factors listed above and place their own wants and wishes first. For example, I have shared correspondence with keepers who insist on setting up large and heavily planted vivaria for chondros, including small neonates.

While I am quite aware of the appeal of such extremely attractive displays and personally enjoy viewing them a lot, in my opinion they are not in the best interest of the animals and good husbandry. It is not necessary to sacrifice having a great-looking cage to be able to provide your animals with an ideal environment that is well-suited to their needs. The details of how to do this are covered in detail in the next chapter, but first let us examine all the important design factors that make good (and not so good) cages.

Size

My personal rule of thumb for chondro cages is to provide as large a cage as is practical and that you can reasonably afford. I need to qualify that statement by saying that it is possible to have too large a cage, and that “reasonably” is a very relative term. Cost should never be the primary consideration when choosing a cage, and it is my conviction that keepers have an obligation to spend the necessary money to provide good caging for their animals, even if it means having fewer animals. The size of your cages is important, because it will directly affect the heating and thermal gradient (or lack thereof), and to a lesser extent, the relative humidity of the cage. Cage size can also affect the activity level of your animals, ease of husbandry, amount of ventilation needed, and how secure your animals feel.

It has been stated frequently that a cage 24” by 24” by 24” is adequate for adult chondros, and this is most likely because a couple of popular plastic cages are manufactured to those specifications. My feeling is that this size cage is not large enough to permanently house mature adults (except some males, which tend to be smaller than females). I realize there will be some knowledgeable keepers who will disagree with me about this and continue to use and recommend the 24” cube cage, but my purpose here is to inform you and to help you make the best decisions,

based on my own experience and conclusions. A good tenet to keep in mind when weighing advice about chondro care is, "Just because it *can* be done doesn't mean it *should* be done." Would so many people recommend this size of cage were it not for the fact that it has been aggressively marketed to those keeping arboreals, or that it has a nice "even" sound to it? Some cage manufacturers think in terms of efficient use of raw materials and standard packing box sizes, not necessarily what is best for animals.

I feel most of the arguments for small cages are made with the needs and wishes of the keeper uppermost in mind, not the needs of the animals. Saving money, fitting more cages into a small area, easier lifting, and getting by with smaller heaters are all poor reasons to choose a smaller chondro cage. I even heard one person claim that cages larger than 24 inches long represent a design flaw!

It is my opinion that most adult chondros will benefit from having a cage that is somewhat larger than the common 24-inch size. Therefore, the smallest size I would recommend for the average adult is a cage 36 inches long, 24 inches high, and 18 to 24 inches deep. Larger animals, especially mature females, should have a cage 36 to 48 inches long, and I consider this an ideal size for most chondros. Conversely, a cage longer than 48 inches or higher than 24 to 30 inches is excessive and can have disadvantages. Too large a cage can be more difficult to heat, and too high a cage will require supplemental heat to ensure proper temperatures at floor level. It is also more difficult to humidify a larger air space, and smaller animals can feel insecure in an overly large enclosure. Moderation is almost always best, and keepers would do well to avoid the extremes of small or huge cage sizes.

You might ask why a larger cage is beneficial to an animal that "just sits there all the time." One of the more important benefits to a roomy cage is that it encourages the animal to not just sit there! Lethargy and boredom are not the friends of captive chondros, and anything you can do to stimulate your animals and encourage them to exercise and be active is important to long-term health. Small cages encourage the opposite behavior. They are also more prone to become stagnant, are soiled more quickly, can overheat more readily in the event of a thermostat failure, can become too warm when a fluorescent light is installed, and are visually less interesting and provide less opportunity for decor. Most importantly, it is nearly impossible to provide an adequate thermal gradient in a smaller cage. It is true that chondros can live in a cage with a uniform temperature as long as it is within acceptable parameters, but providing a gradient is highly desirable, and the wider the gradient the better, again within acceptable parameters. I do realize that many have the attitude that chondros will be fine in a small cage with little or no thermal gradient. This is not how I approach things, and I feel my results speak for themselves. If you use 36" x 24" x 24" as a minimum cage size for adults, you won't go wrong, and your chondros will thank you!

SHAPE

Shape can also impact important elements of chondro needs and husbandry. It is my belief that chondros benefit from cages oriented on a horizontal plane rather than a vertical one. This contradicts much of the advice given for arboreal caging. The utilization of tall cages may seem appropriate because chondros climb trees and shrubs, and because captive GTPs will frequently use the highest perch in the cage. This is more than likely due to the fact that it makes them feel secure, and it stands to reason that wild chondros may escape from threats real or imagined by being upwardly mobile. However, both wild and captive chondros will also take refuge at ground level and frequently can be observed prowling and resting on land. But the arboreal nature of GTPs has created a tendency for some keepers to utilize tall, vertically oriented caging. While this will not necessarily harm the animals, I do not feel it is the best design for an arboreal cage.

It has been my observation that most chondros will ignore a vertical thermal gradient and will select the perch that makes them feel most secure regardless of whether or not that location is within the ideal temperature range. In fact, many reptiles will trade proper temps for a hiding place that is too warm or cool if they feel exposed and must choose one over the other. Most chondros will select the perch in the highest part of their cage, and they seem to gravitate to that location by nature. With a tall, narrow cage, the chondros will have to accept the temperature at the top, and it is difficult to provide a horizontal gradient in a tall cage unless the cage is both tall and wide. This makes the cage excessively large and impractical, with too cool a floor level temperature. I consider the floor in my cages a part of the total environment usable by the animal, and this area should be warm enough, although it will usually be the coolest part of the cage.

Tall enclosures are often difficult to humidify as well, as the damp substrate is too far from the heat source. Rather than evaporating moisture into the air, it simply stays wet and contributes little to the cage humidity. Much more will be said about humidity in the next chapter.

This cage demonstrates all the elements of good design: Adequate size, horizontal orientation, easy access, adequate ventilation, good visibility, and attractive appearance.

Because of these considerations, I feel that a horizontal cage, wider than it is tall, is more practical and is better utilized by the animals than a tall, narrow cage. In such a horizontal setup, one perch can be installed that spans the length of the enclosure. This perch is located in the top third of the cage, and when a heat panel is installed at one end the animal has both a heat gradient and the highest perch in the cage! This seems so simple, yet we continue to see tall, narrow cages being used to house arboreal snakes. I prefer my cages to be shaped so that the entire cage can be accessed easily, with no hidden areas for the animals to hide or defecate in, and in such a way that the animals can use the entire interior space, including the floor.

ACCESS

A good cage will feature easy and broad accessibility to the entire interior. A cage that is difficult to get into, or has limited access to some parts of the interior, is a pain in the keister and will be a source of daily irritation to the keeper. Chondros have a gift for soiling the least accessible part of the cage. Top opening cages, in addition to being less than ideal in terms of providing a good environment, are often not user friendly. A top door requires room above it to lift open, and also necessitates approaching the animal from above to perform maintenance. Some chondros find this intimidating, and they may strike out of fear. Some cages open

from the side, and this can make it difficult to access the far end of the cage unless both sides open. Such cages are also limited to placement in locations where the ends are not blocked by walls or other cages.

I greatly prefer front opening cages, and there are two widely used types of doors: hinged and sliding glass. After using both types for many years, I have come to prefer sliding glass doors. The reasons include more controlled access, better visibility, the convenience of not having an open door to contend with when cleaning and feeding, ease of cage construction, and often less weight. Sliding glass allows the keeper to have very controlled, incremental access to one-half or even less of the cage interior, while a door requires the entire cage to be exposed at once, and also requires space to swing open which can be an issue in tight areas.

Sliding glass doors have no frame to block the view of the cage interior and can be lifted out and removed for easy access when cleaning or stripping down the cage. They also contribute to cage ventilation by allowing some air exchange where the panels overlap. On the down side, sliding glass doors can be more prone to accidental breakage and are a bit less secure, although neither concern is a problem when proper care is exercised. If using hinged doors, I prefer a bottom, rather than a side hinge. This allows an incremental access to the horizontal span of the cage along the top edge of the partially open door.

VENTILATION

Adequate ventilation is an important design element when considering chondro caging. Insufficient ventilation is unhealthy and will contribute to a stale, stagnant cage atmosphere that stays too wet and grows mold and mildew. Too much ventilation will prevent you from being able to maintain adequate humidity. Many commercial plastic cages have too much ventilation built into them, and in most areas of the US, the vents and other openings must be partially covered to allow adequate humidity to develop. In fact, you will need to tailor the amount of ventilation in your cages to your local climate, and even from season to season. In Ohio, where my home is, we experience wide seasonal shifts in the relative humidity. I heat with wood, which makes the air in my house very dry in the winter; and in the heat of summer I use air conditioning, which also dries the air. The only periods of the year when my house has approximately the same level of relative humidity as the outdoors is in the spring and fall. Consequently, I make adjustments throughout the year to cage ventilation (and spraying cycles) to compensate for current conditions. Details about this are covered in the next chapter, but we are concerned here with the principles of cage design that will allow such adjustments to be made and that will make it easier to manage humidity.

A good rule of thumb is to plan for just a little more ventilation than you need, and then regulate it slightly. You will need to experiment with your cages until you find a good balance that allows you to build and maintain high daily humidity but still allows the cage to dry out overnight. If your cage has high humidity all the time, with heavy condensation on the glass or mold and mildew developing on

cage fixtures or the substrate, you may need to increase the ventilation and/or decrease spraying cycles. Since most cage designs have rather generous ventilation, it is more common to have to decrease the air exchange to establish the correct balance. The easiest way to decrease cage ventilation is to cover up some of the cage openings with plastic. Heavy-duty clear freezer bags can be cut to size and used for this purpose, but any plastic heavy enough not to tear easily will do. Install these over some or all of the screened areas, using clear tape, on the outside of the cages. (Never use tape inside a chondro cage!) Experiment until you find the right balance. You can also build fewer vent openings into your cages if you make them yourself, after you find out what works well in your area.

I recently began making my own cages with two vents rather than four, because I always ended up covering two of them anyway. Some vents have louvers or slides that can partially or completely close them off, making adjustments easy. If you need more ventilation in a commercially manufactured cage, you can usually drill small holes somewhere, or even cut out more openings and install your own vents.

There are many kinds of small plastic vents that you can buy for installation in chondro cages. The vents I use are made to provide cooling for audio and video equipment cabinets, where heat tends to build up to excessive amounts. They measure about 8 inches long and 3 inches wide, and have small non-moving louvers that no chondro could get through. Two of these do a good job in my cages, and I cover one of them with clear Plexiglas inserts cut to fit, in the driest parts of the year. You can look for vents in home improvement stores or hardware catalogs. Most are easy to install; you just cut an opening of predetermined dimensions and pop in the vent. Since warm air rises, some cage builders like to have vents at the floor level and at the top, with the idea that natural airflow will draw in through the lower vent. If you do this, make sure to keep the lower vents high enough so that spilled water and substrate material won’t go through them. I like to locate my vents in the cage back rather than in the sides, because I locate many cages side by side, which would hinder good air flow. Some feel that rear ventilation is poor if the cages are placed along a wall, as they usually are, but I have not found this to be a problem. The cages can always be placed a few inches away from the wall if there is a concern. Avoid locating ventilation in the tops of cages; the heat loss can be excessive, and top ventilation also precludes stacking. Remember that sliding glass doors allow some air to flow between them, adding to the fresh air exchange inside the cage.

Many chondros will use the cage floor as a resting place, and this should be considered when choosing a cage shape and design. Many tall cages are too cool at floor level, making them unsuitable for ground use and allowing the substrate to stay wet.

Most new cage builders tend to go overboard when allowing for ventilation, and many keepers have an exaggerated idea of how much ventilation snakes require. As noted previously, a stagnant cage atmosphere is to be avoided, but snakes do not need a huge quantity of airflow to be happy and healthy, and chondros will suffer if the cage ventilation doesn't allow adequate levels of humidity to be maintained.

Normal household wall vents, installed as part of the heating and cooling system in many homes, are much too large and allow too much air exchange in most areas of the US.

VISIBILITY

We keep chondros in large part because they are so beautiful, so it makes sense that many keepers place a premium on visibility when choosing caging. Visibility is more than just an aesthetic consideration, however; it is important to be able to see well into the cage interior to perform routine husbandry and feeding duties, as well as to make frequent inspections to determine the well-being of the animals. As mentioned above, sliding glass doors provide slightly better cage visibility than hinged doors. Visibility can be taken to an extreme, and I am not a fan of

enclosures that expose the animals to view from many directions. I prefer to use real glass, of double strength thickness, in my cages. Plexiglas scratches easily and flexes excessively, so it's not the best choice for cage doors. Plate or safety glass is expensive and unnecessary for chondro cages.

Appearance

There is no need to house chondros in unattractive cages or those with bare, drab interiors. While many commercial cages are not all that attractive in my opinion, they can at least be set up with an interior that is pleasant to the eye and healthy for the snake. On the other hand, custom-made cages can be as attractive as the skills and budget of the builder allow. In either situation, complicated and elaborate cage plantings and decorations are best avoided. My friend Harry Grant has designed an enclosure that he calls a True Rainforest cage, and his creativity and thoughtful design is the ultimate example of combining aesthetics and function. It is entirely possible to make an attractive "natural looking" cage interior that remains easy to clean and maintain – more on this and Harry's rain forest cages in the next chapter.

Too many keepers who are interested in such an enclosure simply fill the cage with plants, bark, grapevines, and moss without considering the difficulty they may have with keeping the cage sanitary or even being able to find the animal in it. Naturalistic vivaria require careful planning.

Many commercial cages are white or other light colors, and for years I used white Melamine board to make my cages. I have come to prefer dark-colored cage interiors. Dark cages tend to accentuate the colors of the snakes better than white cages, and I feel that they tend to make the snakes feel more secure. The most important consideration when designing the appearance of your cage is to keep the needs of the chondros uppermost in your thinking and let your personal tastes take second place if there is a conflict.

Using Plastic Tubs to House Chondros

The comments of critics aside, plastic tubs make outstanding enclosures for young chondros, and in fact are superior to any other type of cage for raising hatchlings and yearlings. Tubs do have a couple of disadvantages, namely that they are top opening and are mostly translucent and do not provide exceptional visibility from a display standpoint. However, the first issue becomes much less of a concern when a rack is used to hold and heat the tubs. Plastic tubs are very economical in both cost and space usage, and they perform so well in virtually all other respects that the visibility issue should be kept in perspective. The goal is to provide the best possible environment for delicate babies, and displaying them is not the top consideration. When you combine the low cost, ready accessibility of tubs of many sizes, ease of cleaning and disinfecting, and the ease with which tubs allow a humid environment to be maintained, it is hard to make a good argument against them. People who feel that keeping chondros in plastic tubs is cruel are exchanging human sentiment for the clear evidence that young chondros thrive in tubs and benefit greatly from the security they afford.

A “true rain forest cage” designed and built by Harry Grant. Such intricate cages are not recommended for the average keeper, but Harry is skilled at setting them up to function well. More on these cages in the next chapter. Photo by Harry Grant.

You can set up single tubs, with heating and access provided at the top via the snap-on lid, or you can make or buy specially designed rack cabinets with built-in heat tapes that allow slide-out, lidless access to the tubs. I greatly prefer the latter because I work with large numbers of animals, but either method works well, and I have published plans for making racks and individual setups on my web site. See the Resources section (Appendix B) for the address. Many keepers use an aluminum reflector with a red light bulb to heat individual tubs, placing this over a screened opening in the lid, but a small, thermostatically controlled heat panel would work as well, if the tub were large enough. Drill small holes in the sides and ends of the tubs to provide ventilation. The quantity of these can be determined by experimentation. I drill 1/8-inch holes about an inch apart in three rows on all four sides of my rack tubs. When using lids with individual tub setups, it is a good idea to secure the lid at both ends with small clamps, available at office supply stores. I transfer my hatchlings from a shoebox-size tub to a three-gallon tub when they are about six to eight months old, and from the three-gallon size to an adult display cage when they are about fourteen to eighteen months old depending on individual growth rates. Even adults can be kept nicely in very large tubs, but once the animals develop adult colors, I like to place them in a setup that allows good visibility. When housing chondros of any age in plastic tubs, it is important to take the time to open each tub and inspect the animal at least once daily. Glass fronted cages make inspecting a group of adults much faster and more enjoyable and make a much better display, so I don’t use tubs to house adults.

The author uses two sizes of plastic tubs to raise young chondros: Shoe boxes for hatchlings and three-gallon tubs for yearlings. Warmth is provided by heat tape that runs under the rows of tubs, and a thermostat regulates the temperature.

In this chapter, we have covered the essentials of good cage materials and design. However, even the best cages won't perform well if the keeper doesn't understand how to manipulate and maintain the correct interior environment. In the

next chapter, we will examine the various aspects of cage thermodynamics in order to utilize them to achieve the desired results.

A simple setup can be made from inexpensive department store items. Always use a thermometer and a thermostat when making a tub enclosure. A rack is the best way to house tubs.

CHAPTER 10. PROVIDING PROPER CAGEENVIRONMENT

"The history of life on Earth has been a history of interaction between living things and their surroundings."

Rachel Carson

Having well-designed cages that allow the keeper to easily provide for the needs of GTPs is an important first step in chondro husbandry. Understanding these needs and knowing how to use your equipment to provide them, goes to the heart of the matter. Having well-designed cages does not automatically mean that they will function flawlessly; any cage must be set up and used with the ambient temperature and humidity of the facility in mind. I once visited a collection that had plastic cages from several manufacturers in place, as well as some custom Melamine units. The owner expressed frustration that none of them would hold humidity properly. The cages were in a cold basement, some had excessive ventilation, and the heaters were running at full power to keep the cages warm enough. This caused the cages to dry quickly with little buildup of humidity. This keeper suffered from a common lack of understanding about the relationships of air flow, temperatures inside and outside the cages, evaporation, and other key factors that affect cage performance. A basic comprehension of cage thermodynamics is necessary for your cages to adequately meet the needs of chondros. In this chapter, we will discuss these needs and I hope to equip you to meet them. The good news is that this is not difficult, and we don't need to be physicists to get the job done! Often just a little tweaking of some element of cage setup or use will make a big difference. The information presented is based on an understanding and acceptance of the principles of good cage design that were detailed in Chapter 8, and therefore we will not cover ways to overcome bad design choices here.

Chondros are special snakes, and they have some specialized needs that must be met in order for them to thrive. These needs may not difficult to provide for, but they are not optional. Chondros come from a part of the world that is tropical, humid, wet, and equatorial. This means that they need an environment that is relatively stable and warm, with adequate hydration and humidity, and a balanced photoperiod; that is, approximately twelve hours each of day and night. They are highly nocturnal, so they do best when provided with a dark, relatively undisturbed nighttime period. They are more delicate than many other kinds of pythons, and must be kept in sanitary conditions. Before we examine each of these topics in detail, it should be noted that the principles of good GTP husbandry in this section relate mostly to captive bred animals. Wild chondros may have differing temperature and humidity needs based on the habitat they came from. This is one possible reason why WC chondros often fail to thrive or breed, and why they are a poor choice for the average hobbyist. Such animals are best reserved for very experienced breeders who are equipped to deal with such challenges and have valid reasons for doing so.

TEMPERATURE

Chondros do best when given a choice of thermal gradients within a specific range within their enclosures. In the size of the adult cages I use and that were described in the previous chapter, both a horizontal and a small vertical temperature gradient can be established, as long as the cage is located in a room that is sufficiently cool but not too cold. I am not an advocate of heated rooms, because it is not possible to provide much, if any, thermal cage gradient when the entire room is heated to cage temperatures. For this reason, I keep my chondro areas relatively cool and provide my cages and tubs with a basking area. The cooler the cage location, the greater the thermal gradient that can be established, so long as the location is not so cool that the cage heaters struggle to maintain the proper temperature. The ambient temperature in my main room is from 72° to 78°F day and night, unless I am cycling for breeding. This allows me to maintain cage gradients of approximately 75° to 90°F, with an average temperature of 84° to 86°F. Most chondros will seek out temperatures in this range as long as they feel secure. Some will choose cooler temperatures if they feel the location affords them more security. For this reason, it is important to maintain even the coolest parts of the cage at a safe minimum.

I don't like to allow my cages to be cooler than 75° to 78°F in any one spot, or warmer than 89° in the basking area. Again, an ideal average is 84° to 86°F. Individual chondros have individual thermal preferences which can change during feeding and shed cycles. To quote the children's nursery rhyme, "Some like it hot, some like it cold." The important point is to allow the animals a choice and to make sure they are comfortable where they choose to spend the most time. A nighttime drop of a few degrees is acceptable, but not essential. Unless the animals are being thermally cycled for breeding, they should not be cooled at night, with 72°F being a safe low point for adults. I keep my young animals warmer than this, and make no special effort to drop nighttime temperatures for animals of any age, other than when breeding. Some will argue that providing nighttime heat isn't natural, but the chondros will thrive without any night drop, and I feel I get a better breeding response when I initiate cycling if the animals have been maintained without any nighttime cooling the rest of the year.

There are several types of heating devices commonly used for reptile cages, including light bulbs, ceramic heaters, heat tape and heat pads, and heat panels. Some keepers of arboreal snakes use heated perches, running a length of heat tape inside PVC pipe, but I do not recommend this. It provides no gradient and forces the animal to coil on a heated surface, which is neither necessary nor even desirable. If you use light bulbs to provide heat, use red colored bulbs, because they will not disrupt nocturnal cycles. Ceramic reptile heaters are even better than light bulbs, because they do not emit any light to interrupt the nocturnal cycle, don't break, and last longer. But ceramic heaters can cause severe animal burns when used inside cages and have largely been made obsolete by the introduction of heat panels. In fact, heat panels are probably the only safe in-cage heating devices for arboreal snakes. I use and highly recommend panels sold by Pro Products of Mahopac, NY. (See Appendix B for contact information.) Pro Products panels are

superior to other brands because they mount more securely, have a signal strength indicator light, come with the longest warranty in the business, and don't have any lip for snakes to hang on. They are also constructed of non-toxic materials that won't outgas chemicals when heated, unlike some plastics.

Pro Products heat panel used by the author in all of his adult cages.

In my opinion, heat tape is best used for heating racks holding smallor medium-sized tubs, and is excellent for that purpose. No matter what kind of heater is used, it is a good idea to use the smallest size or wattage rating that will get the job done. This may prevent a fatal level of heat buildup or even a fire in the event of a thermostat malfunction. Keep in mind that when using fluorescent lighting inside your cages, the heat generated by the ballast will raise the cage temperature several degrees.

All heat devices must be thermostatically controlled, and using proportional type thermostats that trickle electrical pulses to the heat device is highly recommended. These are much better than mechanical on-off-type thermostats, which require a fluctuation of several degrees to actuate. "Wafer" thermostats that are sometimes seen on inexpensive incubators are an example of the latter, and should be avoided on both cages and incubators. There are several brands of proportional thermostats that are popular with chondro keepers. The Helix Basic System and the Helix DBS-1000 are widely used to control cage heaters, and Herpstat by Spyder Robotics is a newer thermostat that seems very well designed.

Chondros do best in a stable environment, so locate cages in an area that does not experience wide temperature swings or drafts. When I say stable, I do not mean to infer static unchanging cage temperatures; rather, I am saying that constant thermal fluctuation and inconsistent cage conditions should be avoided. Adult chondros can sustain sharp drops in temperature, so long as they are temporary, such as during a power outage in cold weather. Back-up heat or electricity must be in place for outages of more than a few hours. Younger animals with less developed immune systems should never be subjected to drastic drops in

temperature. The purchase of a small portable generator is good insurance for the chondro keeper – it buys a lot of peace of mind.

HUMIDITY

This is perhaps the most intimidating and confusing aspect of chondro husbandry for new or prospective owners, and a plethora of questionable advice via the Internet has not helped resolve the issue. Gauging and providing an adequate level of cage humidity tends to cause new keepers an unnecessary amount of worry, and some believe that precise measurements are required or else the pythons will suffer or possibly even die. This is far from the truth! The fact is, while chondros do need moderate humidity levels to do well and will suffer eventually if kept too dry, the exact amount of humidity is not critical. After all, relative humidity is "relative." Humidity is the measure of water vapor in the air, and warmer air can hold more water vapor than cooler air. Also, a smaller volume of air saturates more quickly than a large volume, and the amount of fresh air exchange will also greatly affect the level of moisture build-up. This is why it is impractical to give specific percentages of humidity, although we can give a specific temperature. Temperature is not relative; 85 will always be the same in my cage as it is in yours. But if our cages are not matched in size, temperature, ventilation, and other factors that affect cage humidity, including local climate, we will have a difficult time comparing data. For this reason, I don't use hygrometers (a device that measures relative humidity) in my cages, nor do I strive to hit certain percentage numbers. It really isn't that critical. (By the way, cheap department store hygrometers are nearly worthless. You don't need them.)

A common misconception is that green tree pythons need constant high humidity, near 100% saturation. This is not only erroneous but also can be dangerous to the animals. A constantly damp, warm cage is a perfect environment for the growth of bacteria and mold. Skin infections and respiratory problems can result from keeping chondros in these conditions. What you need to establish is a twenty-four hour cycle, with a period of high humidity followed by a slow drying out of the cage or tub. This is usually accomplished by daily misting or spraying cycles. The goal is to build humidity to near 100% saturation just after spraying and then allow it to slowly decrease over the rest of the day or night, repeating the cycle each day. Other than tubs housing new hatchlings or enclosures with opaque animals of any age, it is important to allow the cage and the animals to dry between sprayings. A wet, sauna-type atmosphere is to be avoided. Using a substrate that retains moisture and slowly evaporates it into the air will help maintain a moderate humidity level during the dry period.

Temperature, ventilation, the amount of moisture you introduce to the cage via the substrate and daily spraying, along with the relative humidity inside of your house, are the most important factors that control how humid your cages will be. Since temperature is predetermined within an appropriate range, humidity should then be regulated by finding a good balance between the amount of ventilation and the quantity of moisture added by you. There are no absolute formulas that can be

provided, because each situation is unique. Each keeper must discover, through some experimentation, the right balance for his or her own conditions. If your cages are dry, with no condensation or fogging on the glass three hours after you have sprayed them, then you are spraying too lightly or there is too much ventilation for existing conditions. Conversely, if the condensation never goes away or you have mildew or mold growth, then you are adding too much moisture or your ventilation is inadequate. Often, adjusting both factors will bring about the best results, and as a general rule, it is better to have ample ventilation and spray more heavily than to seal up a cage so that only light misting is needed. If you spray heavily and the cage dries quickly, the air exchange is excessive.

These cages are showing a buildup of high humidity following daily spraying. The humidity should sustain for a few hours before slowly decreasing over the next twelve hours or so, and the cages should dry considerably by the beginning of the next cycle. If the cage glass isn't fogging, the humidity isn't building adequately.

It is also worth noting that simply having wet substrate is not the same as having good humidity. I have seen cages with excessive ventilation that had sopping wet substrate but very low humidity. Remember, humidity is the measure of water vapor *in the air*, not how wet your cage is. For this reason, the practice of using water as a substrate to boost humidity is not a good idea, and it introduces other problems (see my comments in the substrate section). However, a good absorbent substrate can greatly assist in maintaining good humidity between sprayings. If you have your spraying-to-ventilation ratio correct, you should be able to thoroughly wet (but not soak) the cage interior, including the perches, substrate, walls, plants, and chondros, and observe a building up of near 100%

humidity for several hours, followed by a gradual drying off period. The drying out part of this twenty-four hour cycle should allow the cage to dry considerably, but not completely, by the beginning of the cycle the following day. I usually spray in the afternoon, but other than avoiding spraying at night, the time isn't critical. (Chondros are very active at night, and spraying after dark can pose a danger to you and the animals.)

The exception to this is for opaque animals. Detailed information about this will be provided in Chapter 11, but suffice it to say that during the entire shed cycle, and especially the last day or so prior to sloughing, chondros need to be kept at an elevated humidity level. This is especially important for hatchlings, which have a very thin skin that easily dries on them, potentially causing serious health consequences. In fact, I do not allow hatchling tubs to dry completely between spray cycles, although a fluctuating humidity cycle is recommended for them too. Once the animals are several months old and have shown some noticeable growth, keeping them on damp substrate at all times is not as critical.

Except for very young chondros or those that are opaque, going a few days without being sprayed presents no big problems for healthy GTPs. If you are going to be gone from home more than two or three days, or if you have baby or shedding chondros, get a friend to spray for you, having them perform the duty at least once with you present so they can get a feel for the proper technique. Having such a person can ease a lot of stress when you need to be gone.

I am not a big fan of automatic misting systems, or in-cage waterfalls, foggers, or bubbling devices. These things can all malfunction, and in my experience with misting systems, can require more maintenance than they are worth. Running such devices in multiple cages can be problematic, because no two cages will need exactly the same amount of spraying, even if they appear to be identical. If you have a multiple cage setup, you will quickly learn which cages need a bit more moisture and which ones need a bit less. Also, misting by hand gives the keeper a time every day to check each cage and animal. Automated systems can encourage us to become lazy and perhaps a bit sloppy with daily husbandry. Nevertheless, some keepers like these systems and find them useful. This is a personal preference, and as long as the animals have adequate humidity and are shedding well, then whatever works best for each individual is good. Automated misting systems are best used by experienced keepers who have a full working knowledge of the needs of the animals, as well as how the cages being used will perform. If a proper relationship between ventilation and misting is developed and maintained, there is no need for special devices to introduce supplemental humidity. Remember: For those starting out, simple is better!

Drinking Water

Chondros drink water two ways: From a bowl, and by licking drops from off of themselves or cage fixtures. Some animals prefer one over the other, and some use both sources. I occasionally observe animals drinking from bowls just after the lights go out, but this is by happen-stance and not something I worry about. In fact,

many animals are rarely observed drinking water but still appear sleek and healthy, with normal moist defecations. The point is, just because you don't often see a chondro drink doesn't mean it isn't drinking. Since all chondros may potentially drink water drops off themselves, it is a good practice to mist directly on the animals during spraying, affording them the opportunity for a daily drink if they choose to take it. It is my feeling and observation that chondros, like most wild animals, are quite adept at sensing and locating water, and there is little chance of dehydration if healthy animals are given a daily misting along with fresh water in a bowl. Providing a properly humidified environment is also important to hydration. Suggestions that chondros lick water from themselves because they are dehydrated, or that spraying chondros teaches them to "forget" how to drink from a dish, are without foundation.

"Buttermilk" (EB-95-31) is licking drops from her coils a few minutes after being sprayed. You can see where her dry head was buried while it was "raining." I make sure to spray each animal along with the cage interior.

Of course, the quality of the water used for spraying is important; in fact, as significant as the water provided in the bowl. Unless you have really poor tap water, your household drinking water should be fine. If you don't drink your tap water, it may be a good idea to give the chondros what you use yourself. I use reverse-osmosis (RO) filtered water for both drinking and spraying, and while the results are not scientifically conclusive, I have noticed a virtual elimination of the kidney problems that I experienced occasionally with hatchlings when I was using softened well water. RO filtered water has a nice side benefit when used for cage spraying: It will not stain your cage glass with mineral deposits the way most tap

and well water does. There has been some concern about using RO or distilled water for reptiles because of a lack of minerals in the former, and a negative electrical charge in the latter that presumably leach good nutrients from the animals that drink it. It is my feeling that snakes get all the minerals they need from eating healthy prey items, and my young animals have been thriving on RO water for over four years. I have never used distilled water, and it may be wiser to buy spring water rather than distilled if you are buying and have a choice. A Brita, or other home filtering device, is an inexpensive way to provide quality drinking water for chondros.

Water bowls filled with cool water should be located in a cool corner of the cage, not over or under a heat source. Some keepers advocate placing water bowls on top of heat pads or heat tape to increase humidity. I don't care much for this approach – who wants to drink warm water? Warm water also grows bacteria more quickly than cool water.

The water bowl does not need to be excessively large. When I first began keeping arboreal snakes, I used large plastic tubs for water in the belief that this would help humidify the cage. All this actually did was make providing clean water more difficult, as the tubs full of water were quite heavy to carry around, which just tended to make me put off cleaning them and filling them with fresh water. A bowl that is ten to twelve inches in diameter is fine for adult chondros, and smaller animals can have proportionately smaller bowls. Keeping clean water available for your chondros is much more important than the size of the bowl, and disinfecting water bowls and spray systems regularly is important.

Another idea put forth is the use of elevated drinking containers. In my opinion this is a solution looking for a problem that doesn't exist, and is rooted in a belief that chondros tend to be easily dehydrated. Since they spend most of the time perched on an elevated roost, the thought is that giving them an elevated drinking bowl will encourage them to drink more. First, I do not believe that when set up and maintained as described in this chapter, chondros have any tendency toward dehydration. Second, I've never observed chondros having any problems finding or using water bowls. Your goal is to stimulate activity, and providing for every need right under your animals' noses may contribute to lethargy. Who puts elevated water bowls in the trees for them in Indonesia? I see no need to do this, and it is one more idea that tends to complicate what is really a pretty simple husbandry issue.

LIGHTING

Chondros do not seem to need any special lighting to be healthy and will thrive in large tubs for years with nothing more than normal room lighting. They get all the nutrition they require from eating healthy prey items and do not need full spectrum lighting (or vitamins) as some reptiles do. There is some circumstantial evidence that exposing chondros suffering from respiratory infections to full-spectrum lighting may aid in a cure (Hickner, pers. comm.), and using these lights do help to provide a more natural-looking environment than standard white fluorescent bulbs.

There is another good reason to use full-spectrum lights in your cages aside from any possible health benefits: Chondros often look their best when displayed under certain kinds of full spectrum fluorescent lighting, and in fact can appear to be much less colorful than they really are when viewed under some common types of indoor lighting. For example, the beautiful blue colors on some animals are rendered almost completely invisible by yellowish incandescent light bulbs.

18” fluorescent light used by the author in his adult cages. The stock white bulb is replaced with a full-spectrum bulb, and the diffuser (shown in the foreground) is discarded.

Normal white fluorescent bulbs also render many colors less visible to the eye. Any chondro looks its best when seen outside under overcast skies (or in the shade where the direct sun doesn’t wash out the colors); this is “full spectrum” lighting in pure form. There are some fluorescent bulbs that closely replicate this lighting and can help show your animals off with a simulated outdoor appearance. I use a bulb made for tropical fish aquariums, and I have tried several others from a few different companies that gave satisfactory results. Different bulbs emphasize various parts of the color spectrum and some create a purple or yellow cast. I avoid these, using bulbs that make my animals appear as close to their natural color as possible.

In my cages I use low wattage fluorescent fixtures that take an 18-inch bulb and have an on/off switch that allows a timer to be used. Rocker, or “push, hold, and release” type switches can’t be activated with a timer. Care must be taken to ensure that using such a fixture doesn’t overheat your cage, as these units do put out some ambient heat. This is one more argument against using small adult cages. In larger cages, the heat generated from fluorescent lights is much less a factor.

You should establish a twelve-hour photoperiod in your chondro area, whether you install lights in your cages or not. Since GTPs are from the equatorial tropics, they are naturally accustomed to a photocycle that is roughly divided into two equal halves, that is, twelve hours of light and twelve hours of darkness. Near the equator, this cycle is in place year round and not subject to seasonal changes as in

southern and northern latitudes. While there is no evidence I'm aware of that mandates this same cycle be provided for captive chondros, it does make sense to do so. At the very least the animals should have a consistent nighttime period of adequate duration, where they are undisturbed by ancillary lighting or much human activity. Being nocturnal, chondros are alert and in hunting mode when the lights go out, and some will be nervous and stressed by a lot of motion in front of their cages at this time. Others will strike at the glass or shadows on the cage interior and possibly injure themselves, not out of aggression but as a result of the strong feeding response that most chondros exhibit at night. This is usually true even of specimens that are quite calm by day.

The natural outside photoperiod where you live will probably affect the seasonal behavior of your animals to some degree too, and my animals seem to be aware of local conditions even when no ambient outdoor lighting is visible. This issue doesn't seem to be important, other than possibly affecting the timing of males going off feed in seasonal patterns. Some of my animals are exposed to the visible outdoor photoperiod and some are in a room with no exposure. My observation is that males go off feed at about the same time of year regardless of location, but I do see a slightly different pattern of behavior in those animals exposed to seasonal variations in the natural outdoor photoperiod. I don't make any conscious effort to adjust to natural changes in the photoperiod, and all my cage and room lights are on the same schedule year round. My lights come on at 8:00 AM and turn off at 8:00 PM. This schedule is based on personal preference, but it does coincide with the average natural photoperiod where I live. Use timers to provide a consistent daily photoperiod in cages and rooms, rather than manually switching lights on and off yourself. Chondros are creatures of habit and need consistency to be content. If my timers fail and the room lights stay on past "wake up time," my chondros all look at me as if to say, "Hey! What gives?"

It is my opinion that manipulating the photoperiod artificially does not affect breeding cycles to any noticeable extent.

SUBSTRATE

There are several kinds of cage substrates that will work in chondro cages, including some that are manufactured specifically for use with reptiles. I have experimented with a few of these, and there are some recently introduced products that I have not tried. My own conclusion, and those of friends who have tried some of the products I have not, is that most of these are messy or fail to perform successfully in one way or another. In my experience, there are two chondro cage substrates that shine above all others – newspaper and red Cypress mulch.

Red Cypress mulch makes a good substrate for arboreal cages housing adult animals. It is generally available from nurseries and many convenience stores year round in many parts of the US.

Newspaper is cheap, readily accessible, holds moisture well, and is easily changed. It provides a sanitary, fresh cage floor covering each time it is changed. It can be folded or cut to fit cages or tubs. I use newspaper in all my hatchling and yearling tubs, and also in my older Melamine cages that would be compromised by continuous contact with damp mulch. I cut newspaper to fit my hatchling tubs on an office type paper cutter, allowing just a bit of excess so the paper folds up slightly in the sides and corners, which is where defecations often occur. A local store gives me all of their leftover Sunday newspapers, so I get all I need for free. Many stores throw away unsold papers once they cut the header off the front page for credit. Other than the lack of cosmetic appeal, I don't think there is a better cage substrate than newspaper.

The one exception to my use of newspaper is in tubs housing yellow neonates, which tend to get black printer's ink all over their faces when burrowing into damp newspaper. Printer's ink, being soy-based, is harmless to reptiles, but it looks bad on yellow faces. For these babies, I use white Bounty paper towels. I like white towels with no dyed pattern on them, and Bounty is thick enough to hold up well and stay damp. Paper towels will grow mold faster than newspaper and will have to be changed more often if you use them, but they do keep little yellow faces yellow!

My other favorite substrate is red Cypress mulch, and I use it in all my adult cages. In my neck of the woods, Cypress mulch is available year round from virtually every gas station and convenience store. It can also be obtained in the

outdoor section of large do-it-yourself stores and from nurseries. Cypress mulch is attractive, smells great, holds moisture wonderfully, is resistant to mold and insects, and is cheap. It is easily spot-cleaned when soiled. About the only negative thing that can be said is that mulch tends to be messy to work with, but a shop vacuum makes a quick job of cleaning up. There has been some discussion about the danger of chondros ingesting mulch or other similar substrate materials when eating, leading to blockages of the GI tract. While I share the common concern that most keepers feel about this and take care to prevent it from getting into my animals' mouths, experience does not indicate that the threat is real. Wild snakes must certainly ingest foreign debris when eating, and I have never seen an actual case of ingested substrate causing any harm to a snake in my care, extending back over thirty years. (For more on this, see the feeding section in Chapter 11.) I thoroughly spot-clean soiled mulch and occasionally replace the entire cage floor with fresh mulch, such as when stripping down the cage for a new occupant, or when the mulch looks old and stale. This is not very often, and I find that Cypress mulch lasts a long time.

I avoid using substrates that are overly messy, tend to pack down and lose absorbency, absorb odors readily, grow mold quickly, stick to food items readily, do not hold moisture well, or may be toxic. These include, but are not limited to: Pea gravel, corncob bedding, pine shavings, cedar products, soil, and chunk-type bark mulch. Tomm Phillips reports that he stopped using finely ground coconut bark sold for use as a reptile substrate when he observed that roaming males were getting the product impacted in their gum lines, causing infections.

Also, I do not advocate the use of water as a substrate. Somewhere the idea got started that the best way to keep arboreals is over standing water. This is a bad idea because it is difficult to keep the water clean and it creates a condition where polluted water can easily be ingested by the animals. In my experience, using water as a substrate is ineffective for providing the correct amount of cage humidity. It is too easy to set up a sauna-like, unhealthy damp environment with no drying-out period; and if the floor-level temperature and air exchange are not conducive to evaporation, the water does little to affect the atmosphere. A wet cage floor is not the same thing as a humid cage environment.

PERCHES

Chondros, being mostly arboreal, need good solid perches of appropriate diameter. There are several types of commonly used perch material, and most work well. PVC plumbing pipe is frequently used for perches, and it is sold in several diameters. It is strong and easy to clean, and can be quickly mounted in a cage using end caps sold to match the pipe size. The caps can be screwed to the cage sides, and can be cut in half to make a cradle for the pipe that allows it to be removed easily. I confess to having a personal dislike for using PVC because it is so ugly, but it does work well. Some keepers improve the white appearance of PVC by scorching it with a gas torch, which singes the plastic to a brown color. Wood dowels from the hardware store are sometimes used, but I find that these

discolor and mildew quickly in the humid cage environment. Some keepers try to seal them to prevent this, but I do not like the thought of my animals coiling on polyurethane, even if it is fully cured. This type of sealed finish won't last, and there are better choices for perch material than dowel rods. (See comments on film finishes in Chapter 9.) Bamboo, acrylic, and fiberglass rods are also used for perches.

Natural wood branches are my perch material of choice for adult cages. I use Sugar Maple branches because they are non-toxic, locally abundant, grow in the sizes and configurations I need, and look very nice. I cut my branches from trees growing near meadows and clearings, because these trees have many low limbs that contain forks and side extensions that look nice, as well as allow a three-point installation that prevents rolling. I use only live-cut branches, because insects may live in dead ones. I scrub new branches under hot water with a stiff brush, and mount them in my cages using hooks and eyes, available from any good hardware store. The hooks screw into the ends of the branches and hang onto corresponding eyes in the cage walls.

Natural wood branches make safe and attractive perches for chondro cages. They provide a variety of angles and diameters, and the rough texture aids in shedding.

The use of hooks and eyes makes the installation and removal of perches easy.

These make secure mounts but are easily removable. There is no need to bake such branches to sterilize them, when used as described. Natural branches look great, provide a textured perch that the animals feel secure on, and have varying diameters so the animals can choose one they like. I should mention that I have no knowledge whatsoever about the missing lower limbs on my neighbor's trees.

Perches must be securely mounted so they don't roll, slip, or fall under the weight of the animals. Perches should be approximately the same diameter as the largest part of the snake's body that will be using them. Large adults should not be forced to use small diameter perches. An upper and lower perch will give the chondro some choice of where it wants to roost, but most chondros will select the highest spot in the cage. I provide a perch section under the heat panel for basking opportunities. If you install your perches so they are removable, you will thank yourself many times, especially if you make a hobby of photographing your animals.

X-shaped plastic perches made from coat hangers make good perches for baby tubs. These perches are inexpensive and easy to clean.

I have found that the best perches for babies and small yearlings are those made from plastic coat hangers. I buy bundles of these, then cut off the long bottom length and the two shorter sides for use. For small shoebox tubs I make a simple X from a long piece and a short piece, using a zip tie in the center. I flex the X-shaped perch a little past perpendicular and place it in the tub, where the spring action holds it in place. In my three-gallon tubs, I use a grid made of two long and two short sections, using zip ties to make a tic-tac-toe shaped assembly. Both of these are easily removed with the snakes still on them when replacing papers and water bowls. Recently a few innovative keepers have published suggestions on the ChondroWeb Forums for improved perches for babies. Two of the best involved making a self-standing jungle gym type of assembly that can be lifted out with the animal on it, and using a small butane lighter to heat-weld the joints of the plastic perches to replace the zip ties. This last tip would eliminate the possibility of a young animal pinching its tail in the juncture of the crossed perch parts.

Tic-tac-toe grid made from jumbo-size coat hangers for yearling tubs. It is easy to remove the grid (with the chondro on it) when cleaning the tub.

PLANTS

Plants make very attractive cage additions and they provide some welcome cover for the snakes. Live or silk plants can be used, depending on your level of commitment. Live plants must be pruned, watered, fertilized, and must have temperature and lighting conditions suited to them that are not necessarily ideal for chondros. Golden Pothos is a very common terrarium plant that is widely used in chondro cages. Some have great success with it, but after years of fooling with trying to keep it healthy and growing, I have given up and now use high quality silk Pothos. Perhaps my cages are too well lit for Pothos to do well; literature on houseplants suggests Pothos needs low lighting, and one hobbyist reports that it grows like crazy in a dark closet. However, I have also been told that in the tropics it grows wild in full sunlight. I can personally testify that silk Pothos thrives on air alone. If you do use live plants, make sure to select a safe, non-toxic kind.

All commercially grown houseplants have insecticide on them; so wash the leaves and stems well before placing them in cages. You may even want to repot them in new soil. Dipping the entire plant in a mild soap and water solution and then rinsing with clear water is a good way to get rid of all insecticide residues (Heller, pers. comm.). There are some very realistic looking silk Pothos and jungle-type plants available at better craft stores. These are not inexpensive, but

they generally hold up well and are easily disinfected. Cheaper synthetic plants may have green dye on them, which may wash off onto the substrate or perches. I used to insert the stems of my plants into green florists foam, burying this under the mulch. Recently I have discontinued this practice and merely stick the stems into the mulch. This makes removing the plants for cleaning quite easy, and they are easily replaced. I also hang vines from the cage ceiling, giving a pleasing "rain forest" look to the cages as well as providing cover for the perched chondros. Do not plant or decorate your cages so heavily that cleaning becomes difficult. A light to moderately planted cage looks nice, affords security to the animals, but is still relatively easy to keep clean. Keep in mind that mature males can become very active during breeding periods and may tear up decorated cages during nighttime prowling. It makes sense to use cage decorations that are easily restored or replaced.

High quality silk plants look very realistic in cages and they never turn yellow! Avoid cheap plants, they have a green dye on them that washes off when you spray. I especially like the vine-type plant on the right, and I suspend these from the cage ceiling.

Rain Forest Vivaria

I have seen some gorgeous vivaria that were heavily planted and decorated with live plants, moss, vines, and other natural-looking decorations. Many of these incorporate waterfalls, fogging or misting machines, and the like. While I am the first to admit that these are beautiful, I must say that such elaborate enclosures are

not recommended for most hobbyists as chondro habitats. They can be nearly impossible to keep clean, and may make it difficult to even observe the inhabitants. Good chondro caging mandates that the animals can be visually checked at all times, and getting an occasional glimpse of a secretive occupant is asking for eventual trouble.

A couple of years ago, I was pleased to make the acquaintance of a very interesting gentleman by the name of Harry Grant. Harry has designed an attractive and functional alternative to standard chondro caging, which he calls a True Rainforest cage. Harry wanted to design a total cage environment that replicated, as closely as possible, the natural habitat of wild chondros. He writes, *"This of course requires more than having a bunch of leaves and branches for them to hide in, it also requires many other environmental variables, such as: The right amount of air flow which creates microclimates throughout the cage, simulated rainfall, humidity variations, lighting effects (simulating dusk and dawn, for example), temperature variations from daytime highs to nighttime lows, cooling and much more. And last but not least, the cages themselves must be designed in such a way as to enable a keeper to easily clean and maintain them, in order to ensure the health of his charges…"*

To accomplish his ambitious goal, Harry begins with a standard plastic cage. He insulates the cage by installing Styrofoam sheeting to the exterior. A "rain" system is installed using a standard pump and garden watering nozzles and supplies obtained from do-it-yourself stores. Through a clever arrangement of valves, this rain-making installation can be set to operate in one, two, or three cages at a time or all at once; it can also be set to rain hard or softly in each cage independently. The system is tested and a 2" floor drain is installed where the water collects on the floor. (I love this guy! How many of us would have simply put the drain in the center of the cage floor and then tried to divert the water to the drain?)

Harry has a master "laboratory" cage that has heating, lighting, and supplemental humidity levels controlled by a Helix Super System. The Super System also controls the lighting in the other cages, but these all have individual Helix thermostats to regulate temperature. The lab cage can also be cooled to a preset level by the Super System. Probes in various locations of the lab cage indicate temperature and humidity levels. The Rainforest cages are fitted with fiberglass branches from Habitat Systems, and silk plants are used liberally to provide cover for the animals.

Often, the reaction Harry gets from someone seeing his cages for the first time is one of concern about how difficult they must be to clean. (I confess, this was my first thought!) Harry says that the key to sanitation in his Rainforest cages is to not use a substrate. The heavy amounts of water introduced to the cages would inevitably soak any substrate used, setting up a bacterial minefield and making cleaning messy and problematic. With a bare plastic floor, cleaning up defecations is easy using paper towels. The soiled area is then disinfected with diluted bleach. Leaves and branches can be spot-cleaned with paper towels as well. Harry points

out that his rain system and drain combo also makes it easy to simply hose down the interior of his cages.

Harry Grant's True Rainforest laboratory cage, fitted with heaters, spray nozzles, waterfall, floor drains, humidity system, dusk and dawn simulator, and heavy foliage. This is obviously a setup for the advanced hobbyist, and it is a fascinating illustration of the creativity and superb engineering of one GTP enthusiast. Photo courtesy of Harry Grant.

In my opinion, this kind of carefully planned setup is the way to go if a naturalistic rain forest environment is desired. Such a setup is not for beginners, and Harry obviously has a deep rooted understanding of the needs of captive tree pythons. While it is doubtful that any artificial indoor setup could truly replicate the diversity of nature, this kind of cage would provide a stimulating environment for the snakes and a wonderful source of visual enjoyment and husbandry interaction for the keeper. Concern for the majority of my readers, who may not have the time or expertise to build and oversee such a setup, requires me to state unequivocally that green tree pythons do not need this kind of cage environment to thrive. However, Harry Grant's cages represent the kind of innovative thinking that an experienced keeper can use to do something really cool and different. Who knows what new things Harry and others like him may discover about GTP behaviors as they experiment with new techniques?

Cleaning and Maintenance

It is a good practice to make a habit of checking your animals first thing each morning and the last thing each evening, at a minimum. Morning inspection includes a cursory check of cage temperatures, looking to see if any animals have defecated, especially in water bowls, and to make sure that all is well in each cage. Prolapse usually takes place overnight, and although cases are infrequent, a quick discovery and treatment of this condition is essential to ensuring a good recovery.

For this reason alone, a morning inspection is a very good idea. Some keepers spray at this time as well. Spraying time is not critical, or even important, and does not need to be performed to a set routine. After all, it doesn't rain at the same time each day. Mixing up the routine can encourage activity and help discourage lethargy. If possible, clean soiled cages when they are discovered, not just on cleaning day. At the very least, clean out defecations the same day they are made, and immediately remove any water bowls that have been contaminated with feces, even if you can't disinfect them on the spot. Remove and record any sheds you find in the morning inspection as well. If you have fed the night before, pay attention that each animal actually consumed the food item, or you will have a most unpleasant surprise in 48 hours or so!

Common household chlorine bleach is a good general disinfectant and is what I use to clean water bowls that have been defecated in. I soak the bowls with a diluted solution for ten to fifteen minutes, then rinse them thoroughly before reuse. Follow the directions on the label for disinfecting. For most other cleaning chores, I use a commercial duty antibacterial cleaner, obtainable from veterinarians under several different brand names. The product I use is Chlorhexidine, sold under the brand name Nolvasan. I use a spray bottle to make up the cleaner from concentrate and use it to clean all non-porous surfaces, such as water bowels, plastic perches, tubs, and contact paper cage interiors. I use a scouring pad to scrub water bowls, then spray and rinse them. Water bowls should be disinfected at least weekly and refilled with clean water. I use a big metal serving spoon to scoop soiled mulch, and disinfect this after each use with the bleach solution. It is also a good idea to soak the scouring pad in the bleach after each cleaning session. Never use the scouring pad to scrub defecation stains and reuse it to scrub water bowls. For cleaning really large stool and urate deposits from mulch, I keep a box of rubber gloves on hand, finding it is faster and easier to throw away a soiled glove than to try and scoop large piles with the spoon. I replace week-old newspaper in tubs with new, even if it hasn't been soiled, because after a week in warmth and dampness it is no longer fresh. Finally, I use 409 Glass and Surface Cleaner to clean glass doors. Always wash your hands with hot water and soap before and after handling animals and after cleaning cages.

It may sound like my chondro facility is run more like a sterile hospital room than a snake-occupied basement, but in reality I just use common sense. Diseases and parasites are spread in fecal matter and on hands, so I pay careful attention to these areas. In their wild habitat, GTPs may be subject to natural parasites and predators, but they never have to lay in filth, drink stale contaminated water, breathe musty stagnant air, or sit on a short piece of pipe with no stimulation, day after day. We should strive to provide a clean, fresh, stimulating environment for our animals that is both pleasing to us and healthy for them.

Items used for daily cleaning and husbandry include bleach, paper towels, Nolvasan (Chlorhexidine), glass cleaner, scouring pad, and stainless steel scoop. Shelves on the far left are good for drying clean water bowls and perches. The upper cart shelf holds a box of rubber gloves and newspaper substrate cut to fit baby tubs. The calendar is handy for recording feed, shed, and breeding dates.

CHAPTER 11. FEEDING, DEFECATION, AND SHEDDINGCYCLES

"I have known many meat eaters to be far more nonviolent than vegetarians."
Mohandas Gandhi

In a recent ChondroWeb Forum poll, a majority of chondro owners indicated that feeding their animals was the most enjoyable of all the husbandry duties they performed. Indeed, there is something very satisfying about watching your jungle hunter come to full alert, seize its prey, and return to its roost with a full belly. Happiness is a room full of well-fed chondros! "How often should I feed my chondros?" is a frequently asked question, and I suspect that what more than a few keepers really want to know is "How often *can* I feed my chondros?" The answer to both questions depends on a number of variables relating to age, growth rate, activity levels, and defecation cycles. The frequent advice to withhold subsequent meals until the last one has been passed is not appropriate under most circumstances, and is based mostly on an inordinate fear of causing rectal prolapse. There will be more information about defecation cycles later in this chapter, but many animals will be underfed if you follow that regimen. But before discussing the important aspects of meal sizes and frequencies, let's look at some feeding basics that apply to all chondros regardless of age or size.

YOU ARE WHAT YOU EAT

If this were literally true, I would be a big stick of red licorice! Seriously, it is a well-known fact that what we put into our bodies directly affects our health, energy, and quality of life, and the same is true for GTPs. For this reason, the vast majority of captive chondros should be fed a diet of laboratory-raised mice or rats that have been fed a nutritious diet of high protein food themselves. In fact, lab-raised mice will consume their own young if the protein content of their food is too low. By "laboratory" I don't mean that only rodents bred and cared for by technicians in white coats in sterile, sealed buildings will do; rather, your rodents should come from a supplier who raises them in clean conditions specifically for reptile food, where they are not exposed to wild rodents, filth, or parasites. Never feed your chondros anything collected from a wild environment, whether it is rodent, amphibian, avian, or any other animal group. The risk of disease and parasites is too great and not worth whatever reasons you may have for using such prey items. If you need to use lizards or frogs to entice your animal to eat, use these prey items to scent the lab rodent instead of feeding them to the snake. More about this can be found in the chapter on managing neonates, in Section III. There is no need or reason to supplement a diet of healthy rodents with anything else, including chicks or other kinds of prey. Chondros get all the nutrition they need from the rodents and do not require any variety. Some reptiles get bored with eating the same prey all the time, most notably true Old World chameleons, but chondros do not. Anyone who has experienced the feeding response of a hungry adult chondro will know that rats will do just fine!

Both the chondros and the keepers enjoy feeding time!

Rarely but occasionally, an adult GTP will refuse standard fare and will insist on something unusual. Thomas Phillips, Webmaster ofChondroWeb.com, has a wild caught male that accepted only live Siberian hamsters for years, despite the best efforts to convince the animal to accept more normal food. (Happily, this male began eating rats in 2004, to the delight of Mr. Phillips and Siberian hamsters everywhere.) This is very rare with captive bred chondros, and in fact you could very well risk teaching your animals bad tricks by giving them unnecessary supplemental food items. The practice of feeding chicks to chondros probably stems from the notion that birds make up a substantial part of their wild prey, which does not seem to be documented by actual evidence. Chicks make for rather nasty defecation by the snakes and are a risk item for transmitting the bacteria Salmonella, both to you and the snakes. I would feed whole chicks only as a last resort.

The question arises as to whether it is best to buy frozen rodents from a dealer or to breed your own. I feel this issue is best answered by considering which you have more of: Time or money. It is far less expensive to produce your own rodents than it is to buy them. Furthermore, you have complete control over size, quantity,

and the health of the rodent supply if you produce them. If your collection is large, breeding your own rodents makes a lot of sense. But it does take time to maintain a rodent colony, and it is best if the rodents are kept somewhere other than in your house. No matter how clean you keep them, rodents have a strong odor and there is no doubt that they are in your home when you or guests enter. I keep my rodents in a barn on my property and clean them once a week. It takes about two hours per week to clean, feed, and water them, and about $40-$50 per month for feed and bedding – far less than what I would pay to buy the same quantity I produce each month.

It is pretty easy to produce quite a number of rodents in a small space using a rack-type breeding setup with an automatic watering system. I feed my entire chondro collection with this small setup, supplementing my production only infrequently.

On the other hand, it sure is wonderful to go to the freezer and pull out what you need with no muss or fuss (and no cleaning or odor), if you have the funds and are satisfied with the quality of the rodents your supplier provides. There are a number of good rodent suppliers around that will ship frozen rodents (which are packed in dry ice) to your door. Many people are quite happy with the rodents and service they get from several of these dealers. You will make the non-snake lovers

in your household happy if you purchase a small freezer in which to keep the rodent supply that's separate from the family food.

Producing your own rodents assures a steady supply of healthy animals in a variety of sizes.

Whether you buy your rodents or grow your own, it is a good idea to feed frozen/thawed food to your animals. Freezing kills most parasites, although it does not kill all bacteria. In any event, it is wise to feed dead prey to your chondros whenever possible; this will be most animals, most of the time. Rarely, some chondros will only accept live food, and when this is the case, exercise extreme caution! Live rodents can be very aggressive, especially when cornered or in fear for their lives, and snakes can sustain severe bites and even fatal mutilation from being left unsupervised with live mice or rats. Often, unweaned live rats with their eyes still closed can be used and safely left in with the snake overnight, because they have not yet developed the ability to bite and attack. Rat "fuzzies" also seem to be particularly attractive to such recalcitrant feeders. Never risk feeding live prey to chondros for the enjoyment of watching the snake make a kill, or for any other unnecessary reason, such as "to provide exercise." I quickly and humanely dispatch my live rodents by placing them in groups into heavy-duty freezer bags and then squeezing out all the air. The animals quickly expire from lack of oxygen and suffer less stress than when being stalked and constricted by a reptile.

The question has been raised from time to time as to whether rats or mice make the better meal for chondros, with a few keepers claiming that they observe faster growth rates when they convert to rats. My own observations do not agree

with this conclusion, and I feel that individual chondros that are genetically predisposed to rapid growth will experience rapid growth regardless of which rodent they eat, as long as sufficient quantities are provided to support that growth. It is a fact of life that some chondros, like some people, grow faster and gain more weight than others do. I suspect that increased growth rates associated with feeding rats is actually the natural growth spurt that happens about the time young chondros outgrow mice anyway. It is also possible that those feeding rats to young chondros may tend to feed slightly larger meals, because baby and fuzzy rats are larger than corresponding sizes of mice. At any rate, I have observed that slower growing chondros, as well as those putting on rapid growth, show the same growth rates regardless of whether they are being fed mice or rats of appropriate size. There have also been comments made about mice causing less of a threat of rectal prolapse than rats. Again, my own experience and observations do not justify this conclusion. If anything, the opposite is true: The majority of prolapse cases in my collection involve neonates being fed mice. I feed 99% of my adults small rats, and incidences of prolapse among this age group are rare.

FEED ME NOW!

Chondros are all individuals, with individual food intake needs and feeding responses, but it is accurate to say that the average chondro has a rather enormous appetite. Exceptions to this include males that are off feed during seasonal fasting periods associated with the breeding instinct, and hatchlings that have not yet been established as feeders. There are also some slow feeders that simply must be accepted as individuals on their own terms. With the majority of GTPs, however, you had better watch where you put your hands after sundown! In fact, some chondros have such big appetites that they would probably eat as much as you would feed them, even to their own harm. Meal size and feeding frequency must be tailored to each animal's age, size, and growth rate. The following are some general guidelines to use in determining what is best for your animals.

Unless an animal has a health-related issue such as a recent prolapse or regurgitation, you should feed it a meal large enough to make a noticeable (but not huge) lump in its belly. Chondros are equipped with that big maw for a reason, and they can take down a substantial meal. There is no fixed formula to determine prey size for a particular chondro, but it is not difficult to look at your snakes and choose mouse or rat sizes that are slightly bigger than the largest diameter of the snakes' bodies. I have seen inexperienced keepers fret over this subject unnecessarily – it isn't that critical. If the meal you feed doesn't make much of a lump and the animal is prowling for food again in three days, then increase the food size next time. If in doubt, feed smaller meals and work your way up, although you might be surprised to see just how big a meal a healthy animal can take down and digest. But it is best not to push meal size or frequency too far. Neonate chondros start out on newborn pink mice, graduating up to fuzzy and "hopper" mice as they grow. Once an adult mouse doesn't make a full meal anymore, I switch my chondros over to small rat pups, and from then on it is

nothing but rats. This seems to be quite acceptable to the majority of captive tree pythons. Occasionally a few animals will reject rats the first few times they are offered, and these exceptions can be weaned over by using some mouse scent on the rats until they acquire an appetite for them. I take the time to do this because chain-feeding several adult mice to a mature chondro is time-consuming and expensive.

Photos on this page show the sizes of feeder rodents used by the author. Hatchling chondros start on day-old mice and gradually work their way up to adult mice before switching to rat pups.

In general, most chondros will do well on one meal every seven to ten days. I may feed established neonates slightly more often, every five to seven days, and fully mature adults every ten to fourteen days. Yearlings in an obvious growth stage get nice large meals, because they need adequate food intake to sustain the rapid growth rate. When the growth rate slows down as young adults begin to reach maturity, I decrease their feeding frequency accordingly. Chondros can appear to beg for food shamelessly, following your movements and engaging in caudal luring (tail wriggling) with enthusiasm. If an animal is growing very quickly, is defecating with regularity, and is engaged in nighttime prowling that is hunger related, then I sometimes offer food with an increased frequency. However, most animals will do best with a regular feeding regimen that is based on growth and age. I also make exceptions for recovering postpartum females, males that have recently concluded a long seasonal fast, and to a lesser degree, females that are being conditioned for cycling and breeding. These groups get more food, again

using common sense and good instincts as a guide. When in doubt, feed less often! Underfeeding is better than overfeeding.

Feeding and handling tools used by the author. The large forceps are used for feeding hatchlings and juveniles; the hemostats are used for adults. The small forceps are used to assist-feed small pinkies to hatchlings. A variety of small and medium hooks are useful when handling chondros.

Feeding Technique

Many chondros will only eat at night and under dim lighting. You can use red-colored cage or room lighting to see what you are doing, but this is not necessary. I use a small incandescent spotlight that I set on the floor, aimed away from the cages and tubs containing animals I am feeding. This lets me see quite well but does not disturb the animals unduly. In fact, most of them are eagerly waiting for me. I use twelve-inch spring-type stainless steel forceps to feed babies and young juveniles. I find that using hemostats with the scissor-type action does not give me a quick enough reflex to release the pinky just as the baby grabs it, so I like the forceps much better. I use these to feed young animals until the strike range begins to get too close to my hand, which is usually at about a year in age. At this time I switch over to a pair of fifteen-inch stainless steel surgical hemostats that I use to feed adult chondros. I make these more user friendly by using a grinding wheel to remove the locking mechanism, so that they open and close freely. Warning! Do not be tempted to use a shorter implement when feeding adults or you will donate blood. Chondros have heat-sensitive labial pits and rely heavily on them to detect the presence of prey, apparently even more so than scent. I learned this fact the hard way as an inexperienced keeper, and could not understand why the animals

would tongue flick the presented rodent and then reach out and nail my hand. When I switched to the longer hemostats, the problem was resolved, although there can still be close calls if I get sloppy and lose concentration. Be sure to open cages and tubs in such a way that your hand is not exposed to attack.

By the way, I have never had my animals break teeth or sustain any other oral damage from being fed using steel implements, and I have used them for years. However, I do recommend that you exercise care so the animals don't strike the tongs, and I make sure to present food items so that they are seized by the head.

This is the safe and correct way to present food to a hungry chondro. Notice that the keeper's hand is off to the side of the cage opening, and the prey is being presented to the chondro head-first.

Do not worry if your chondro occasionally chooses to swallow a food item tail first. For all their relative intelligence, GTPs are not always very bright when it comes to finding and swallowing the heads of prey items, and every once in a while a chondro will grab a rodent at mid-body regardless of how you offer it. Sometimes they can take what seems like forever to begin swallowing, but leave them alone and usually they will get the job done. Rarely will you have to present the item again after they drop it. I have one female in my collection which, despite having a ravenous appetite, almost always takes two "gives" before she swallows her food. Always double check to make sure each chondro has swallowed its food and not dropped it behind some cage plants.

I thaw out my frozen rodents in a tub of hot water, rinsing them well to remove any droppings or bedding that may have stuck to them during freezing. You can also thaw rodents by letting them set at room temperature during the day prior to an evening of feeding. If you do this, protect them from flies and other pests and from household pets. A word of caution: Do not attempt to thaw rodents

by heating them on a heating pad or in the hot sun. It is easy to overdo it, which can severely weaken the abdominal wall of the food item. When the chondro grabs and constricts the item…well…it isn't pretty.

Chondros will usually swallow their meal head-first, but some will occasionally swallow the tail-end first. This causes no harm. I hold onto the prey with the hemostats while the snake wraps it up. This helps to prevent the chondro from dropping to the floor and getting substrate on the rodent.

Typical hanging coil of a constricting chondro.

I offer the rodents still wet and warm from their soaking. The warmth makes the item more appealing to slower feeders, and the water helps hydrate and lubricate. Be sure to offer the food item at an angle that causes the snake to strike upward and then constrict without the prey hitting the cage floor, or the snake and food falling into the water bowl. This helps to prevent the snake from ingesting any loose substrate and from contaminating the drinking water with the rodent. If any food or residue falls into the drinking water, rinse the bowl and refill. If you do see any substrate particles getting into the chondro's mouth, you can attempt to remove them with small forceps while the animal is still swallowing the food. Do not attempt to reach into the cage once the food item is past the jaws and neck! If any small bits of substrate get swallowed, there does not seem to be cause for alarm.

I have never known this to cause any harm, after more than thirty years of using such substrates as pine shavings and Cypress mulch. Be very careful when feeding your chondros, or any time you are moving around in front of them after dark, especially with a flashlight. Chondros are very alert at these times and will sometimes strike at shadows on the cage walls, floor, or ceiling, risking injury or a mouthful of debris.

I offer food to all animals of the same age and/or size group at one time. Off-feed males and gravid females may be exceptions, but often I attempt to feed them

also. Most males will begin to undergo seasonal fasting when they are about two years of age, and a few may begin when even younger. Many mature males will fast at approximately the same time every year. Do not get creative and try all kinds of strange food when this happens. If the male grew up eating rats, then he will still eat them when he is hungry. Males will resume eating when they are ready, not when you are. I work with problem feeders, which do not fall into the normal fasting patterns of the rest of the collection, when I'm relaxed and can devote some focused attention to them. Tips for dealing with some of these issues are given in Appendix A. Specific information for starting neonates can be found in Chapter 16.

Do not refreeze uneaten rodents for later use, and never offer a food item to a different animal after it has been in contact with a non-feeder. Unless you are very experienced, never attempt to feed multiple animals in the same cage. In fact, except during the breeding season, chondros should be housed singly.

Defecation Cycles

Young animals have a higher metabolism than older ones and defecate more frequently, often depositing feces between feedings. At the other extreme, large mature females, and even some males, may go for weeks between bowel movements. Consequently, no hard and fast rules can be made concerning the ratio between frequency of meals and defecation. The oft-repeated advice to wait for a bowel movement between each feeding is based on inordinate fears about prolapse, and doesn't hold up well in actual application. Many chondros will be underfed if this advice is followed, yet such advice is frequently repeated on Internet discussion boards. Personally, I feed my animals according to the schedule I have determined for them, based on their individual size, age, and growth rate. They get fed when it is time, whether they have defecated that week or not. Of course, an obviously constipated animal should not be fed, but just because an animal has not had a bowel movement in a while does not necessarily mean it is constipated. In fact, sometimes feeding the animal one more meal will trigger the next bowel movement. Chondros often defecate when shedding off their old skin.

Baby chondros often experience smeary, pasty defecations. One theory about this is that neonates are not used to eating pink mice and may lack some of the stomach enzymes needed to digest them easily at first. It is assumed that neonates eat small frogs or lizards in the wild. Make sure that babies are kept well hydrated while their systems adjust to a diet of rodents. Do not feed neonates any frogs, lizards, or other wild prey that may contain parasites. As the young animals grow, they will begin to develop better-formed stool. Older animals should have well-formed dark stool, along with lighter colored hair bundles, and white or yellowish urate deposits. Urates are the snake equivalent of urine, and are excreted by all snakes. Males seem to leave smaller and more frequent urate deposits than females do, although females being courted by males during breeding periods may scent-mark perches and cage floors with small urate deposits. Odd-colored feces or

diarrhea may indicate parasites or other health problems. If in doubt, have your vet perform an inexpensive fecal test, using a fresh stool sample.

At the risk of being too graphic, I will mention that chondro defecations can contain weird-looking stuff at times, including orange stringy or sandy looking matter, and gray or bluish urate material, and may be accompanied by quite a bit of clear fluid. If all else is well, and the animal has normal bowel movements in the future, there is no need to worry. (Hey, at least I didn't include photos!) Some animals, in particular those that tend to "hold it" for a while, can develop the habit of letting the tail and part of the posterior section of the body hang down from the perch for several days prior to defecating.

This large old female in the author's collection has a habit of tail-hanging prior to having bowel movements. Although this is probably a condition that relates to the feasting and relative inactivity of captivity, it doesn't seem to indicate a health problem. This female has never prolapsed.

Such incidences of tail hanging often concern the keeper, and there is a general feeling by many that this behavior is indicative of constipation and may precede prolapse. My experience is that usually neither is the case, and I have some animals that occasionally behave this way and yet always defecate normally without a prolapse. I do pay attention to such animals and may try to stimulate a bowel movement with handling or a warm water soak if I feel that is necessary. I feed such animals smaller-sized meals as a rule. Rarely is there any real problem, and most of these animals will have a bowel movement at the very latest when they shed. For symptoms and treatment of irregularity and true constipation, see Appendix A.

SHEDDING CYCLES

Chondros, like all snakes, periodically shed their outer skin. Baby chondros normally undergo their first shed about ten days after hatching, and usually shed every six to eight weeks during the first year of growth. Rapidly growing specimens can even shed every four to six weeks. Chondros continue to have regular sheds throughout their lives, but the interval between sheds is much longer in adults, due to a slower metabolism and lack of noticeable growth. Even old specimens benefit from renewing this protective outer covering, and most shed a few times a year. Chondros that have been injured by a cut or tear of the hide will often undergo several sheds in succession until the wound is healed. Gravid females undergo a pre-lay shed approximately fourteen to twenty-one days prior to egg deposition.

Like all snakes, chondros go through a specific process while preparing to shed. The first thing that may be noticed is a normally good feeder suddenly refusing to eat. Many baby and yearling chondros will choose to accept food while preparing to shed, but most mature animals will not. A dulling of the normally bright colors follows food refusal, and in some cases a distinct milky haze will cover the animal, including the clear scale that covers the eye. This milky haze is most noticeable on dark animals, especially maroon or brown babies, and may be very difficult to discern on yellow babies to the point that inexperienced persons may find it nearly impossible to tell when a yellow neonate is opaque. Some adults develop bright salmon coloration on their bellies just before going opaque. After a day or two of peak cloudiness, the colors brighten, almost to the point that everything looks normal again, and after several more days, the animal will peel out of its old skin, turning it inside out like a sock being pulled off a foot. The entire process takes about ten days to complete.

Chondros must have adequate humidity to shed properly, and keepers are well advised to keep humidity levels boosted during the opaque period, especially the last few days and hours prior to the removal of the skin. GTPs have very thin, delicate skins that easily dry on them during the final days of the shedding process. One of the most common beginner mistakes is to not provide enough humidity during shedding, and it is wise to err on the wet side during this brief time until you acquire a feel for getting it right. Full length, whole sheds are a good

indication that your humidity is correct, although occasionally an animal may experience a bad shed even with adequate humidity present. This may be caused by poor health, or more commonly from stress of some kind. A few animals, while apparently in robust good health otherwise, seem to have chronic shedding difficulty. Even veteran keepers sometimes have to deal with poor or dried sheds, and detailed instructions for taking care of this problem are given in Appendix A.

This photo clearly shows an opaque, cloudy-eyed female next to her bright-eyed mate. The opacity is easier to see on adults, but it can be very difficult to tell when yellow neonates are going to shed.

Full sheds are the best indicators of adequate cage humidity.

Some chondros will begin accepting food again once they clear up from being opaque, but most keepers withhold food until the actual shed occurs. The last day or so before this happens, the old skin becomes very fragile, and it is vulnerable to tearing prematurely if the animal is exposed to handling or anything abrasive. Scarring can occur if this happens too soon before the shed takes place. It is very important not to handle or stress the animals during the opaque period, right up to the final sloughing off of the old skin.

Chondros may exhibit odd posturing, may choose unusual places to perch or lie, and generally act “under the weather” during the opaque period. The skin on the sides of the neck behind the jaws may also appear wrinkled or loose. Some chondros also exhibit a swollen head and nose during the opaque period, which lasts right up to the removal of the skin, and can be quite alarming when seen for the first time. This is apparently due to a buildup of fluid, but causes no harm and always clears up immediately after the shed takes place.

Chondros are resplendent with beautiful colors and iridescence after shedding, and this is a prime time for taking photographs. Since chondros often defecate as a part of the shedding process, and males sometimes shed out small sperm plugs with the old skin, this is also a good time to probe yearling or older animals for gender determination.

These are sperm plugs (not shed hemipenes) and indicate that the former owner of the skin is a male.

Summing It All Up

These wonderful and beautiful arboreal pythons are not necessarily right for every person who may want one, and they are not a good species for those on a limited budget, persons who travel a lot, or people too busy with other life issues to give chondros the attention and care they need. But we have also seen that they are not too difficult to care for, nor are their few but important needs overwhelming. For those who are willing to learn, success is a sweet reward, and chondros repay their owners many times over for the effort and energy we put into them. Many lives have been enriched, even changed, by these inhabitants of the rain forest. Given a roomy cage with a comfortable thermal gradient and a daily humidity boost, a weekly or biweekly feeding regimen, and basic sanitation, green tree pythons will demonstrate that for many keepers, they are the perfect snake species.

Now, let us move on to the greatest challenge of working with chondros – the science and art of captive breeding.

CHAPTER 12. THE CHALLENGE OF BREEDINGCHONDROS

"A special ability means a heavy expenditure of energy in a particular direction, with a consequent drain from some other side of life."

Carl G. Jung

For those who have been deeply afflicted with chondroholism, there is no bigger challenge and no greater thrill than hatching out your very first clutch of green tree python babies. Seeing those noses and heads poke out of the eggs you have watched like a hawk for fifty days brings gratification that lasts a lifetime. I never get tired of breeding chondros, nor has my enthusiasm lessened over the years, and each hatch is as exciting as the first one. I'll grant you that there is something special about your first hatch, much like your first kiss…but neither thrill diminishes with time if executed properly. (Perhaps many of my readers just realized how much of a chondro geek the author truly is!)

Baby tree pythons are the culmination of a lot of patience and hard work.

Persons who possess the skills and instincts required to consistently produce healthy chondros may come to feel that the endeavor isn't all that difficult; and in reality some aspects of captive breeding aren't considered as difficult as they once were. Still, consistently producing captive bred chondros is part science and part art, and it is generally accepted that chondros represent one of the more challenging breeding projects that reptile keepers can undertake. After all, if these things could be cranked out with the ease of most colubrids and even some boids,

then captive bred baby chondros would be the usual offering from animal dealers instead of imports, and would be available by the thousands like boas or ball pythons. Especially amusing is the oft-repeated claim in Internet classified ads that the chondro offered for sale "will make a great breeder!" Aside from the fact that nobody can predict the breeding potential of individual chondros, most of this hype comes from people who have never bred a chondro in their lives and find it easier and more profitable to sell imports rather than learning how to produce and establish healthy captive bred stock themselves. Chondros are not a commodity to be brokered and moved for the lowest price as quickly as possible; they are living jewels that deserve to be treated with respect and care, before and after the sale.

The steps to producing baby chondros escalate by degrees of difficulty as you get nearer to the final goal – a batch of healthy, established youngsters ready for new homes, including yours. (In fact, if you intend to develop a large collection, an important and pleasurable milestone is reached when you begin to "grow your own.") Inducing mature, well-acclimated adults to copulate is pretty easy to do, and getting a female or two to develop ripening egg follicles is not much more difficult, especially if you have several pairs breeding. However, not all females with developing follicles will ovulate, and occasionally females will reabsorb their follicles. Some that appear to have had a normal ovulation will produce only a few fertile eggs. It is possible (indeed, not even rare) to get clutches containing only infertile slugs even after everything else seems to have gone well.

Once a fertile clutch is obtained, then an incubation method must be successfully implemented. The emerging hatchlings must be carefully managed and set up, and once they experience their first shed, feeding trials begin. This last, critical step is what separates "the men from the boys" as the saying goes, and is why well-established baby chondros will always be challenging to bring to market, even if all the other steps are reduced to a fool-proof formula, which is not likely to happen either. Even with all the challenges and trials that may be involved, I believe that anybody with enough dedication and patience, and the right motives, can successfully breed chondros. So much progress has been made, and so much helpful information has been made available, that breeding GTPs is no longer the lucky stab in the dark that it was once considered to be.

This last fact bothers some breeders, and the truth is, not everybody is happy about an increase in the success rate among newer breeders. I received much initial help from the written papers and oral advice of my friend Trooper Walsh, and I have always followed his example of being open to share information. I have not always been popular for sharing my own methods and results, or for articulating my own application of ideas developed by others. I think this sort of attitude is sad, and reflects not only an unhealthy level of selfishness, but also reveals a fundamental lack of understanding about how market forces and free enterprise work. Most of the time, the desire to hoard secrets and maintain exclusivity is rooted in greed, and the fear of losing profit due to market saturation. My position is, and always has been, that the more keepers enjoy success with chondros, the more they will spread the passion for them. This will spill over to more people,

fueling a consistent growth in the market. A policy of openness and honesty, serving and sharing, always pays more valuable dividends (including financial) than does the keeping back of information, the hoarding of secrets, and the attitude that others don't deserve the same satisfaction, joy, and rewards that some already have experienced. In defense of my position, I can cite the fact that the chondro market has only expanded and improved, with the value and demand for high-end specimens noticeably increasing, during the last several years since my web site was launched and the ChondroForums were developed. While I wish to make it clear that in no way do I take credit for all that has happened, and while I fully understand that many breeders and enthusiastic keepers have all contributed to the present realities, the two resources just mentioned have led the way in promoting the philosophy I believe in, and I believe the results speak loudly.

The motivations for breeding chondros, like those for keeping them, are varied. Most are positive and constructive and are based on the same feelings of fascination and passion that inspire many keepers to begin collecting these animals. A few attempt to start breeding mostly for notoriety and a desire to make big money. Experienced commercial breeders smile a little to themselves when they run across one of these latter individuals, who has his yearly quotas and profit all mapped out, often before he has even produced his first clutch. In reality it just doesn't work that way, but some folks insist on learning this the hard way. If a hobbyist (and most breeders are hobbyists) is able to pay for his or her expenses, trade or sell some babies to acquire new stock, and maybe make a little side money, then he or she is doing well. Chondro breeding is not a get-rich-quick proposition – if anything it is a get-poor-fast undertaking! Critics often suggest that statements like these ring hollow when coming from commercial breeders, and from those like myself who work with some very expensive bloodlines. For the record, I have no problem at all charging (or paying) top prices for extreme animals and rare morphs, and there is nothing wrong with dollars that are honestly earned, even in abundance. However, I am drawn to these specimens first and foremost because they are beautiful, not because they are expensive. I produce many mid- and lower-priced babies too, and it is the income from some of the more specialized morphs that allows me to do what I love for a living. I have said many times that if the animals I work with lost all commercial value, I would still work with them, because what fuels my passion for them is not money, but beauty and mystery.

The best rewards from breeding green tree pythons are not measured in dollars, but in excitement, wonder, accomplishment, and in being able to have a small part in the preservation and promotion of this species.

I think the very best rewards from breeding chondros come in forms other than money, such as the indescribable sense of accomplishment that comes from meeting a challenge and achieving a difficult goal; the ability to develop your own bloodlines and maybe hatch out something really new and spectacular; and the independence of building a collection with your own efforts. With these rewards come the requisite responsibilities of establishing the babies and not just dumping them off cheaply because they present a difficulty; of keeping good records of doing your part to help grow the market for captive bred chondros; and of treating your customers as you want to be treated.

These last two obligations warrant special comments. If you desire to breed chondros, you should share in helping to spread the passion and grow the market. This can be done many ways: attending shows with a nice display and answering questions, participating on Internet discussion and help forums, giving talks at schools, developing an attractive and interesting web site, and writing articles for herp newsletters are all ways to invest in the value and future of this species. As a leader in this aspect of the herp business, it is a bit irksome to see those who contribute little or nothing to market growth show up only when they have something to sell, and usually for top dollar. Don’t be a freeloader; if you want to

share in the benefits, share also in the work. And help to promote the image that green tree python people are among the most helpful and courteous of all reptile people by taking exceptional care of your customers. It only takes one bad apple to give the rest a bad reputation. Many have labored to build the GTP market and community to where it is today; let's keep building!

One last thought to close this introduction to chondro breeding… While there is something to be respected about the methods of those who consistently produce quality babies, nobody should feel superior because of their success. There isn't one of us on this planet who has the power to create the spark of life, or who can even claim any real control over breeding success or failure. Even veteran breeders have more failures, losses, and disappointments than they care to talk about, and anyone fortunate enough to experience the thrill of helping new little chondros into this world has many more people to thank than just him- or herself. And we all must ultimately look to the Author of all life with gratitude for the privilege and the honor of being able to participate and to cooperate with One so great in such fantastic adventures.

CHAPTER 13. CONDITIONING AND CYCLING

"Having good health is very different from only being not sick."
Seneca the Younger

Successful breeding begins with a pair of conditioned, mature animals in prime health and vigor.

SELECTION AND CONDITIONING OF POTENTIAL BREEDERS

The first requirement for producing healthy babies is to begin with healthy parents. Adult chondros being selected as potential breeders should be healthy in all respects, having had no medical problems for at least one year prior to attempted breeding. They should be of good weight for their size, glossy, alert, and have good muscle tone. Males can become sexually active as young as eighteen months old, but females need to be much older and larger before they can be safely bred for the first time. The accepted rule of thumb is at least three years of age *plus* a body weight of at least 1000 grams before beginning the first cycling period. Animals that are bred too soon, those young in age and especially those that are too small, are likely to experience infertility, egg binding, stunted size, or reduced fecundity over the duration of their reproductive lives. Females have a finite number of safe breeding periods in their lives, and it makes no sense to rush a female to her first breeding or to waste some of her energy and bodily resources for

nothing. If in doubt, wait another year. Patience is a way of life for chondro breeders.

A well-conditioned female will have good fat reserves, but will not appear to be obese. Females may not be capable of developing follicles if fat reserves are insufficient.

The stress of cycling and breeding takes a toll on both males and females, but is most noticeable with successfully bred females. Pythons grow their ova (eggs) "from scratch" (not from preexisting immature ova such as mammals do), undergo ovulation, and contribute the calcium needed to shell the eggs, all while enduring two to three months of fasting. Tack on another fifty days without food or water if the female incubates the eggs herself. Males usually fast as well, sometimes much longer than the females and occasionally going five or six months out of the year without eating. For these reasons, it is important to condition potential breeders by feeding them well prior to the commencement of cycling. Females especially must have good fat reserves to undergo the drain that breeding activities put on their systems. It is generally acknowledged that most if not all snakes harbor potentially pathogenic bacteria in low numbers that are not a health threat under normal conditions. Stress can allow these bacteria to gain a foothold during a time of lowered immunity, and breeding necessarily stresses the animals. Respiratory infection (RI) is just one possible condition that may surface during periods of stress, and while thermal cycling is commonly suspected of causing RI, it is far more likely that the overall stress of breeding activity is responsible for any health

problems encountered during or just after breeding periods. RI is very uncommon in my experience when properly conditioned animals are cycled.

Potential breeders should be selected with genetic diversity in mind, unless the pairing is a carefully planned project that requires controlled inbreeding in an attempt to establish or strengthen a trait. Sibling-to-sibling or parent-to-offspring mating should never be a matter of convenience to the breeder, and best results are often obtained from planning your breeding program rather than indiscriminately mixing and matching animals with the hope that something develops. Potential breeders should also be established in your collection, well beyond the quarantine period recommended for newly acquired animals. Chondros are sensitive animals and creatures of habit, and attempting to breed animals that have been recently purchased, or that have been frequently moved from cage to cage, often results in failure. One successful breeder friend of mine lost two seasons' worth of successful mating when he changed his facility over to a new brand of cage. This is one reason why purchasing animals with the expectation of breeding them that same year is not a realistic idea, and why providing a stable, consistent environment is important.

I begin conditioning by increasing the meal frequency of breeder animals approximately two to three months prior to the anticipated onset of cycling. I prefer to feed smaller meals more frequently, rather than simply offering larger meals. Smaller food items are digested more easily and quickly, and I feel that this is the safest approach to extra weight gain. Obesity is always to be avoided, but some extra chunkiness on pre-cycling females is preferable. In fact, females without adequate fat reserves may not develop follicles. Since most females will eat ravenously at this time, beefing them up is not a problem. I like my males to be in a good state of flesh at the beginning of the breeding period, but not especially heavy, because I think fat males make lazy, apathetic breeders. I continue to feed females on a weekly schedule right on into the actual cycling period, and I offer food to the males as well, although most of them refuse food once cycling begins, and sometimes sooner. Cooler nighttime temperatures do not seem to pose any trouble for females with full stomachs, although I do keep meal sizes reasonable so as not to put any undue strain on their digestive systems. I feed females until they refuse food, which usually takes place as they begin to swell with ripening follicles. Some females will go off feed once thermal cycling begins, but this does not necessarily mean they are progressing toward a successful breeding.

The second step in my conditioning program is to move the pair of breeder animals from their maintenance cages to their breeder cages. You will have to adjust this to your own facility, but in my basement I have a main room that houses many of my animals, and my cycling area lies outside of this room. It is not possible for me to adequately drop the nighttime temperatures in the main room because there are no windows, the room is insulated well, and most of the cages and racks have nighttime heat. My cycling area contains a small window, and by opening this at night, I can easily regulate the amount of temperature drop. Consequently, I have to move any potential breeders living in the main room to the

breeder cages in the cycling area. One fact of life with chondros is that many of them don't like to be moved and will need an adjustment period. This can be the case even when seemingly identical cages are used throughout the facility. I give my breeders plenty of time to acclimate to being moved, often planning my breeding projects during summer and getting all the animals into the cycling area then. The longer these chondros are established in the actual breeding cages, the better.

Cycling Regimen

The following cycling regimen is the one I have developed for use with the conditions and parameters of my facility and the climate where I live. There is more than one effective way to cycle chondros for breeding, and what follows works for me and serves to illustrate the fundamental principles involved. Each breeder will need to adapt these principles to his or her own situation. Although there are a few individuals in the US who use little or no thermal cycling to induce breeding, I am not aware of any breeder who claims consistent, large-scale success with a breeding program that does not use thermal cycling. There are a few scattered reports of persons experiencing successful reproduction in pairs that have not been cycled, including an accidental breeding reported to me by a hobbyist. However, most breeders use thermal cycling to induce successful captive reproduction of green tree pythons, and most attempts at breeding without cycling result in partial or complete failure. At the very least, it does seem to be important to expose the animals to some distinct environmental change, with temperature being the most common and effective.

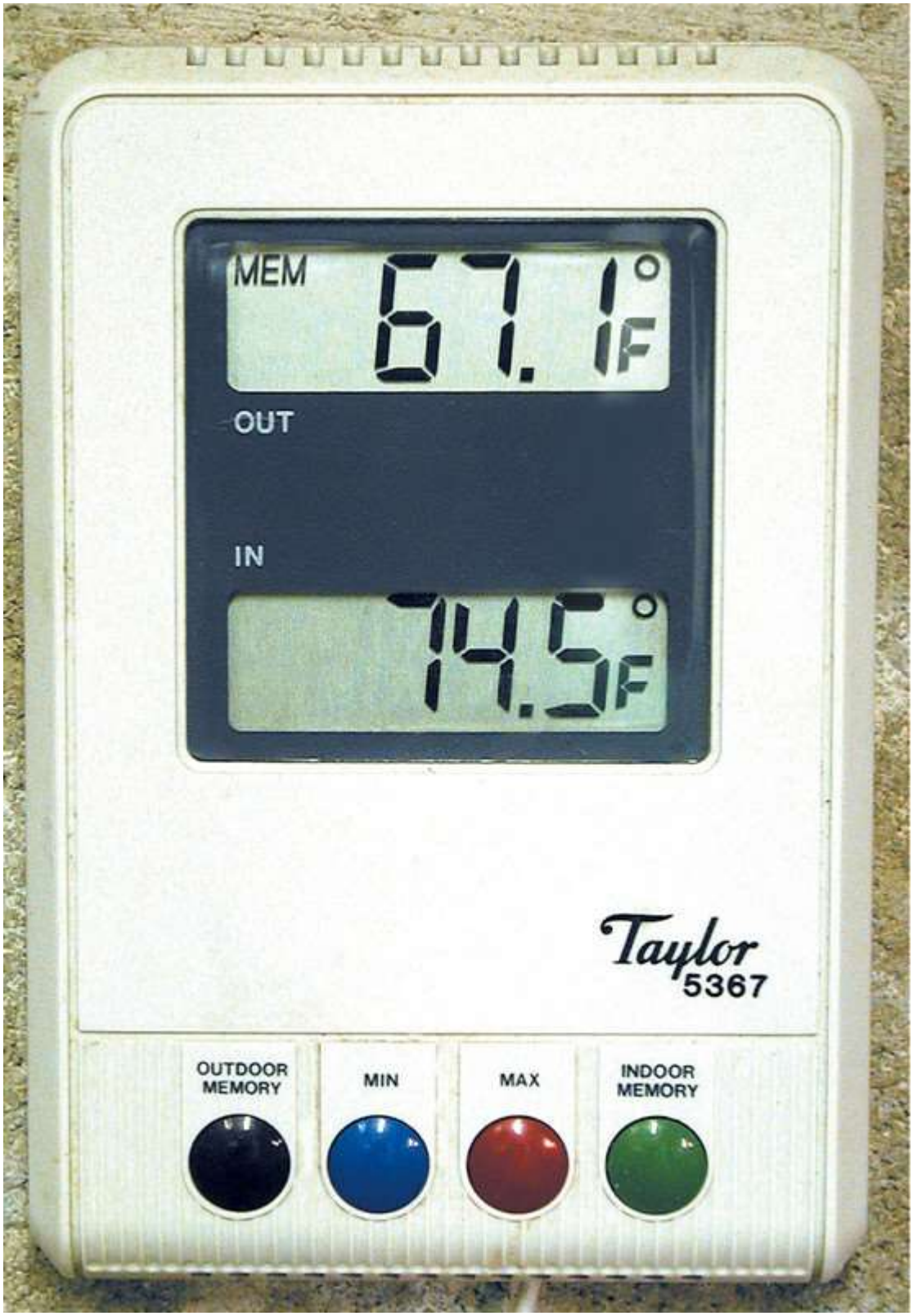
As mentioned, RI is not a problem when dropping night temperatures as long as a normal daytime basking temperature is provided throughout cycling. This is an important point; chondros do not hibernate (brumate) like many snakes, and must not be cooled around the clock. Always provide them with normal daytime temperatures of 78°-89°. There is no sound evidence I am aware of that manipulating the photoperiod (duration of exposure to daylight compared to darkness) helps with successful cycling, although some breeders do like to shorten the average daily photoperiod when cycling. Others increase the frequency of spraying in the belief that this artificial rainy period induces breeding activity. I keep my photoperiod on a 12-hour-on/12-hour-off cycle year round, but I do tend to spray breeding pairs lightly just before lights out in order to stimulate activity. I also make sure to spray in the evening if local weather includes approaching storm fronts. However, it is my firm belief after years of successfully employing the cooling technique, that thermal cycling is all that is required for consistent breeding success, and methods that rely on other stimuli seem to achieve sporadic results.

There doesn't seem to me to be any good reason *not* to cycle chondros, except for unfounded health concerns. If a pair of chondros aren't fit enough to be cycled without health issues popping up, then they aren't in breeding condition to begin with. It would surprise many chondro owners to see how much nighttime cooling

these animals can safely sustain. I once observed a facility that housed Blackhead pythons (*Aspidites melanocephalus*) and green tree pythons in the same room, with the chondro cages placed along an outside wall with a window. The window was opened at night to lower the room temperature for cycling, and the owner had the blackheads on a night drop regimen that dipped into the lower 50s Fahrenheit. Using a Raytek temperature gun, I marked the chondros' body temps down to the upper 40s and low 50s on several occasions. Some of the chondros were so chilled that they draped from the perches. I would have bet a lot of money that all of them were going to develop serious RI, yet to my surprise not a single one did, and two pairs actually reproduced successfully under these extreme conditions. I must state that such low nighttime temperatures are certainly contraindicated for cycling chondros, but this true story does illustrate that fears about RI are unfounded, especially when a mild and proven cycling regimen is used.

Once my pairs are in prime breeding condition and settled into the breeder cages, I begin to drop the nighttime temperature. I use timers to shut off the cage lights and the heaters and to turn them on again in the morning, providing a 12-hour-on/12-hour-off daily cycle. I give the animals a week or two of nighttime temperatures in the mid 70s, and then I begin to slowly lower them to about 68°F or so by opening my window to a gap that is appropriate for the current outside conditions. I make no adjustments to the photoperiod or the thermal gradient inside the cages, maintaining the standard cage temperatures that are in place all year long. I continue with this twenty-four-hour cycle for several weeks and begin pairing animals up when I feel they are ready. (See the next chapter for specific details about how and when I pair up my breeders.) If the animals are compatible and ready to breed, courtship and copulation will usually commence during the evening hours following first introductions and will take place frequently over several weeks.

There is no set length of time for the cycling period; I gauge what I do based on my observations of the animals. In general, I will continue to thermally cycle and pair two animals as long as they are actively breeding, and sometimes longer if I feel there is still a good chance that breeding activity will resume. I stop thermal cycling and initiate nighttime heat when: (1) I am convinced that the pair are completely done with any further breeding activity, that the pairing was not successful, and I do not plan on introducing a second male to the female; or (2) The breeding was successful and the female requires the return to a full heat schedule. Details about the thermal needs of gestating females will be given in the next chapter. I receive many questions about how long cycling should continue and when to stop it; I follow the regimen and parameters given in this paragraph with nearly all my breeder pairs. You must observe your animals and proceed accordingly; to repeat: There is no set time for duration of cycling or pairing of animals, other than what you do based on the behavior of the animals.



Nighttime lows of about 68° F are adequate for thermally cycling chondros for breeding. Indoor/outdoor thermometers with a memory feature make it easy to record the low temp from the previous night.

Since my annual cycling period is based on the existing local nighttime temperatures, I plan my pairings around the cooler months of the year. This makes for a longer potential breeding period than you might assume. Using only natural

nighttime cooling, I have hatched baby chondros in every month of the year except December and January, months that would correspond to cycling during the heat of summer. Since chondros are not seasonal breeders and can be successfully cycled and bred at any time of year as long as conditions are conducive, it is theoretically possible to use air-conditioning to thermally cycle animals in the heat of summer. I have not attempted this. Since air-conditioning lowers the ambient humidity level considerably, special attention would need to be paid to cage humidity levels if this method of cycling were to be used.

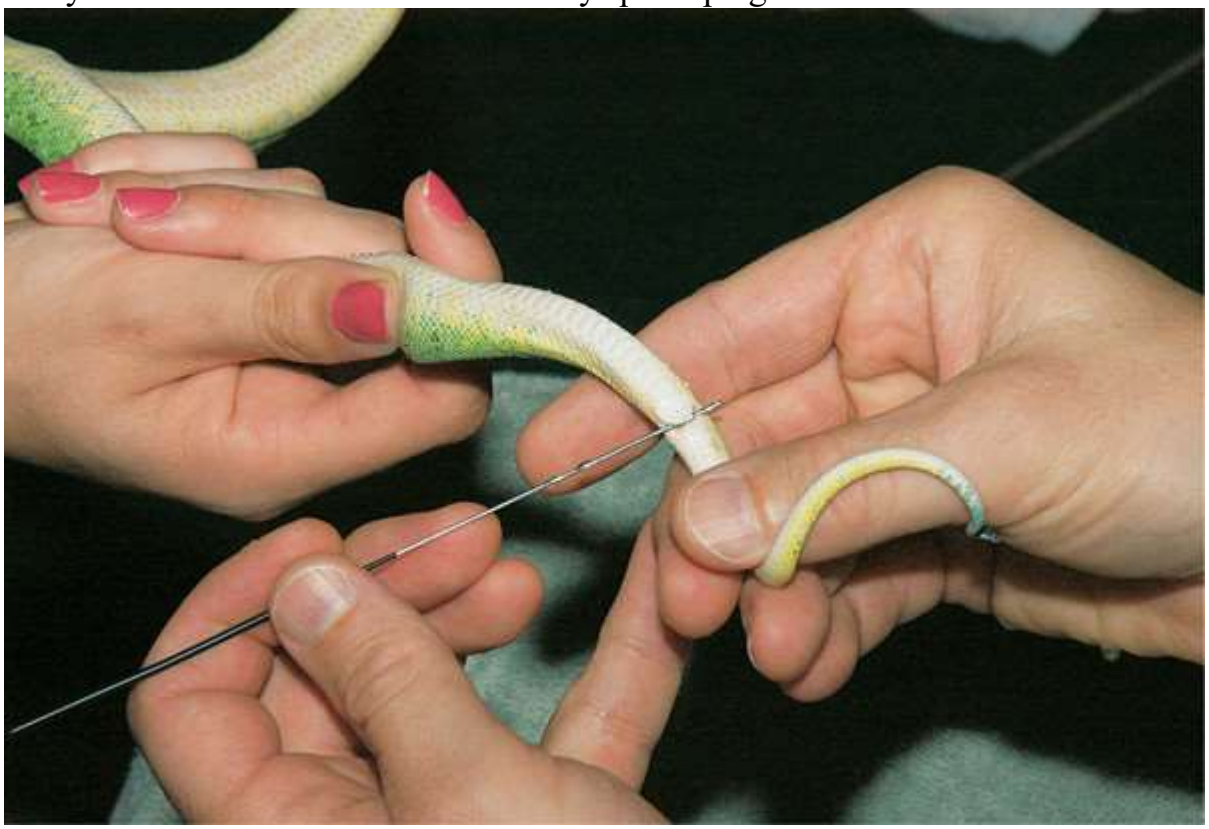
I have read comments to the effect that reestablishing nighttime heat is needed to induce females to ovulate. While it should be understood that multiple methods that have been successfully used to cycle and breed chondros and no single way is the only correct way, I do not believe that the ovulation event is directly related to temperature cycles. In fact, many breeders do not understand the difference between follicle development and ovulation, and this will be covered in the next chapter. I'm convinced that it is best to continue thermal cycling for an indefinite period and to make changes according to observed results rather than arbitrarily establishing a preset length of time to begin nighttime heat again. Some females will show signs of progress in a relatively short time and others may cycle and breed for months. I once left a breeding pair together from March through August because they showed intermittent breeding activity during the entire time. Cycling for this pair began in February, and the eggs hatched the following November! Think in terms of months, not weeks, when planning cycling regimens.

Once I determine that it is time for the thermal cycling period to end, I simply remove the timer from the heat panel and allow it to remain on throughout each twenty-four-hour cycle. I use a timer to maintain the 12-on/12-off photoperiod in my cages year round. Males will usually commence eating within a short time of the nighttime heat being restored, but some will fast longer. Males will begin to eat again when they are ready, and it is useless to fret about this fact of chondro life. Both sexes are provided with the standard thermal gradient described in Chapter 10, regardless of whether or not the breeding has been successful. Males can be cycled again for future breeding once they have had a resting period and have resumed eating for long enough to have regained lost weight, but don't push them too hard. Any females that did not become gravid may be cycled again, as long as they are given several months of stable thermal conditions and are well-fed and conditioned as described above. Any female that produces egg follicles should be given a full year of conditioning before being cycled again so as not to overtax her system. This is true whether the female lays fertile eggs or not. Females that lay fully developed and shelled infertile eggs are as depleted as those laying fertile eggs and must be given a full recovery period.

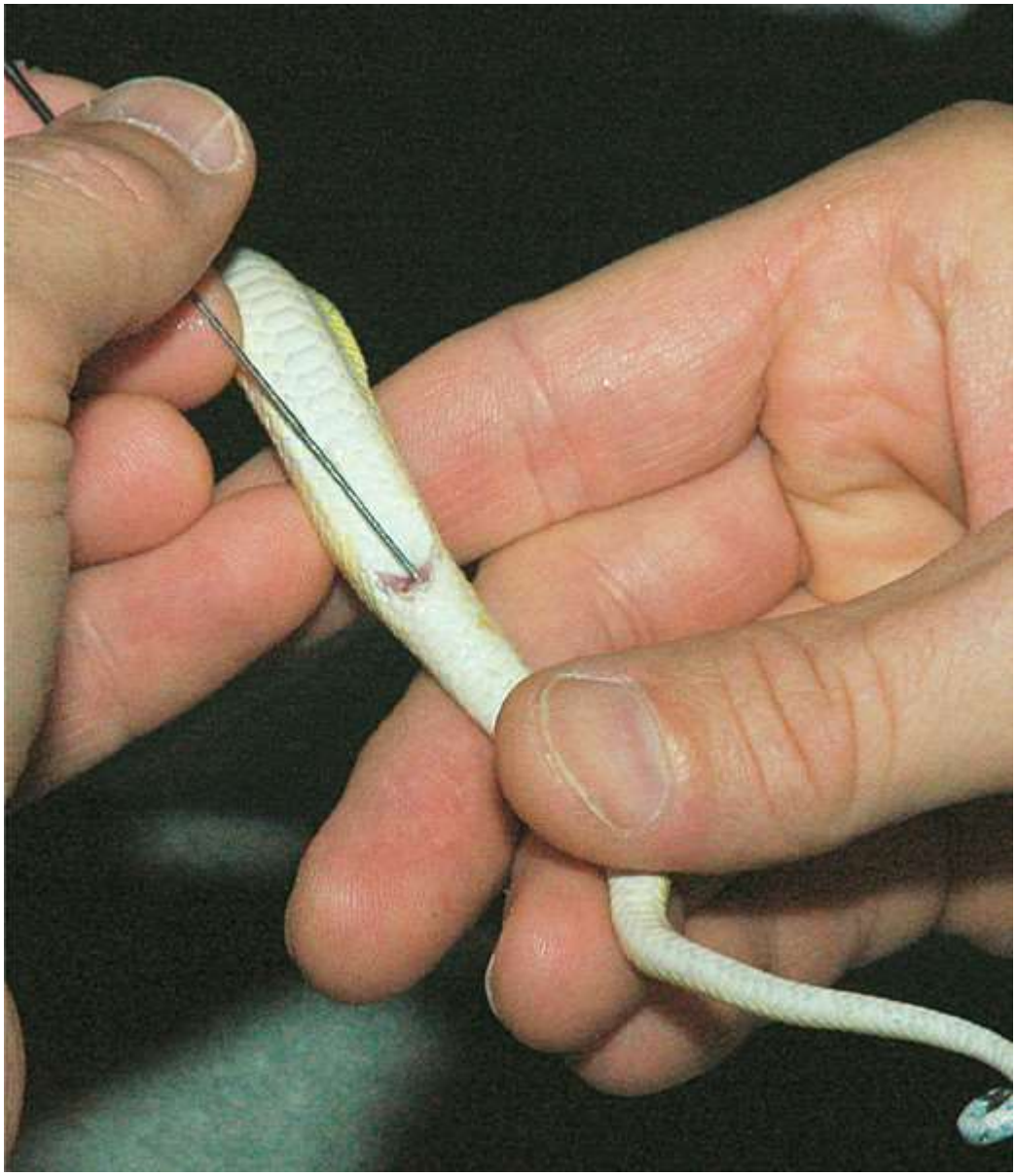
Sexing Chondros

It goes without saying that breeding can't take place without a true sexual pair being introduced. It is surprising how often chondros are mis-sexed, and how frequently would-be breeders attempt to guess the gender of their animals. Other

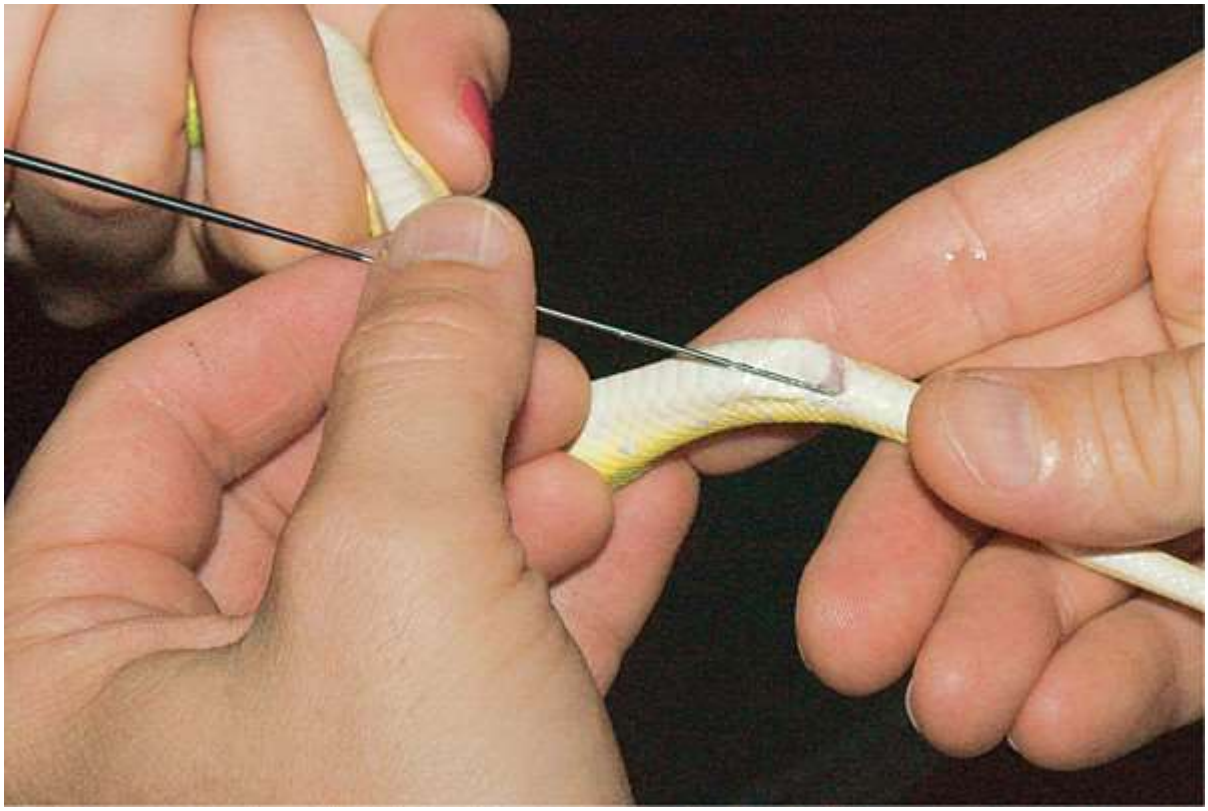
than the presence of sperm plugs (see photo on page 216), the only reliable way to sex chondros is by probing. This should only be done by an experienced person on chondros that are 100 grams or larger, which is usually about one year of age. Accurate probing is a learned art, and practicing on less delicate species such as corn snakes is a safe way to learn. The following series of photographs illustrate the correct technique. The best time to probe a chondro is just after it sheds, when it is likely to have defecated and shed out any sperm plugs.



It is best to have a helper when sexing chondros. Here, my daughter-in-law, Dena, assists me in probing a yearling. The assistant gently restrains the head and supports the snake's body a few inches above the vent. Wait for the animal to get over the worst of its gyrations before attempting to insert the lubricated probe. The prober supports the tail and body with one hand while positioning the probe with the other. Do not pull on the tail or bend the body of the snake.



After sliding the probe under the anal plate and smearing some K-Y Jelly™ on the vent opening (previous photo), I gently insert the probe into one of the two pocket openings in the base of the tail. This is not always easy, and some animals really clamp down when they feel the probe; wait for them to ease up. Insert the probe with a slight spinning motion, and do not apply pressure to any depth resistance…insert the probe only as far as it will easily slide in. Experienced probers will immediately feel the difference between the shallow, wide pocket of a female, and the deeper, narrow pocket of a male. The male's pocket is actually one of the inverted hemipenes.



After probing the right pocket, I probe the left side. I always check both sides to make sure they feel and probe the same. (Note that I am left-handed, right-handed probers will reverse the position of the hands.)

The position of my left thumbnail marks the approximate depth of the probe indicating a male. Females probe to about 1/3 of this depth. It is important to remember that *feel* is as important as depth when probing; depth can fool you, but feel seldom will.

Chapter 14. Breeding and Egg Laying

"Do a little dance, make a little love, get down tonight, get down tonight."
KC and the Sunshine Band

In this chapter we will cover the real "nuts and bolts" of breeding chondros, before going on to deal with incubation and neonate management in subsequent chapters. While the successful incubation of chondro eggs has been largely reduced to formulas and established procedures, the timing and activities that lead to obtaining viable eggs are subject to variability and the individuality of the animals. In Chapter 13, the first two phases of the breeding process were covered: conditioning and cycling. The next four phases, which I call the main breeding period, consist of courtship and copulation; follicle development; ovulation; and egg deposition. A thorough understanding of the progression and the general timeline of these events can greatly assist the breeder in doing the right thing at the right time, as well as easing stress and worry about what is happening. I don't know about you, but when I am attempting to meet a challenge, I feel better knowing what is happening. To me, knowing what to expect is far better than being anxious and in the dark and grasping at straws. Some of this core breeding activity can be aided or controlled by the breeder, but ultimately the success of each pairing is a matter of compatible breeders being paired at the right time. External factors the breeder has no control over, such as weather patterns, also can have a strong influence on breeding activity and success. But the first step is to introduce your mature, conditioned, and cycling breeder animals to each other when the chances for success are highest.

Courtship and Copulation

Getting chondros to copulate is usually not difficult. Mature, sexually active males will almost always show immediate interest in mature females. Not all males are good breeders; some males have a rather lackluster sex drive; a few seem to have almost none. Males from this last group often act like the proverbial fourteen year old at the high school dance, staring at the prom queen while hanging out against a far wall with little notion of what to do next. Other males, prized by their owners, might attempt to impregnate a hemp rope if placed in a cage with it! For this reason, it is a very good idea to have a heavy male-to-female ratio when setting up a breeding colony. Nothing is more frustrating than having a cycled and receptive female waiting and no interested males available. In fact, I consider a group of mature animals consisting of no less than four or five males and two or three females to be the minimum number and sex ratio to put the odds in the breeder's favor for obtaining one good clutch during a breeding period. Of course, all it takes is one pair to do the job, but we are talking odds, not biology. There is a notable difference between "possible" and "probable," and those with only a single pair of chondros will be lucky to have breeding success.

I like to introduce males to females in the late afternoon. Since males frequently roam their cages at night and can be quite active during the initial

phases of the main breeding period, it makes sense to me to allow males to “find” females by moving them into the females’ cages. Late afternoon introductions allow me to pair the animals just before the evening activity period is about to get underway, but prevent getting a possible feeding response from the female as the cage is opened. If you introduce the male to the female too late in the day, the female may already be in feeding mode and will strike at anything that moves. I often spray the animals lightly at the same time I introduce the male. This may help to spark some activity as the lights go out, may help make scent pheromones from the female more intense, and directs the attention of the animals to the water and the keeper, rather than each other. While I definitely want the male to notice the female quickly, I also want to avoid an aggressive interaction in the first few minutes of cohabitation.

Observing copulation taking place is an exciting first step in your breeding project.

Two excellent times to make introductions are on days when a storm front or low-pressure weather system is approaching, or immediately after the female has shed her skin. Leaving the shed skin in the cage can help trigger interest, presumably due to the release of scent. It makes sense to wait for the female to shed while in the early cycling phase of breeding, because you do not want her to go opaque in the middle of the primary breeding period. There are times when I may choose to introduce a female to a male’s cage; chief among these is during attempts to breed aggressive, territorial females that have a tendency to dominate males and defend a favorite cage location. Placing such a female in a strange cage can allow the male to get a few copulations accomplished before the female reestablishes dominance and stakes off a new place to guard. I continue this pattern of movement with such pairs, switching the female around to keep her off-guard. This trick was described to me by Tomm Phillips, and was successfully used by him to obtain a clutch from his nasty female, the late “Endora,” a wild caught Biak type that unfortunately didn’t survive long after her babies hatched.

Most sexual pairs will be compatible, but not all will be receptive to breeding. Some females (and rarely, some males) will seek refuge from a would-be suitor by escaping to the cage floor. This is not necessarily bad, and I have seen successful mating take place there; the keeper will have to determine by observation if the grounded animal is too stressed to remain paired. I tend not to worry as long as the female is getting bred. Some females will become noticeably agitated, and will evert their cloaca, making a mess by smearing urates around the cage as they avoid contact with the male. This is not to be confused with the behavior, sometimes observed being performed by receptive females, of scent-marking the cage floor or perches with small amounts of urates. Rarely, one animal will show aggression toward the other. While this is very uncommon, introductions must be closely monitored to make sure that such an interaction does not occur. Chondros can inflict serious damage to each other with their sharp teeth, and such wounds can be fatal. Incidentally, never cage two males together! There is a possibility of them combating with each other, and this risk goes up considerably if there are any females nearby. There is no valid reason to house males communally, and to do so is irresponsible and risky. If a sexual pair doesn't show any aggression toward each other after an hour or so, then most likely they are safe to leave together. Make sure to accurately determine the sex of your animals prior to pairing them; don't guess. Pairing females accidentally may not harm anything, but it wastes your time and preparations. Males may be determined by the presence of sperm plugs (see photo on page 173), but unless you are absolutely sure, it is best to probe all specimens to determine gender.

If you observe any stress-related behavior from either animal over the next twelve to twenty-four hours, it is probably best to separate them and try again a few days later. Understand that breeding among reptiles is not based on mutual affection, but often results from the male imposing his intentions on a female. It is normal for some pursuit and evasion tactics to occur between pairs, but do not force an animal to endure the stress and fear of being housed with a mate it clearly doesn't want any contact with. There is seldom any copulatory action between an aggressive male and a truly stressed and unreceptive female. Sometimes the male will actively court the female, but with no mating taking place. If the pair seems to accept each other, but no courtship or breeding takes place in the first few days after being paired, you can leave them together for a while, or you can separate them and try again in a few days. Changing weather conditions, feeding cycles, shed cycles, and other unknown factors (including stages of female reproductive cycles not visible outwardly) can all play a part in determining when pairs are receptive to breeding. Normally, however, a receptive female and a sexually active male will engage in almost immediate courtship behavior, culminating in copulation the first night they are together.

Courtship activities include the male draping over the female, tail wrapping, the male titillating the female with his spurs, scent marking of the cage by the either animal, one or both animals slowly crawling about the cage, and the female exposing her cloaca to the male. Do not confuse tail wrapping with copulation.

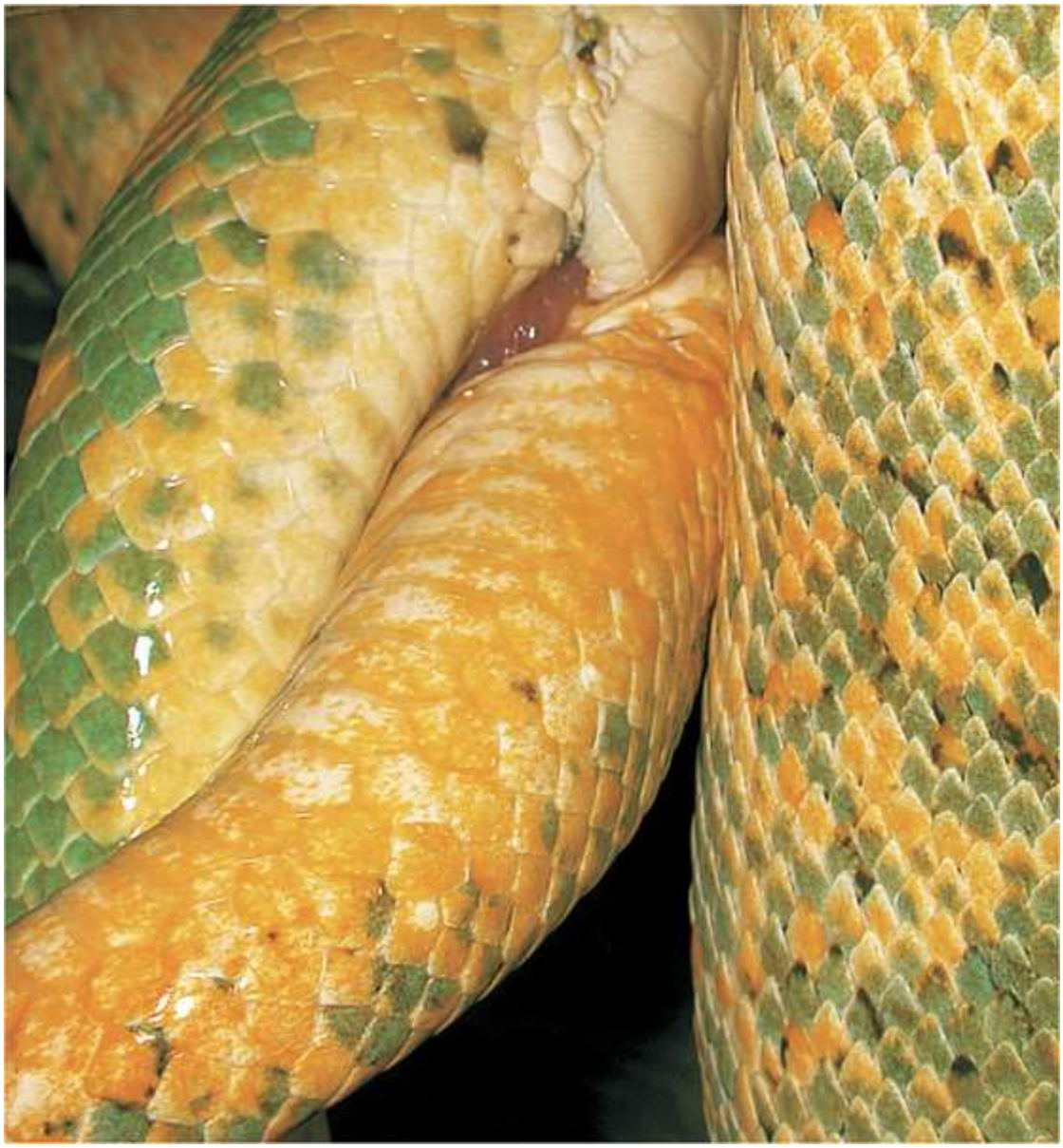
Actual penetration by one of the male's hemipenes, the paired copulatory organs possessed by all male snakes, can be difficult to confirm when looking at an entwined pair of chondros. Tails can be wrapped and the vents aligned without actual breeding taking place, and care must be exercised before a mating is confirmed and entered into your records. At times, a small reddish or purple section of the inserted hemipenis may be visible in the vent of the female, and at other times the position of the tails may make this impossible to see. Sometimes it is clear from the contracted muscles of the male that he has engaged the female.

Courtship behaviors include increased activity, the male draping himself over the female, and attempts by the male to tail-wrap the female. Courtship usually begins at dusk.

Tail-wrapping without actual insertion is common among courting pairs. Care must be exercised to observe actual penetration of one of the male's hemipenes before a true mating can be recorded.

Copulation almost always commences after dark, but can last well into the following day, sometimes exceeding fourteen hours in duration. It is common for a pair to mate several times in succession over several days, and then seemingly ignore each other again. You can leave the pair together or separate them and re-pair them again in a few days. I usually keep my pairs together, often feeding the female in the cage while the male observes her eating, uninterested in food himself. This requires experience and close observation to do safely, and if you have any doubts about your ability to pull it off, it is far better to remove the male. I prefer to disturb or handle my breeders as little as possible, so I don't usually split them up. Exceptions are made for the occasional male that will accept food while sharing a cage with a female (one of my best breeders does this); or when trying to stimulate breeding activity from a slow male by removing him from the female and then replacing him in a few days. Often such males will wander their cages looking for the female, and breeding will resume once he is placed with her again.

Typical entwined-tail position of copulating green tree pythons.



Inset: Insertion of the male's hemipene is visible. It is not always easy to observe this.

I let a male breed a female as often as he will, and for as long a period as he remains interested in her. Keep in mind that it is common for breeding activity to increase and decrease, and just because a pair has not mated in a few days, or even a couple weeks, doesn't mean they are finished for good. Shed cycles will definitely interrupt actively breeding pairs, and they will usually resume copulation immediately after a shed, especially a shed by the female. Copulations between a specific pair can number over a dozen, and will usually take place over many weeks or even months. Unfortunately, multiple copulations do not assure a gravid female. One theory is that consistent breeding activity is an important trigger in stimulating follicle development in the female, so allow your pairs to keep breeding as long as they are willing.

I am frequently asked about breeding a male to more than one female. My personal practice is to try and use one male per female during each breeding

period, sometimes shifting a male to a different female if a poor response is observed. It is possible for a male to impregnate more than one female during a breeding period, either from being rotated between several females or from being used with a second female following successful mating with a first. Due to the frequent fertility problems experienced by chondros in captivity, I would not recommend using a male to breed more than two females at a time.

I keep pairs together for as long as breeding activity is being observed. Males will often breed a female for several days, seemingly lose interest for a few days, and then resume breeding again.

Understanding Follicle Development and Ovulation

Female pythons grow their ova from scratch and must have sufficient fat reserves for this to take place. This is in contrast to mammals, which are born with all their immature ova already in place. In pythons, ova are referred to as follicles until they are released from the ovaries, during an event called ovulation. Follicle development and ovulation are separate occurrences, and they are frequently confused with each other. Both are associated with certain types of swelling, making them difficult to differentiate at times. Ovulation must take place for viable

eggs to be produced, and it always follows follicle development in sequence. A detailed examination of both events follows, which should help to clear up this sometimes confusing aspect of chondro reproduction.

Follicle Development

The first real progress in obtaining a fertile clutch of eggs from a female chondro is made when she begins to develop ripening follicles. Outward signs that this is taking place include a puffy or swollen appearance, a change in coloration that usually is lighter than normal and often bluish, going off feed, a personality change, a change in thermal preference, and a flattened or sunken appearance in the head. Not all specimens exhibit all of these symptoms, and going off feed, along with color shifting and some swelling, are the most reliable indications that something is happening. Perhaps others are more sensitive to the "sunken head" effect than I am, but this has not been a common or easily observed sign in my experience. Some females will seek heat during this time, and some will seek cooler temperatures. It is important to provide a thermal gradient with a basking spot for females with developing follicles. If a female is not seeking heat, I will continue providing a mild nighttime temperature drop. If she is staying in the basking area, I will usually end the thermal cycle at that time and restore full heat, although I am not in a hurry to do this. I often wait to restore nighttime heat until the female ovulates. As always, try to be sensitive to what the female is telling you she needs.

The two females shown on this page are exhibiting classic signs of growing ripening follicles. Notice that they are coiling normally, and a noticeable swelling can be seen with the coil rolled slightly over the perch. The underside of the coil is flat.

Developing females usually go off feed suddenly, but a few may taper off after wrapping and dropping food several times without swallowing it. I always offer food to breeding females until they are solidly off feed. The length of time from first copulation to the onset of fasting can vary quite a bit. I have had females go off feed as early as two weeks following first mating, and others have continued to eat for close to two months. Keep in mind that most successful breeding results from multiple copulations, and it is normal for females to continue to eat while being bred. The average time from first copulation to first refused meal is about four weeks. A normally ravenous female suddenly refusing food after a few weeks of breeding activity is usually the first indication of progress. It is not a guarantee of anything; there are no guarantees with chondro breeding.

Most developing females will begin to show some swelling in the weeks following food refusal. Females usually appear swollen anywhere from ten to thirty days after going off feed, and forty to sixty days following first mating. (Females that appear swollen but are still on feed are seldom developing follicles

and will usually remove all doubt when they defecate and appear normal again.) The number of developing follicles has a lot to do with how large an individual female will come to look, and in some females the swelling is not a reliable indicator, being no larger in appearance than normal fat reserves. However, as they progress, most females do show a sufficient amount of swelling to give an experienced observer a pretty good idea of things to come. Some females get so large that all doubt is removed, and may even appear uncomfortable, shifting body positions frequently. Most females will lie quietly during the period of follicle development, not moving for days on end. As a rule, developing females normally perch in the inner-looped manner common to resting chondros. The swollen area of the body may hang under the perch where it appears much like a digesting food item; or it may be draped on top of the perch, causing the swelling to appear quite large. The female may often be seen rolling her coils slightly sideways, exposing them to basking heat. This swelling can be mistaken for ovulation, and can trick even experienced breeders into wondering if this event is taking place.

Many developing females show a color shift as they go off feed and begin to swell. A few may darken, but most lighten in color. Some females undergo the well-known blue hormonal color shift, and such specimens are truly beautiful and add to the growing excitement of the breeder. Not all females turn blue, and not all that do go on to have a successful breeding. Some blue females will retain much or all of the blue, but many will return to a green or aqua color. Some females retain more blue each time they are bred and become permanently blue after their third clutch. Females often show a personality change, with normally sedate specimens becoming irritable and cross animals becoming abnormally quiet.

This female is full of ripe follicles and is basking with the characteristic sideways rolling of the coils. Urate stains from courtship activity are visible on the perch. The female ovulated about one week after this photo was taken; compare her posture here with her ovulation photo on page 249.

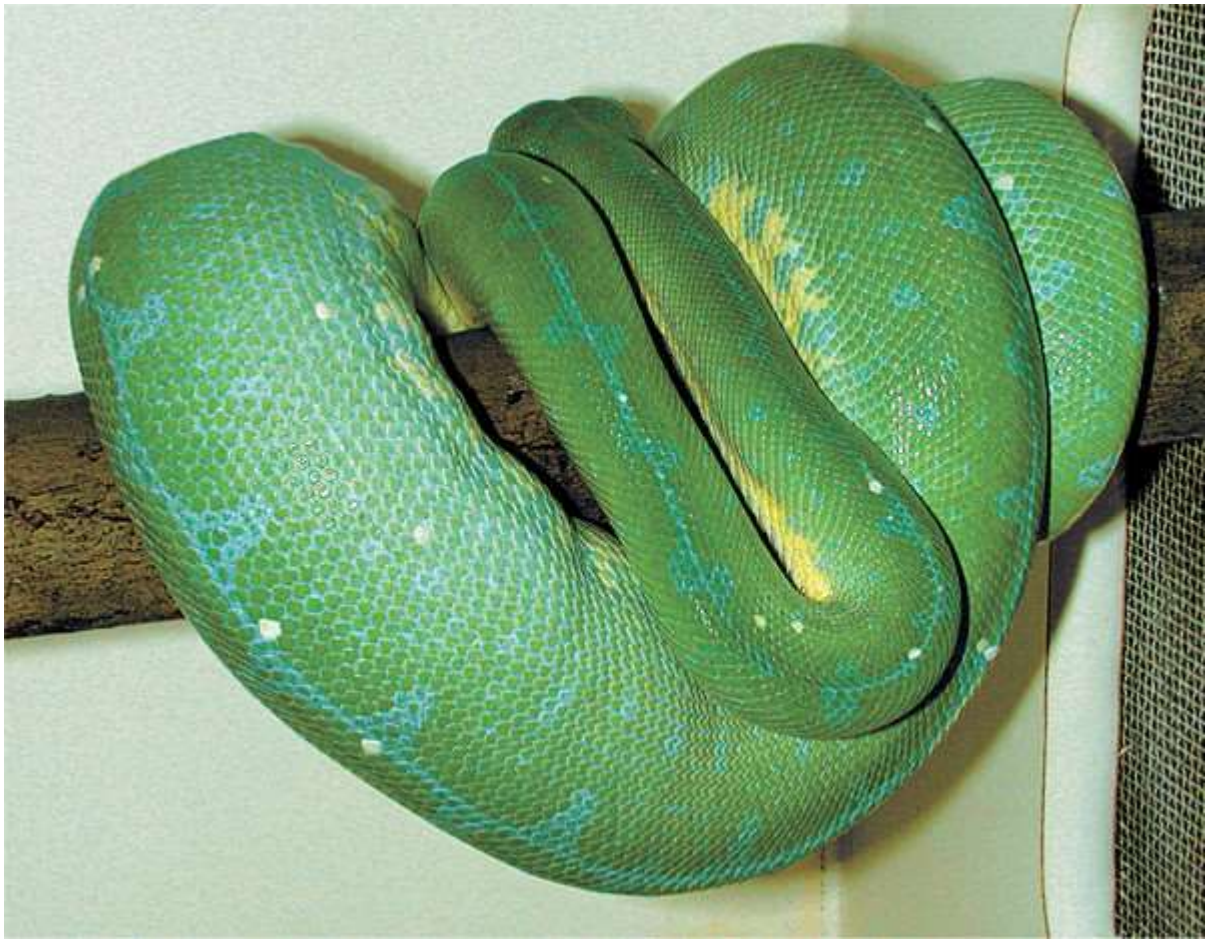
It is during this time of change and outward symptoms that many believe their females to be gravid, but this is not the case yet. Certainly such females are on a course that will hopefully culminate in a successful breeding, and I use the term "developing" to describe females that are off feed and filling up with ripening follicles. However, until the female undergoes a successful ovulation she is not gravid, and she may in fact reabsorb her egg follicles and return to a normal feeding and behavior pattern, leaving a very frustrated and confused breeder to wonder what happened. "What happened" is that her ovaries reabsorbed the developing follicles, resulting in no ovulation and no clutch. The cause of this phenomenon is not clear, but there is evidence to indicate that failure to provide the pre-gravid female with sufficient heat can contribute to this problem. This was commented on by Walsh in a 1979 paper, and has been observed in my own collection as well. I once had a female absorb obviously developing follicles when I failed to notice that the ceramic heater over her cage had burned out.

OVULATION

Ovulation is the process of the ovaries releasing ripe follicles into the oviducts, where they are (potentially) fertilized and shelled. A normal ovulation is fairly easy

to observe once you understand what to look for, but Rob Worrell is generally credited with being the first to note that the ovulation swelling is observable in chondros on an average of forty days prior to egg deposition. A lot of early confusion resulted from a misunderstanding about what takes place during ovulation, the difference between ovulation and follicle development, and at what point a female chondro becomes gravid. But today the process is understood and there is no need for anyone to be in the dark about what is happening with their snakes. The dictionary defines ovulation, "to discharge ova," and it is universally understood that an animal cannot be gravid (pregnant) until ovulation occurs, because ovulation is the process whereby mature follicles (ova) are released from the ovaries for fertilization.

At the onset of ovulation, the mature follicles begin to be released from the ovaries, and they are then gathered into the body cavity (Barker, pers. comm.). Female pythons can sometimes be seen contracting the muscles as this takes place (Jannotti, pers. comm.). Ovulation is accompanied by the quick onset of a very noticeable mid-body swelling that lasts from twenty-four to forty-eight hours, and disappears as quickly as it developed once ovulation is concluded. Females show signs of being very uncomfortable during this two-day period, and ovulating females are usually quite restless and active, sometimes moving from one end of the cage to the other every hour or so and frequently shifting positions while perching abnormally. One thing that may be counted on during every normal ovulation is the large bloated area of the body. Females at the height of ovulation usually assume a characteristic stretched out posture, with the bloated area unable to flex over the perch and appearing stiff. This swelling is caused by the released follicles, now referred to as ova, being grouped up inside the female just prior to their entering the oviducts and being fertilized and shelled (if all goes well). Ovulation is an exciting event on the breeding calendar of the breeder, because for the first time since conditioning began there is likelihood that something positive is going to take place. Ovulation marks the first date that can be used to predict the egg deposition and hatch with a fair degree of accuracy. Ovulation does not guarantee that fertile eggs will be laid, but a normal ovulation usually results in at least a partially fertile clutch.



Onset of the ovulation event, with rapid, localized swelling. The coil is round in cross-section and is unable to bend over the perch. Compare to the same female at the top of page 242.

A classic ovulation swelling and posture. This female appears to more comfortable than was actually the case, and she held this resting pose for only a few minutes. Compare this photo to the same female on the bottom of page 242.

There is a wide variation in the length of time from first food refusals to ovulation; the same is true for last copulation-to-ovulation time spans. I have records of females eating nine days prior to ovulation, and those that went over fifty days. Length of time from last recorded copulation to ovulation ranges from five days to seventy! While I have observed a loose correlation between the length of time from last copulation to ovulation and fertility of clutches (with shorter times usually associated with higher fertility), the seventy day span did result in a large and nearly 100% fertile clutch. These highly variable time spans can be frustrating to breeders who are looking for specific answers to the "how long" question about ovulation. Fortunately, there is one time measurement that is much more consistent than those already mentioned: ovulation usually takes place from four to eight weeks after the signs of follicle development are noted. Probably this time-frame is less variable than it may appear, because not all females show swelling and other signs as clearly as others, and pinpointing the exact date of first swelling is subject to the eye of the breeder. I believe that most females ovulate about one month following noticeable swelling from maturing follicles.

Once a female ovulates, the odds are high that she will go through the deposition phase of breeding. This is because there is no biological mechanism in place for the female to absorb follicles once they are ovulated and shelled (Barker, pers. comm.). Ova may pass from the gravid female as viable eggs, fully shelled

but infertile eggs, or slugs. Slugs are small yellowish objects that are usually solid and dry; infertile eggs may appear completely normal (and fertile) outwardly or they can be soft and wet. There is evidence that unshelled slugs may be reabsorbed, even after ovulation takes place (Crafton, pers. comm.). Two incidents in my own experience confirmed this, when females passed a few small slugs following large ovulation swellings. Females that go longer than 45 days post-ovulation without laying eggs or slugs should be examined to determine if they are egg-bound. This may require an x-ray, but proceed with caution; chondros can always surprise us, and as noted later, I had one female lay on day 49 past her ovulation. In my experience this is highly unusual.

The inexperienced breeder may have trouble distinguishing between a swollen female full of ripe follicles and the ovulation event. Once enough females have been observed in both conditions, the differences in behavior, posture, and appearance become clearer, and experience brings a degree of confidence to the breeder who is determining which phase his or her females are in. The following tips, with the accompanying photographs, should help breeders identify the differences between follicle development and ovulation.

Females with ripe follicles often sit very quietly day after day. Some choose to bask and some prefer the cooler side of the cage. Developing females often assume one of two common resting postures: One in which the body section containing the follicles hangs in a low loop just under the perch, much as an animal perches when it has eaten a large meal; the other is a tendency to roll the coils sideways slightly, especially when basking. While this inverting of the coils is not practiced by female chondros to the degree of other gravid boids (which may turn the section with eggs or unborn young completely upside down), it is assumed that the function is the same – to expose the developing follicles (or young) to more heat. With female green tree pythons, the coil containing the follicles can appear large and somewhat distended when on top of the perch and rolled this way, and some breeders mistake this for ovulation. It may be noticed, however, that when the coil is rolled sideways over the perch, the top of the coil appears swollen and large, and the underside of the coil (where it contacts the perch) will have a slightly hollow look to it.

Ovulating females, on the other hand, are almost always very restless, shifting positions and perch locations and seldom, if ever, maintaining the normal inner-looped resting coil. The ovulation swelling is solid all the way around the body and belly, with no hollow area. It can look so large that one may begin to fear for the safety of the female, thinking she may burst! Females experiencing a large ovulation are clearly uncomfortable. I have had two females ovulate on the floor of the cage; in both cases the swelling was not as easy to discern as with a perched female. The large, localized bloating, rapid onset of the swelling, fullness of the body shape at the swelling, and the behavior of the female will almost always serve to distinguish ovulation from any other swelling.

A wild collected Aru-type female ovulating on the floor of her tub. Even without being perched, the swelling and discomfort was evident.

Of course, some females won't divulge what it going on inside themselves that easily, and a few can appear to be restless and semi-swollen several times prior to the full ovulation event. It is possible that these females, which definitely appear to be experiencing something, may be releasing a few follicles prior to the main event. The keeper will simply have to watch and wait to see what happens, and taking notes and snapping a few photos can help when looking back and piecing together an overall timeline. However, there is only one main ovulation event, and this is almost always observable if a fertile clutch is to be obtained. There have been isolated reports of females having two ovulations; one person even suggests that this is the norm. My own conclusion, made after years of observing many gravid females, is that such reports confuse some of these preliminary swellings for multiple ovulations. All my "textbook" breedings from the last nine years have clearly had one large main ovulation event. Still, chondros can throw curve balls at

the most experienced keepers, and observers may differ as to the conclusions drawn when marking events on the breeding calendar.

The same female shown on page 244, seen here in the middle of her ovulation event. Again, the bloated mid-body swelling and uncomfortable posturing, combined with the rapid onset of these, will almost always serve to distinguish ovulation from follicle development. If you aren't sure, it probably isn't ovulation…or at least not a normal one.

Throughout this ovulation discussion, I have mentioned watching for the signs of a "normal" ovulation. Female chondros do not always have a normal ovulation. If all goes according to the book (no pun intended), the swelling should develop quickly and smoothly and have a peak time of twenty-four to thirty-six hours before smoothly reducing in size again. If there is much deviation from this normal pattern and timeframe, including repeated small ovulations, no visible ovulation, or the swelling lasting much longer or shorter than noted, then the result is usually either infertile slugs, a combination of infertile and good eggs, or a half-sized clutch of good eggs. Normal clutch size for an average adult female weighing 1200-1500 grams is between eighteen and twenty-four eggs; clutches numbering nine to twelve eggs often seem to be related to less than perfect ovulation and are assumed to be the result of one ovary not ovulating. With some experience, the breeder can usually tell from observing the ovulation if the clutch is going to be a good one or not. As I have learned, however, even this is not a guarantee of good results.

I always restore heat to females once they ovulate, if I have not done so already. Gravid females will usually adopt a location that is suited to their thermal preference and gestate there without much movement. This will often be in the basking area under the heat panel. Gestation averages thirty-eight to forty days, although it can range from thirty-seven to as long as forty-nine days, in my experience. Keepers with gravid female chondros can use this time to prepare for egg deposition and incubation. I note day forty from ovulation on my calendar and plan on keeping the few days just before and after this date free of obligations so I can focus on setting up the eggs when they arrive.

The Pre-lay Shed

Female chondros almost always undergo a pre-lay shed fourteen to twenty-one days prior to egg deposition, and the timing of this event can be combined with the ovulation date to ascertain, within a few days, the likely timeframe for the eggs to arrive. I have had females lay as soon as day twelve and as long as day twenty-one post-shed, but the average seems to be from days fourteen to sixteen. I have never had a female lay her eggs without undergoing the pre-lay shed, and Walsh has experienced this once in twenty-five years (Walsh, pers. comm.). With chondros, there are exceptions to everything, and there are records of females skipping the shed, but this should not be considered normal or common. The pre-lay shed usually occurs predictably on day twenty-five or twenty-six following ovulation. In my experience, the shed is the more reliable indicator of when to expect the eggs if there is a discrepancy between the shed and ovulation dates. For example, when one of my females went all the way to day 49 post-ovulation for egg deposition, she still laid on day fifteen post-shed.

Make sure to hydrate opaque, gravid females well. This is not only to ensure that they will be in good health for egg laying, but also because the last thing you want to do is soak a dried shed off a gravid animal. If your female has been off feed for a while, was bred multiple times, appears swollen, and then goes opaque without an apparent ovulation, it is best to prepare for eggs based on the pre-lay shed schedule outlined above. It is possible that the ovulation took place and was simply not recognized. By the way, chondros do not have a pre-ovulation shed as is sometimes reported.

Nest Boxes

I provide my females with a nesting box as soon as they complete the shed, if not sooner. Some females that appear uncomfortable on a perch, or that lie on the cage floor, will benefit from having a nest box provided for them before they reach the pre-lay shed stage. I do not recommend giving females a nest box before they ovulate; there is no need to do so, and it can make observing ovulation difficult if the female enters the box and stays inside. Although many gravid females will not enter a nest box until just a few days before laying their eggs, some enjoy the security of such a box and will make a habit of resting inside it even when not being bred. At any rate, chondros do not need a nest box until after they ovulate or

shed. Providing one sooner than this just complicates being able to observe the female, and having a nest box in the cage does nothing to advance the progress of the breeding.

Pine nest box used by the author for gravid chondros, with clear front, hinged lid, and access hole on the side. The raised back allows for screwing the nest box to the cage wall.

I make my nest boxes out of pine, with a hinged top for easy access, and a clear Plexiglas front for easy viewing. I cover this clear front with dark paper when not actually viewing the interior. My boxes measure about ten inches square and the bottoms are lined with a few inches of dry sphagnum moss. An access hole about three inches in diameter is made on one side. I prefer to mount my nest boxes with the access hole about perch height, but they can be set on the floor of the cage. You can also use several other types of containers for nesting boxes, such as plastic ice cream tubs of appropriate size with a hole cut in the lid and dry moss inside. My first clutch of chondros was hatched using maternal incubation in such

a container, but I have come to prefer wood nest boxes. They seem more natural, and females seem to like them better. For maternal incubation, they are also more thermally efficient than plastic. You can use just about any wood or plastic container for a nest box, as long as it is the right size and has an access hole located so the female can enter easily.

A gravid female basks under the heat panel, near the nest box entrance. I provide nest boxes to females after the pre-lay shed.

The ambient temperature at the location of the nest box should be about 85°-86°F. It is especially important to measure and regulate the floor temperature of the nest box because the female will need to be comfortable or she may not use the box. If the cage floor is too cool, you can use a small heat pad made for using underneath aquariums to warm the nest box. Attach the heat pad to the underside of the nest box with masking tape. If you do this, be sure to use a thermostat, placing the probe on the floor of the box and adjusting it to maintain an 85°-86°F temperature. The easiest way to check this, and the body temperature of the female when she is inside, is with a non-contact gun such a Raytek. Nest box temperatures of more than a couple of degrees lower or higher than suggested may not be ideal for the maturing eggs, and may also be rejected by the female.

Most females will enter the box several days before the eggs are deposited. As mentioned above, some will enter it sooner, but this doesn't have any real significance as an indicator of breeding progress. As exciting as it is to see a female enter a nest box, the use or non-use of a nest box by a particular female is not an indication of a successful or failed breeding. In other words, do not judge

the status of things by whether or not your female enters the nest box. However, it is important to observe your female as the time window for egg deposition draws near.

Females may grow restless in the nights just before egg deposition, and may enter and exit the nest box several times before settling in. New breeders sometimes place too much importance on the timing of females entering the box.

Females usually enter the nest box for good about 2-3 days prior to laying.

Rarely, a gravid female will not use a nest box and will lay her eggs in the water bowl or drop them from the perch. These females usually telegraph this behavior by acting restless and never settling down into the nest box. Females will often be in and out of the box a few times before making a permanent entrance to it and this is not a problem, but females that are constantly cruising all over the cage as the date window for eggs draws near should be viewed with suspicion. My own practice is to seal females acting this way in the nest box by day 14 after the shed. I have only one female in my collection that habitually refuses to lay in a nest box, but she settles down nicely once I seal her in by taping a piece of cardboard over the entrance hole. She will even brood the eggs normally if I let her. You can wait until the female enters the box to seal it, or place her inside yourself if she refuses to enter it. Restless females may choose to use a different type of nest box, or one in a different location, so experiment if you have a troublesome female. It may be a good idea to replace the normal water bowl with a small one to help prevent the female from laying eggs in it. Make sure to maintain an adequate humidity level for gestating females. Not only will this make them feel at ease, but it will protect the eggs from desiccation while they are being laid.

Typical circular coil with tail in the middle that most females adopt as they deposit their eggs. Three freshly deposited eggs behind the vent show the slightly yellow or tan color eggs have until they dry and turn pure white, as the rest of this clutch has done.

Egg deposition usually begins early in the morning, sometimes before dawn, although it can take place at any time of the day. Females usually require several hours to complete the egg-laying process, and signal the completion of the job by forming up the clutch in what is called a beehive coil. This is a characteristic tight vertical coil with the head on top. (See photo in the Maternal Incubation section.)

This female has nearly completed the job of laying her eggs and is beginning to tighten her coils preparatory to forming them into a mass for brooding. *Below*: Eggs are soft and flexible until the shells have dried. The orange-looking spots on the eggs in both of these photos are small areas of poor calcification. These eggs usually hatch without any problems.

The breeder will usually have made a choice of incubation method before the eggs arrive, and can proceed with setting up the clutch for maternal or artificial incubation once the female has completed laying. We will look at both methods in detail in the next chapter.

Eggs are soft and flexible until the shells have dried. The orange-looking spots on the eggs in both of these photos are small areas of poor calcification. These eggs usually hatch without any problems.

CHAPTER 15. INCUBATION

"When the press talks about my successes… hardly anyone mentions that I usually had more and better information than my colleagues."

Lyndon B. Johnson

There is no doubt about it: GTP eggs are one of the more difficult kinds of python eggs to hatch successfully. Some have disputed this statement on the grounds that they have hatched *Morelia viridis* eggs without much difficulty. However, there is no arguing the fact that green tree python eggs are more delicate than those of many other kinds of snakes. Chondro eggs will rapidly show signs of distress if they are subjected to conditions that fall outside of the narrow parameters they require. However, to say that some progress has been made in the last few years would be an understatement, and many new breeders are experiencing first-time success, even with artificial incubation which was once considered to be a very hit and miss proposition. Much like learning to use a computer, some have an aptitude for incubating eggs and some find success to be elusive. In this chapter, we will discuss both maternal and artificial incubation, with detailed methods outlined for the successful employment of either type, as well as the pros and cons of each to help the breeder choose the method best suited to his or her situation.

MATERNAL INCUBATION

In the wild, female GTPs brood their eggs and most captive females will readily do this as well. There is something very satisfying about watching a female brood her eggs, and it is an experience I highly recommend for every breeder to observe and learn from at least once. While I mostly use artificial incubation these days for reasons mentioned later, I have a great fondness for maternal incubation. This is not only because of the high rate of success I enjoyed with it early on, but also because I understand artificial incubation better as a result of watching mom do it. I don't think that anybody can argue that mom doesn't know best! By watching a female incubate her eggs and observing their appearance, the potential user of an artificial incubation method can see what incubating eggs are supposed to look like. Maternal incubation is definitely a good choice for many new breeders, but it isn't foolproof. I have had several 100% hatches using this method, but also some dismal failures. Maternal incubation is kind of like a glass of cold milk – when it's good it's very good, but when it's bad, it's horrible. I'll share more about how to tell which direction a specific clutch is going in a minute.

Maternal incubation is easy, and no expensive or fancy equipment is needed. If you are using a cage that can sustain continuous moderate humidity, you don't even need a special setup, and the female can incubate her eggs right in the cage where she laid them (inside a nest box, of course). The only conditions required for successful maternal incubation, once a good clutch is laid in the nest box and the female is willing to brood them, is adequate humidity and the correct ambient temperature. Notice I said adequate humidity, not high humidity. It has been stated

that chondro eggs need close to 100% humidity to hatch, and this has caused some of those using maternal incubation to believe that the cage or chamber holding the nest box must be kept saturated. Not only is this a false idea, but it can also lead to unhealthy conditions for the mother and the eggs.

An Aru-type female with her eggs, showing the type of beehive coil needed for good maternal incubation. A good high coil will lift the eggs off of the substrate and completely control their environment.

Excessive moisture is a great enemy to chondro eggs, and many new breeders would be surprised to see the moderate level of humidity that will successfully hatch maternally incubated eggs. (Artificial setups require a higher humidity level, more on this later.) I use a large incubator as a brooding chamber for maternally incubated clutches, and humidity is provided by tubs of water placed on empty shelves. Other than a light fog developing on the lower part of the glass door, no other outward sign of humidity is present, and the hatch rate from good clutches is excellent. Unlike chondros being kept in maintenance cages, I do not cycle the humidity for brooding females, but provide a constant, moderate level of humidity. Dripping condensation on the glass and mildew growth indicate excessive humidity levels. Also, it is important to make sure that the interior of the nest box remains dry at all times, both before and after egg deposition. The goal is a

moderately humid chamber that is neither too dry nor too wet. Frequent light misting, large water tubs, and damp substrate can all help in maintaining an adequate humidity level. Also effective is a moist bath towel hung over a perch: it evaporates moisture into the air. If you use this technique, change the towel as soon as a mildew odor is detected. Using a diluted Chlorhexidine solution to dampen the towel will help to prevent bacteria growth. I place a few drops of this antibacterial in my incubator water tubs when filling them.

A good mother with a nice beehive coil and perfect-looking eggs. The female has been induced to move from the top of the eggs for this photo; normally the eggs are not visible. Photo courtesy of K. Tepedelen.

It has been demonstrated that brooding female chondros regulate the temperature of their eggs differently at different stages of development. It was discovered that females cycle their eggs throughout the incubation period, maintaining them at a slightly cooler temperature during the first and seventh weeks. This was first verified in the early 1980s by Dr. L.H.S. Van Mierop, whose experiments helped to establish the temperature regimen for successful incubation that is still used by some today. Dr. Van Mierop's work also showed that female chondros are able to raise their body temperature by as much as 7°F above ambient conditions (Walsh, 1997). During the warmest period of incubation, the female

will increase the egg temperature to approximately 89°F. If you provide her with an ambient temperature of 84° 86°F outside the nest box, then she will be able to regulate the eggs without expending an excessive amount of energy. Note that the temperature inside the nest box will be higher due to the heat generated by the brooding female. The ambient temperature range stated will allow her to regulate her eggs with the least amount of expended energy, and yet will require her to do enough to be in control. I reduce the ambient temperature to the low end of this range in the final week of incubation, because females lower the temperature of their clutches as noted, and I want to make sure they can cool the eggs to the temperature they choose, not being limited by an ambient temp that is too warm. Neither the humidity level nor the ambient temperature is super critical, and as long as brooding females are provided these within the ranges specified above, they will do the rest. I once hatched a clutch of eggs that suffered through a three-day power outage, forcing the female to brood her eggs with ambient temps in the mid 70s until the heat was restored. All the eggs hatched.

The first thing to do when considering using maternal incubation for a specific clutch is to assess the overall pregnancy and the reproductive history of the female, if known. If the ovulation was abnormal, you should plan on using artificial incubation, because a poor or irregular ovulation usually means poor fertilization. Females with a history of infertility or poor brooding instincts make mediocre candidates for maternal incubation. Once the clutch is being laid, try to candle a few of the exposed eggs (see Egg Management in the Artificial Incubation section) to determine fertility and strength. Obviously infertile eggs indicate a need for artificial incubation. Finally, observe the beehive coil of the female. A good mother will form up the clutch and hold it in such a way as to control the environment all around the egg mass, even holding it up off the floor of the nest box. If the clutch is too large she may not be able to do this effectively. A flat, pancake-type coil is not good. If a willing female is provided with the correct environment, the factor that will determine the ultimate success of maternal incubation is the viability of the clutch. If they are strong, and all are fertile, you will be setting up your new babies in 49 days. However, the Achilles' heel of maternal incubation is the presence of wet slugs. These are shelled but infertile ova that have begun to decompose at some point in the incubation process. Small, yellowish unshelled slugs are seldom a problem and will harden and dry up, posing no threat to the good eggs, but wet slugs can and will quickly ruin entire clutches once decomposition is underway. These infertile ova can appear dry and white, just like fertile eggs, when first deposited, although some appear to be soft and wet from the beginning. The dry but infertile eggs will turn bluish green, brown, or purple when they begin to rot, and will smell very foul. Detecting this odor can be the first clue to trouble, since the female will often not allow a very thorough inspection of the clutch once she forms up her beehive coil. I do not know if the presence of toxic gases, along with the contact moisture present when slugs are rotting, contributes to the demise of good eggs, but I *can* tell you that failure to remedy the situation will very likely result in the rapid death of all the good eggs.

Other species of snake eggs can and do hatch when in contact with bad eggs, but chondro eggs are very sensitive and will not tolerate such conditions, so ignore the skeptics who contradict this advice. If the bad eggs are located at the bottom of the beehive coil they can kill the entire clutch before anything becomes visible at the top, which is often all that the female will expose when disturbed.

This female is attempting to brood a clutch of twenty-four fertile eggs. The clutch is too large for her to manage, resulting in a flat coil and one egg left outside. The eggs were removed and successfully incubated artificially.

Left: Three slugs, and an infertile egg. The egg looks normal, but candling revealed no veins or embryo. Such eggs will eventually rot and turn into wet slugs (*below*), threatening the survival of good eggs.

Since most females will not allow the removal of slugs without a potentially dangerous battle, most breeders choose to pull the female from the clutch if slugs are shown to be present, and finish incubating the good eggs artificially. Because there is always the possibility of this happening with any given clutch, an artificial setup must be ready at all times unless the breeder is willing to assume the risk of losing all. At least one person has claimed success with pulling and then replacing the female while removing bad eggs, but I consider this risky. For one thing, slugs don't all decompose at the same rate, as anybody who has artificially incubated infertile eggs can attest. I would not want to be continually removing the female to check for more bad eggs. (Even eggs that candle fertile can die and decompose.) In addition, the clutch might be affected adversely if you wait to discover whether a removed female is willing to reestablish her brooding of the egg mass. It is always a judgment call whether to remove a female and switch to artificial incubation, but at times the survival of the clutch will depend on it. I visually inspect the clutch as best I can by prodding the female into lifting a coil or two; this is done weekly, along with a daily scent check of the brooding chamber or cage. Healthy chondro clutches have a distinct mild smell, but the harsh foul odor of rotten slugs will not

be forgotten once you smell it. At the first sign of trouble, it is best to consider pulling the female. The entire clutch can spoil very quickly once decomposition begins, so move quickly if you decide to move at all. It is worth noting that occasionally one or two eggs in an otherwise good clutch will turn dark purple or black, and sink in. Such eggs seldom smell or turn wet, and are not harmful.

I remove the female from the egg mass when the first eggs begin to pip, and then set up the eggs in a hatch tub as described in the next chapter. Babies left to hatch with the mother still coiled around the egg mass are subject to possible damage from crushing, or from trauma if the female attacks the breeder when the progress of the hatch is checked. The female will loosen her coils as the eggs begin to pip and the neonates show them-selves. Use care when removing the female, moving quickly and with confidence as you restrain her head and unwrap her from the eggs. Having an assistant can be of great help in this process. Another good reason to remove the female at this stage is so that you can pip any eggs that have not done so on their own within twelve to twenty-four hours of the first eggs. It is not uncommon to lose a few full-term neonates from the bottom of maternally incubated clutches; manually pipping these eggs may save them from full-term egg death.

Aru mother with pipping eggs. Females will loosen their coils as the young begin to pip.

The recent increase of success by those using artificial incubation has caused some bad press for the further use of maternal incubation, but I feel it can be the right choice for some. It is easy to do, and provides insight into yet one more

fascinating and mysterious element of chondro behavior. Maternal incubation can mean the difference between success and failure in the event of a power outage if the breeder is not equipped with a generator, and it allows the breeder to be gone from home with much more peace of mind. For those not blessed with a detail-oriented personality or good egg care instincts, maternal incubation is the way to go. And, it is nature's way. Maternally incubated eggs almost always hatch like clockwork on day 49 of incubation, and there is no greater thrill than watching those little yellow or maroon faces peer out at you from the inside of mom's coils. It is a mental image you will have for life.

A high white Aru-type female with her newly hatching yellow neonates. In this instance, the nest box is a plastic bucket. I dare you to stick your hand in there! Photo courtesy of Chris Rouille.

Artificial Incubation

For a long time, the prospect of having to use artificial incubation to hatch chondro eggs struck fear into the hearts of breeders not experienced with it. Failures when using artificial incubation were well-known, and total losses were more common

than successes. For years, Walsh and Bessette of Ophiological Services were among the few breeders who claimed consistent success in the US, utilizing a technique that worked very well for them but unfortunately was not easily duplicated by others. This fact and the many failures associated with early GTP incubation attempts, led to the understandable conclusion that GTP eggs were extremely difficult to hatch using artificial methods. OS employed the use of large clear jars with screw-on lids to hatch eggs, with humidity supplied by damp pea gravel in the bottom of the container. This was covered with dry moss, and the humidity was regulated by the tightness of the lid, as well as the humidity level of the incubator. Once this closed system had the kinks worked out of it, success was obtainable, and I hatched my own first artificial clutch using this method, but only after several failures while I learned to adapt the method to my own equipment. As is true with many incubation methods, the OS jar technique requires the person using it to become familiar with his or her apparatus and how to tweak it. The closed nature of this setup and the lack of air exchange apparently make this method intolerant of any deviation from ideal temperatures and humidity, and in my experience, it is easier to lose eggs in this setup than it is to hatch them. Throughout the 1990s, failure to successfully hatch chondro eggs was frequently blamed on any deviation from the precise temperature regimen that Walsh and Bessette were using, furthering the belief that these eggs were extremely difficult to incubate. But eventually, other artificial incubation methods were discovered that had a much higher rate of success, and slowly the exaggerated difficulty associated with artificially incubating GTP eggs was eased.

The old OS jar setup, showing damp gravel, dry moss, and thermometer probe inserted through the lid.

A real breakthrough occurred when a handful of breeders, including Tracy Barker, Rob Worrell, Jayson Flemming, Rico Walder, and Janet Hickner, reported having success using damp vermiculite along with different temperature regimens. To those having learned egg husbandry from the pioneers in the subject, allowing

chondro eggs to contact a damp substrate was considered anathema, and initially these reports were met with some skepticism. However, the high success rates being reported caught my interest, and I decided to try the vermiculite method. I tailored the technique to my own equipment and the knowledge and experience I already had obtained using both maternal and artificial incubation successfully. I had a near 100% hatch rate using the vermiculite on two consecutive clutches, but I wasn't comfortable with the bloated appearance of the eggs compared to how my maternally incubated clutches looked.

Around the same time, Trooper Walsh revealed a technique he had adapted from one widely used overseas, and by at least one other US breeder (Gurley, pers. comm.). Referred to as the "no substrate" method, the eggs are placed in a small dry container (or a mesh net) and are suspended over water inside a semi-sealed egg box. This assembly is placed inside the incubator, which can be humid or dry. I tried the Walsh adaptation of this method with great success. Walsh uses small deli cups such as those used for packaging potato salad at the grocery store, to hold several eggs each, placing these in clear shoeboxes (see photo on page 268). I have improved on this setup with containers purchased from The Container Store, and with some other small adjustments, the no-substrate method has become my technique of choice.

Both the vermiculite and no-substrate methods are detailed below. I believe that a careful application of either system will give the first-time user a high chance for success. New methods and a willingness to publish them have opened the door for breeders to enjoy the benefits of artificial incubation, with an expectation for success replacing the former dread. It is amusing to hear a few newer breeders scoff at earlier attitudes about the degree of difficulty in artificially hatching chondro eggs, now that easier methods have been worked out and published. Such persons may want to consider what artificial incubation was like before all the recent information was made available, and when answers were hard to come by and failure was common! Indeed, I have been criticized harshly by a couple of GTP producers who resent the success of others and desire to have a monopoly on incubation "secrets." Such attitudes should be ignored!

Artificial incubation has several distinct advantages over maternal, including a much shorter recovery time for the female. This should not be used as an excuse to rush a female into the next cycling and breeding period, but it certainly does make things much less taxing on females and probably results in a longer reproductive life for them. Other important advantages include saving good eggs from contact with bad ones, and knowing the number, strength, and fertility rate of the clutch as soon as it is laid. Disadvantages include potential disaster from power outages (remedied by purchasing a generator), and the need for much more breeder participation and oversight compared to maternal incubation. Artificial incubation is not recommended for those who are not detail-oriented.

Note: Temperature regimens will be discussed in the section on Egg Management.

VERMICULITE

This absorbent mineral has been widely used for hatching snake eggs of all kinds for years, but it didn't become popular for incubating chondro eggs until the late 1990s, when I and a few other breeders published our results with this medium on the Web. Using vermiculite isn't foolproof (no method is), but it is easier than the no-substrate technique to set up because the humidity concerns are less exact and there is more of a safety margin. The eggs draw moisture directly from the substrate, and unless the vermiculite is too wet or too dry, the eggs will incubate nicely and hatch rates are generally high.

To incubate eggs using this substrate, obtain some vermiculite from a garden supply store. It comes in several grades – many people like a medium grade. Coarse can be too chunky and a fine grade may be too smeary and won't allow air to percolate under the eggs. I used a grade similar to coffee grounds for my experiments, and I would recommend a more course grade for those using this method.

Mix vermiculite with clean water until it is damp enough to clump. Squeeze out all excess moisture.

Vermiculite, being characteristically absorbent, has a variable amount of moisture content in the bag, so quoting weight ratios of vermiculite to water are only usable if the vermiculite has been dried. This is not necessary, and I mix mine by feel. Begin by adding enough clean water to the vermiculite to make it moist, and then squeeze out as much water as you can with your hands. The vermiculite

will then be damp and clump easily, but will not be wet and heavy. Place a two-inch layer of the vermiculite in a clear plastic box and drill plenty of ventilation holes in the lid. I like to use the type of domed lid that makes extra air space; Hickner uses another tub placed upside down on the egg tub as a lid. Place the separated eggs on the substrate, embryos oriented up (see instructions about candling below), burying them slightly up to about 25% of their height.

Eggs being incubated in damp vermiculite. The eggs are slightly buried in the substrate and must be monitored carefully to prevent too much swelling, or desiccation. Also check the underside of the eggs occasionally.

The eggs should stay nice and plump, but should not become tight or bloated. Snake eggs are porous and will absorb moisture and gain weight during the course of incubation. They can absorb too much moisture, even to the point of bursting. If the egg surfaces begin to look stretched and taut, increase ventilation or replace the vermiculite with a drier mix. Conversely, if the eggs dent in, mist the vermiculite under those eggs and replace them; they should fill back out. In fact, placing slightly desiccated eggs from other incubation methods on damp vermiculite is an effective way to rehydrate them. I prefer to replace the vermiculite with fresh about halfway through the course of incubation, or any time the overall mix is too wet or dry. I favor this method of regulation, rather than trying to add water to the existing vermiculite. The exception is when just one or two eggs need a little extra moisture; in this case I simply mist under the egg and replace it as noted above. Don't rely too much on a formula or preconceived ideas; let the eggs tell you what they need. As long as the eggs are white and full (but not bloated) the moisture content is okay. Be sure to keep an eye on the underside of the eggs as well as the tops, because vermiculite that is too dry can desiccate the eggs from the bottom. Walsh reported losing an entire clutch of eggs because of this. *Note:* It is normal

for chondro eggs to dent in during the final twenty days of incubation. This can be alarming to inexperienced breeders, but it is to be expected. Actually, an indication of excessively moist vermiculite is full-term eggs *not* denting in.

Be sure to move pipped eggs to a hatch tub (see Chapter 16) when using vermiculite to incubate them. *Caution*: Failure to do so when using a fine grade of vermiculite can be fatal to neonates, which can become coated with the stuff and can even choke on it. This is another reason to select a coarser grade of material over the really fine grade.

Using vermiculite requires close observation and good judgment on the part of the breeder, but the method is not difficult to master once you get a feel for it. It is a hands-on, breeder participation method that requires a correct blend of water and substrate and adjustments and maintenance along the way. The vermiculite method can result in first-time success for those who use it properly, and there are breeders who swear by it.

The No Substrate Method

I like this technique because it removes the variable of determining the moisture content of the substrate and because once it is correctly set up, it is nearly maintenance-free. This is the primary method of egg incubation used in Europe, and it was also used by at least one US breeder in the late 80s. It has recently caught on in the US after Walsh described and published his technique for employing the method on the ChondroForum. This method is a little more difficult to employ than vermiculite, the correct amount of humidity being supplied by water and absorbed by the eggs from the air; but once the dynamics of the egg box and incubator are worked out to provide the desired humidity, this system is a joy to use and it delivers consistent results clutch after clutch. I have found that the no-substrate method causes my eggs to more closely resemble maternally incubated eggs than other methods.

The setup is simple: An inch or so of water is placed in a clear tub which serves as the egg box, and a plastic grid is suspended above the water using short sections of PVC pipe or similar material. The eggs are placed in small groups in dry containers such as deli cups, and these are placed on top of the grid. The lid is placed on the egg box, and no ventilation holes are made in this tub or lid. The egg box with water, grid, and deli cups holding the eggs is then placed in the incubator, which is usually humidified. A light fog will develop on the lid of the clear tub, and some condensation will appear on the sides or front. The eggs will stay humidified but dry. I have never had a problem with water dripping on the eggs when using my incubators - see notes on incubator design below.

A clutch of eggs being incubated in one of my incubators using the Walsh no-substrate setup. Eggs are placed in dry cups and suspended over water, inside of an egg box. Thermostat and thermometer probes can be seen inserted through the lids and in contact with the eggs.

The humidity in the egg box can be somewhat regulated by the humidity level inside the incubator. Misting the inside of the lid of the egg box can help to increase the humidity if the eggs dent in slightly during the first week of incubation. One important element of the no-substrate method is getting the evaporation/humidity cycle inside the egg box working properly, and placing too much water in the bottom of the egg box can hinder this. I have also found that slightly cooling the incubator will jump-start the evaporation process, and the egg box will develop condensation quickly as it cools (be careful and don't cool the eggs more than a couple of degrees). Slowly bring the egg box and eggs up to incubation temperature – this process should be enough to get the humidity cycle going.

The egg boxes and egg cups I now use give me an even better performance than the clear shoe box and deli cups. I use clear acrylic storage boxes that are nine inches square and five inches high. These have a wedge-fitting lid that makes a perfect seal – not airtight, but enough to prevent excessive air exchange. I also use a clear acrylic dish as my egg cup. These are about six inches square and two inches high. I fit these cups with plastic grid of the same material as the one in the egg box. I get these acrylic components from The Container Store (see Appendix B for contact info). I get the plastic grid from a lighting store; they sell it to allow fluorescent lighting to shine through in suspended ceilings. The grid in the egg cup

holds the eggs off the bottom and prevents contact moisture when the eggs begin to shed moisture in the final stage of incubation. I can get from eighteen to twenty eggs in one of these setups, and use two of them for larger clutches. A smaller version of the acrylic egg cup is available for small clutches of just a few eggs.

Components for my version of the no-substrate method. I have replaced the deli cups with a clear egg container which is fitted with a plastic grid to hold the eggs off the bottom. I can incubate one clutch of twenty or so eggs in this setup.

My setup, with eggs incubating. Humidity build-up can be seen on the front of the box, but no drips form on the lid. The thermostat and thermometer probes are let into the box through a small hole in the front, and are placed between and in contact with the eggs. Another thermometer probe (on top of lid) records the incubator temperature, but it is the egg surface temps that matter.

When using the no-substrate method, air exchange is not important until the final stage of incubation, and I have successfully hatched clutches without opening the incubator door for several weeks. However, the eggs will begin to emit moisture beginning about day thirty of incubation, and if adjustments are not made the eggs can end up contacting accumulated moisture in the bottom of the egg cups. Providing extra ventilation via the egg box lid is one way to deal with this issue. If you are using deli cups to hold your eggs, make sure to dry the bottom of them during this time. Once the eggs pip, I set them up in a hatch tub as described in the Egg Management section below.

INCUBATORS

An incubator is simply a heated and humidified box. The topic of incubator selection has caused new and would-be breeders a lot of unnecessary stress. While it is true that a good incubator makes the incubation process easier and a poorly functioning unit will be a constant hassle, it must be stated at the onset of this discussion: There is no magic incubator that will eliminate all guesswork or act as a substitute for good egg incubation skills. An experienced person can hatch chondro eggs in a mediocre incubator, and good eggs can perish quickly in the best

incubator if the proper moisture or temperature parameters are exceeded. Incubators can be purchased or homemade; commercial models are available from both ends of the price spectrum and some of these work well. But whichever way you choose to go, either buying an incubator or making your own, you will need to understand the needs of chondro eggs and how to make your incubator (and incubation method) provide them. Fortunately, none of this is really all that difficult.

ACCURACY

The first question that almost everyone asks regarding incubators is, "Which incubator is the most accurate?" To me, this question reveals a subtle misunderstanding of incubator function and user responsibility. The question seems to imply the hope of finding an incubator that will allow a breeder to insert the eggs, set a temperature, and then remove babies forty-nine days later. In fact, I once saw a novice who had never bred chondros before describe his newly purchased Forma Scientific incubator in this way. In order to discuss incubator selection or construction in a meaningful way, an understanding of the true purpose of an incubator is necessary. Simply stated, the purpose of an incubator is to maintain a temperature setting with as little fluctuation as possible. Consistency is actually more important than accuracy for your eggs (and peace of mind). Accuracy means how close to a known standard an incubator temperature will be; consistency is the measure of fluctuation of that temperature.

Think of it this way: Say you have an incubator with a Helix Basic System thermostat controlling it. You adjust the Helix to read 88.7°F. Then, using a calibrated thermometer, you determine the actual temperature to be 87.3°F. The difference (1.4°) is the margin of error, or the measure of inaccuracy. Now, if this incubator never fluctuates more than one- or two-tenths of a degree (my Melamine incubators always hold within this range) then it is very consistent. Conversely, if the temperature fluctuates over a two or three degree range throughout the day, then the incubator is inconsistent. It is easy to calibrate the margin of error out of a consistent incubator. Using the example above, you would simply adjust the Helix until the calibrated thermometer indicated an incubator temperature of 88.7° regardless of what the Helix readout showed. If an incubator has spot-on accuracy (meaning the Helix and calibrated thermostat always agree) but there is a three degree fluctuation, then the incubator is not well-suited for chondro egg incubation. This is why I always say, don't think in terms of accuracy; think in terms of consistency. You will need to monitor the actual egg surface temperature during incubation, and this will almost always be slightly different from the incubator temperature anyway, so the accuracy of your incubator or thermostat readout is not the main focus.

DESIGN

What makes a good and consistent incubator? The first rule is the same as in selling real estate: Location, location, location! It is important to locate any

incubator in a thermally stable environment that is free of drafts. The ambient temperature should be cooler than the incubation set point, but not so cold that the unit struggles to maintain its temperature. Beyond a good location, the construction materials, fresh air exchange, size, heater, thermostat, and thermal mass of the incubator will all affect performance and consistency.

My incubators are old CageMaster units; the smaller on the left is the original prototype. The water tubs act as a heat sink and also provide humidity. A flexible lamp is mounted on top for viewing light, and thermocouple probes are inserted in the door joints.

Building an incubator from materials having good insulation qualities makes sense, so I won't go into detail about that. (Tomm Phillips reported improving the performance of his large melamine incubator by enclosing it in Styrofoam sheeting.) Incubators don't need to be sealed up airtight, but they do need to have minimal air exchange in order to function well. (My solution is very low tech but effective; I use masking tape to seal part of the door gap on my units.) As far as

size, a larger incubator will be more thermally stable than a smaller one. This is because a smaller volume of air is subject to more rapid change than a larger one. You will want an incubator with a reliable heat source, one that puts out a steady, even heat without danger of fire or burnout. Many homemade incubators use heat tape. I use ceramic heaters made for use as baby chick brooder heaters, obtained from a poultry supply house. Light bulbs of appropriate wattage will serve, but are subject to suddenly burning out. This is almost guaranteed to happen while you're away!

Any reliable proportional type thermostat will work on an incubator, provided it can be adjusted in small increments. For example, the Helix DBS-1000 is a great cage thermostat, but it is not well suited for use as an incubator controller because it is only adjustable in one-degree increments. The Herpstat by Spyder Robotics seems to be especially well designed for incubator use; it is able to be owner-calibrated and has other user-friendly features. Avoid using cheap on-and-off type thermostats, such as the wafer types that come with some inexpensive incubators; these cause too much fluctuation by the very nature of their operation.

Thermal mass can be defined as the amount of resistance to thermal change within the incubator. An excellent way to increase thermal mass is to place water-filled vessels inside the incubator. These act as a heat sink, storing and releasing heat more slowly than air. This not only makes the incubator more stable and decreases recovery time when the door is opened, but open water vessels will also help increase the humidity of the incubator. A humidified incubator will, in turn, make the humidity inside the egg box more stable.

COOLERS

Some breeders have made incubators from common camping coolers. The best design for this I have seen comes from Damon Salceies. His cooler incubator is an ingenious combination of heat tape, fans, plastic grating, and a PVC frame. This unit has been tested by Damon on several clutches of chondro eggs, and he reports that the problem of condensation dripping on eggs from the egg box lid (a frequent issue with some cooler-type incubators) has been eliminated by the air flow and other dynamics of his design. You can get detailed plans for making a Salceies incubator from his web site, listed in Appendix B. Salceies reports that the cost of building the unit is around $200.

Avey Incubator makes a cooler type incubator that is extremely consistent and well-made. Jim Avey, owner of the company, is actually a parrot breeder who manufactures bird incubators and brooders. Tim Graichen discovered the Avey web site and contacted Jim about making a unit for chondro incubation. With input from several breeders including Trooper Walsh, Avey designed and brought to market the Rept-48 and the larger Rept-100. Avey includes an egg box with his incubators that feature adjustable vents in the lid. I have experimented with the Rept-100 and had some trouble with excess condensation forming on the egg box lid. This had to be dried every few days to prevent drips from contacting the eggs, and a lot of heat was lost each time I had to open the cooler lid, clear inner lid, and

egg box lid to dry the latter off. This seems to be associated with top-opening incubators such as coolers. In my front-opening Melamine CageMaster incubators, lid condensation is never an issue, with the heaviest moisture forming on the front of the egg box where it runs harmlessly down. There are several possible solutions to the Avey condensation problem, but I prefer an incubator with a glass front door for visibility and condensation reasons. Incidentally, Avey has introduced such a model but I have not had an opportunity to test it.

Others have made incubators from small college dorm type refrigerators. Heat tape is most commonly used for heat, and bottled water is located in the bottom of the fridge in one design and functions as a heat sink. Phil Black came up with this design and reports that it works well. Homemade incubators can also be built from scratch using wood or wood byproducts which have been sealed or laminated to protect them from moisture damage. There are published plans for making an incubator in the now out-of-print *Reproductive Husbandry of Pythons and Boas* by Ross and Marzec. *Reptiles Magazine* also ran an article on converting an old refrigerator into an incubator. I would personally stay away from small, inexpensive incubators offered to the herp market. These are lacking many of the important ingredients discussed above.

Homemade incubator, using a cooler for the cabinet. Design elements incorporated into this unit have solved the issue of egg box lid condensation that has been a factor with some cooler-type incubators. Design and photo by Damon Salceies. Details for making this unit are on his web site.

THERMOSTAT PROBE PLACEMENT

One last important element of incubator function needs to be mentioned, that of thermostat probe placement. There are two schools of thought: One holds that probing the incubator air is the best approach, the other believes that probing the eggs is best. While both will work, I favor probing the eggs. Here's why: The eggs will change temperature more slowly than air, especially when you consider that they are inside of an enclosed egg box. Placing the probe in contact with the eggs protects it from immediate exposure to the cooler air when the door is opened, making the system more stable. I really don't care what the air temperature inside my incubator is (within reason) as long as my egg temps are what they are supposed to be. Placing the probe in the air regulates the air; probing the eggs regulates the eggs. Since air is more changeable than a solid, it seems to make sense that regulating the air would, in effect, regulate the solid inside the air more consistently too. In practice, at least in my incubators, probing the air results in small fluctuations in the air and egg temps.

There is one important point to always remember if you place your probe in with the eggs as I do, and this is the fact that the egg box and eggs will warm more slowly than the incubator air when you first set up the system. This will cause the air to overshoot the set point, often by several degrees, until the egg box and eggs equalize thermally and the entire system stabilizes. Two things should be done to prevent the eggs from overheating during this process. First, set up the egg box and incubator and have them stabilized at operating temperature before the eggs arrive. Second, when you add the eggs (or anytime you open the door or egg box and introduce cool air), watch the egg temps carefully and turn off the heater as they approach the set point. Then, slowly turn up the thermostat until the heater just comes on again. Monitor the eggs and make the final adjustments to bring them to temperature.

No matter what kind of incubator you buy or build, gaining familiarity with your equipment and how it behaves in your own facility is important. The longer you use it, the more confidence you will have. I consider having an accurately calibrated probe-type thermometer to be an indispensable part of my incubation setup. Department store quality thermometers can be both inconsistent and inaccurate, and it is important to calibrate all of your thermometers and thermostats against a known standard. A laboratory grade mercury thermometer that has been certified to N.I.S.T. traceable standards will work, but I find that my Atkins Temp Tech thermocouple thermometer is more practical than using a long, glass mercury instrument. I calibrate my Atkins using ice water slurry, and I can adjust the thermometer to within one to two tenths of a degree Celsius (which is the system I use for egg incubation). By adjusting it to read 0.00°C (32.0°F.) in the slurry, which is of course the freezing point of water, I can have a very accurate and reliable measure of temperature. It is amazing to me that some people will put in the effort and patience it takes to get fertile chondro eggs and then hope their temperature regulating and monitoring equipment is good enough to do the job. I know where mine is, to a few tenths of a degree, and I make sure it stays that way.

For monitoring eggs, I use a thermocouple probe thermometer, placing the tip of the probe through a small hole in the lid of the egg box and pinching it between two or more eggs.

Egg Management

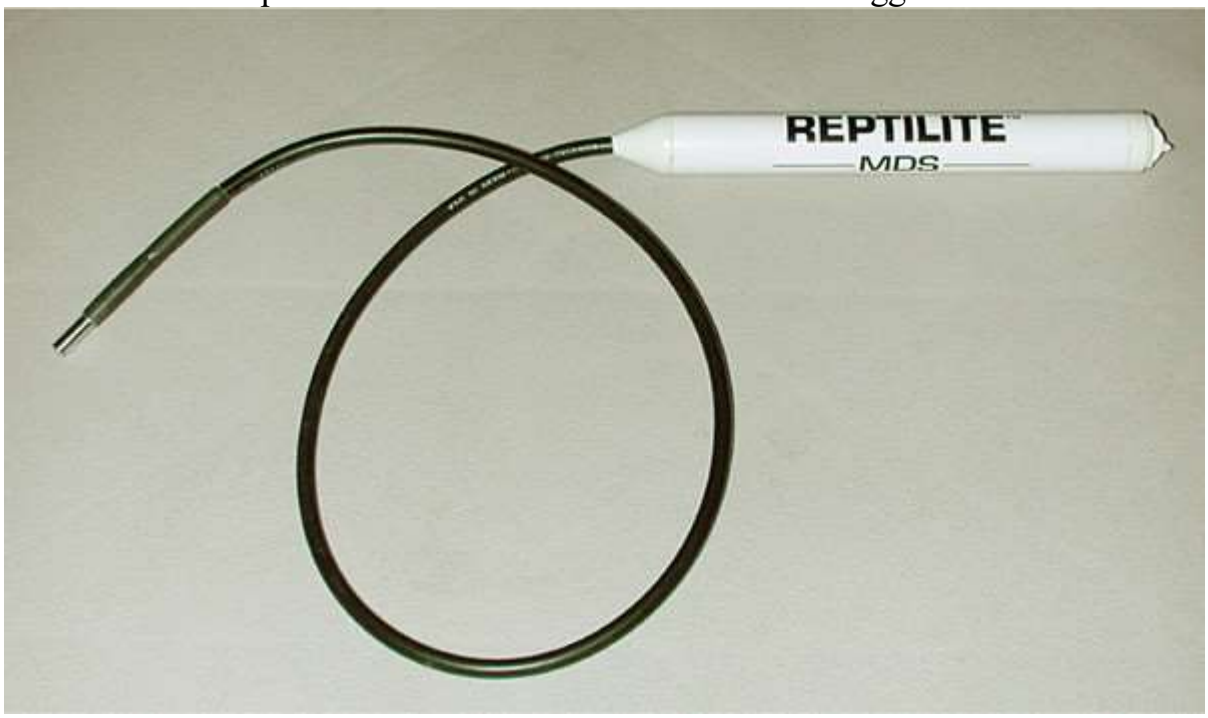
Of course, it stands to reason that in order to artificially incubate your eggs, you must first take them away from the female. Having a helper makes the job a little easier, but I have done it by myself many times. Once the female has completed egg deposition and has formed up the clutch in her beehive coil, it is time to act. Make sure you have everything ready before you begin. I have a large plastic tub lined with damp newspaper ready to receive the female, a paper towel to drop over her when I open the nest box, my egg candler, a fine-tipped marker to mark the eggs, and anything else I may need all laid out. You do not want to disturb the female and then discover that you can't find the roll of paper towels!

Remove the nest box from the cage and open the lid. Some females will hunker down, others will be ready to attack you. The important thing in the latter case is to move in quickly to prevent the female from damaging the eggs during striking. Drop the paper towel (or a small wash cloth) over her and then quickly place both hands on top of the towel and the female while you find her head and restrain it. Even sedate females will resent being pulled from the eggs, and will let go of them more easily if you restrain their heads. Begin to lift the female gently while attempting to unravel her from the egg mass, which usually will have begun to stick together. This is where a second person is helpful. Try to free the egg mass from her body and tail with as little vertical rotation as possible, taking care to hold her low over the nest box as she releases the eggs so any stragglers don't fall and suffer damage. Place the female into the prepared tub with damp substrate and clean water to drink, covering the front with paper if she is prone to striking at it. It is not a good idea to place the female back into her cage, because the odor of the eggs can cause some females to remain off feed and even coil on the cage floor in a beehive coil, brooding imaginary eggs. Giving the female a clean tub and maybe even a shallow warm soaking will help to wash the smell of the eggs from her and get her feeding again sooner.

Good eggs are white and full, not small, yellowish, wet, or sunken in. Some clutches contain eggs that are very smooth, while other clutches have what I call a "moon" surface…that is, they appear slightly lumpy on the surface, with snowflake-like spots. This is normal and no cause for alarm. At times, a few eggs may have yellow or orange looking areas, especially at one end. These are poorly calcified parts of the shell, and unless they comprise a large percentage of the surface, such eggs usually hatch. The orange areas turn gray as incubation progresses and they may even grow a little blue-green dusty-looking mold. If you see this, gently wipe the area clean with some diluted Chlorhexidine.

Separating and Candling Eggs

Of course, you will have had your incubator and egg box set up and calibrated several days in advance of the eggs arriving. When you remove the female, you will probably find most of the egg mass stuck together, with small groups of two or three stuck together separately and maybe a few lone eggs. I begin with the individual eggs, working my way through the small groups and finally separating the main mass. As you separate each egg, candle it and mark the location of the embryo (see candling notes below) and then place it polar position up in the egg box. Separating the eggs is not difficult, but it is always intimidating to those not experienced with doing it. The key is to go slowly, and very gently roll the egg being freed away from its fellows – don't simply pull the eggs apart. Some eggs will come apart easily, others will take a bit of finesse. The really firmly adhered eggs will separate if you roll them away from each other in one direction and then finish by rolling in the opposite direction, breaking the adhesion from both sides. There will be a fuzzy textured spot on each egg where it was attached, but this is normal and doesn't hurt anything. You can leave the eggs adhered in small groups, but separating each egg allows you to remove bad ones easily. Also, if you manually pip the eggs, it is much easier to work with them individually. If the shell of an egg is ruptured during separation or at any other time, you can mend the area with melted paraffin. This is sold at grocery stores. Also effective is patching the torn area with a small piece of shell cut from an old or infertile egg.



I would not be without my egg candler.

Candling is a step that has no direct bearing on successful incubation per se, but I feel it is important for several reasons and consider my candler to be a valuable tool. For those not familiar, a candler is a device that illuminates the interior of the egg by focusing a bright light against the shell, in the same way a flashlight held against your thumb makes it glow red. My candler has a flexible

shaft with the light at the tip. Candling establishes with a fair degree of certainty if an egg is fertile, how strong it is based on the vein development, and the location of the embryo, which appears as a small dot or circle with veins emanating from it. The affect is similar to how a city appears on a map, with major roadways emanating from it. There is some evidence that orienting the eggs with the embryo on top is important to normal development, and I mark the embryo location with a fine point marker as I candle each egg. I place any questionable eggs in their own cup when setting up the clutch so I can monitor them easily and to remove the risk of them spoiling a neighbor while I'm away. I've seen nonviable but normal-looking eggs go from good to sour in a matter of hours. I'm able to anticipate this when candling reveals a yellow glow with no vein development. Healthy eggs have strong, visible vein growth when laid. Tiny veins or those barely visible can indicate a weak clutch, but these eggs usually hatch with proper conditions. Using a candler eliminates almost all of the guesswork and frustration caused by watching what appear to be good eggs suddenly turning colors and dying. It can take days or weeks for infertile eggs to show outward signs of death in an incubator, but when they go, they usually go fast.

A poorly calcified egg with network of veins visible. This is how a normal fertile egg that is several days into incubation appears when candled. The egg in the photo failed to hatch. Photo by Marcial Mendez.

I prefer to set up my viable eggs in one container if possible, and I place them together in rows, touching each other. This makes it easy to lightly pinch the tip of

my thermostat and thermometer probes between some of the eggs. I like my egg box and egg cup with eggs to be rather snug; I feel this helps the eggs to behave more like a mass, the way they are when maternally incubated. Once I candle and mark all the eggs and set them up in the egg box, I pay close attention to them for the first few hours to make sure my temperature is set correctly. I also watch to make sure that any bad eggs are removed as soon as it is clear that they are dead, and I check that my egg box humidity is beginning to build. I like to see some light condensation building in the first twenty-four hours, and any slightly dented eggs filling out. I recandle any questionable eggs after a few days, and sometimes I am surprised by some vein development. Once everything is set and functioning correctly, it is watch and wait time! This can be difficult for anxious breeders who watch the eggs daily, and I try to busy myself with other projects such as cage construction or web site development to help the time pass quickly. Some aspects of chondro breeding are like riding a roller coaster; waiting for eggs once your female ovulates is like climbing that first big hill of the coaster, and when you see them being laid, the rush compares to that huge exhilarating downhill plunge. Then you set up the eggs and climb the hill again…"clink, clink, clink"…and then as the first heads appear you shout as your adrenaline peaks! (Perhaps this explains why the neighbor sees me occasionally running around the yard and shouting with my arms in the air.)

INCUBATION TEMPERATURES

Up until now, specific incubation temperatures have not been discussed. There is some variation in opinion about this, and some breeders use one temperature throughout incubation. Others follow the regimen that was established in the 1980s by Van Mierop, Walsh, and Bessette that was developed from monitoring brooding females. I am in the latter group, because "mother knows best." However, both methods have been proven to work successfully, and using one temperature can be helpful when multiple clutches are being incubated in the same incubator. Successful hatches have been reported using steady temperatures between 86°F (30°C) and 88°F (31°C).

I prefer to use the temperature regimen established from the careful monitoring of female thermoregulation of eggs. The eggs are established at 86°-87°F (30°-30.5°C) for the first week, then slowly increased to 89°F (31.5°C) for the next five weeks, and then cooled slightly to about 85°-86°F (29.5°-30°C) during the final week. Eggs incubated at these temperatures will hatch in about 50 days. There is evidence that the neonates will die full-term if the egg temps are not cooled in the final week. Also, I feel that weaker clutches benefit from the cooler incubation temps during the first week. It is important to note that the temperatures specified are egg surface temperatures, *not* incubator temperatures. Eggs begin generating heat at a certain stage of incubation, and the egg surface temperature will not be the same temperature as the surrounding air, especially if the eggs are left in a mass. When I set up my eggs, I carefully position the thermostat and thermocouple thermometer probes in with the eggs. I wedge the tips of the probes

between eggs near the middle of the egg group. If you let the probes into the egg box through a small hole in the front, rather than through the lid, the probes will not get dislodged when the lid is removed for any maintenance.

It is normal for the eggs to dent in during the final twenty days of incubation. They will also begin to expel moisture, and you will notice an increase in the amount of egg box condensation when this begins to happen. I provide ventilation to the egg box at this time by skewing the lid slightly. Depending on your specific setup, you may need to dry the bottom of your egg cups to prevent the eggs from contacting the accumulated moisture. This is when the benefit of fitting my egg cups with the plastic grate is seen. Some eggs will dent in so much that it doesn't seem possible that a live neonate could be inside, and until the breeder gets used to seeing this it can be stressful. After so much preparation and care, the final days tick by slowly and the dented eggs just add to the anxiety. Don't worry! Unless the eggs are turning colors and becoming wet, you are right on track.

Thermometers used by the author include a laboratory mercury thermometer (top) and left to right: Taylor wall thermometer, Atkins thermocouple and bare-tipped probes, Raytek non-contact infrared temp gun, and a Taylor indoor-outdoor thermometer with memory. The acrylic thermometer holders are a much-appreciated gift from a fellow chondro breeder.

It is normal for eggs to dent in and expel moisture during the final twenty days or so of incubation. You can see the beads of condensation on the rear of the egg cup in this photo. Provide extra ventilation at this time.

Pipping Eggs

It is my practice to manually pip any eggs that have not done so on their own by the evening of day 49 of incubation. This is the case whether I use maternal or artificial incubation. In almost all cases in my experience, maternally incubated eggs will begin to pip on day 49. When I see the first eggs pipping or offspring emerging, I pull the female and set up the clutch as described in the next chapter. Usually the female will have loosened her coils and you can see the slit eggs and, in some cases, neonate heads. I begin watching maternally incubated clutches carefully beginning on day 48.

Artificially incubated eggs often don't pip on day 49, and because I always err a tiny bit on the cool side with my incubation temperatures, most of my eggs hatch on days 50-52. I have found that when using the variable temperature regimen discussed previously, a decrease of even one- or two- tenths of a degree over the middle five weeks is enough to add a day or two to the length of incubation. This statement can only be made when the data is being gathered using accurate, calibrated equipment. Chondro egg incubation is a very precise thing, and when I hear about 53 or 54 day hatches being associated with a maternal-type incubation temperature regimen, I know that the monitoring equipment used was a little off. Using thermometers that have been calibrated for accuracy, along with a consistent temperature regimen each time you incubate eggs, will establish what you can

expect in the way of incubation length and hatch dates. An important part of the decision of when (or whether) to pip eggs is knowing when the eggs are supposed to hatch. It is quite acceptable to use slightly lower, one-temp regimens and non-calibrated equipment and just let nature take its course. But for the precision-minded, there are alternatives that yield precise results. To hear some people talk, you would think that investing in a thermocouple and taking an hour to calibrate it was akin to asking them to gather moon rocks!

I am a firm believer in manually pipping eggs that do not do so on their own. There is no doubt in my mind that this saves some neonates from full-term egg death, and I have lost full-term neonates because I waited to pip the eggs. In a few cases, I have seen eggshells scratched where the neonates attempted to cut them, but couldn't. Once I was observing a clutch on day 50 of artificial incubation and witnessed a neonate pushing the inside of the shell in an obvious attempt to cut through. By the time I got my pipping scissors and opened the egg, the neonate was dead. About half of that clutch was saved as I pipped the rest of the eggs, but the remainder were completely developed dead neonates. I decided then and there that never again would I wait longer than 49 days to pip eggs. To repeat: An important part of this decision is knowing when your eggs are supposed to hatch. It has been an established practice among python breeders for many years to manually pip full-term eggs. At the very least, any eggs that have not pipped on their own within twenty-four hours of the first eggs to self-pip should be cut. I should stress that when done correctly, pipping the eggs does no harm to the neonates whatsoever, even if they are not quite full-term. Full pigmentation is the final development in neonates, and those that look a bit pale have a day or two to go before emerging.

I use sharp-tipped cuticle scissors to pip eggs, cutting a narrow triangular flap about fi-inch long and parallel with the long axis of the egg, taking care to avoid cutting any major veins and spilling as little fluid as possible. Make very tiny snips with the tips of the scissors, keeping the tips pointed upward and slightly pulling the shell up and away from the contents as you go. It is normal for a little clear fluid to emanate from the initial prick of the shell, and also for a little blood to be seen as you cut. It is easier to show than to tell, and the photo shows the correct technique. Once I have the little flap opened up enough to peek inside, I touch the neonate with the tip of the scissors. Live neonates have a slight reflex when touched in this way. This can be very subtle and requires an experienced eye. Others will move noticeably when touched. Dead ones feel stiff and rubbery. It is not always easy to tell the difference, especially with eggs that have two or three more days to go, because the neonate will be under a lot of fluid and movement can be hard to see. Full-term babies that are ready to hatch will be completely pigmented and there will not be excessive egg fluids. Once I pip the eggs, I set them up, along with any eggs that have pipped on their own, in the hatch tub setup described in the next chapter. Eggs that are not completely full term will not be harmed by manual pipping if done carefully, so I push the flap closed, return them to the incubator, and check them again in two days.

When manually pipping eggs, use sharp-tipped scissors to make a V-shaped cut in the top of the egg. Make tiny snips and keep the tip of the scissors pointed up and away from the neonate and the veins that lie just under the shell. It is normal for a small amount of the clear fluid to seep out, as well as a little blood.

Chapter 16. Managing Neonates

"My mother had a great deal of trouble with me, but I think she enjoyed it."
Mark Twain

Congratulations! You have conditioned and cycled your adults, bred them, observed and recorded ovulation, obtained fertile eggs, and successfully incubated them. Now the most challenging and rewarding aspect of the entire process is at hand – the management of your new neonates, establishing them as healthy, feeding animals that are ready for market. Be forewarned, dealing with neonates is not for the impatient or easily frustrated. Feeding them is a learned art, and as long as you have made it this far, why not develop the skills to do it? You can broker your animals through someone else (who may or may not get them feeding), but unless you have a trusted person of integrity to work with you on this, you owe it to yourself, your animals, and your customers to put in the time and effort to establish your babies. Anyone can simply unload offspring into the market and let somebody else worry about them. There is a big difference between a broker and a true breeder. I have a strong opinion about this; I don't think that anyone who can't or won't establish their own babies should be producing babies.

Don't allow the challenges of working with neonates scare you off. Feeding new chondro hatchlings is difficult and time consuming, but it is also a skill that improves with practice and experience. Some clutches are easier than others, but even the really tough babies can usually be coaxed into eventually taking food. I average about an 80% success rate when making the first or second feeding attempt with any given clutch; you can do it!

Setting Up a Hatch Tub

Neonate management begins by setting up the hatching eggs to allow the new babies to safely emerge. I set up full-term clutches in a clear shoebox-sized tub with a lid, using damp white paper towels as a substrate and a temperature setting of about 85°F. I move the eggs to this hatch tub once the eggs begin to pip, or when I manually pip them. Don't place your eggs directly on the wet substrate; I use clear deli cup lids as a dry base for my pipped eggs. Keep the paper towels fairly wet but not saturated, and replace them once over the two-to-three day hatch period. As babies emerge they will smear egg fluids and umbilical tissues on the paper towels, and an odor will develop if the towels are not kept fresh. I use the same incubator that the eggs have been in to set up my hatch tub. I allow it to thermally acclimate inside the incubator overnight before adding the eggs. Because I am very familiar with my incubation regimen, I know that I will need my hatch tub to be ready by day 50.

Usually one or two babies will stick out their noses at first, followed by the bulk of the clutch over the next twenty-four to forty-eight hours. Most of the time there will be a straggler or two that won't make an appearance until the rest have emerged, but any neonates that are more than one day behind the majority are almost always deformed or dead. The newly pipped babies are in no hurry to

emerge from the eggs, and will often sit with just the nostrils and eyes showing for a day while they absorb their yolk and transition to breathing oxygen. This is a critical time for the neonates, because the eggs have reached the end of their finite life span. The life-carrying veins begin to atrophy and turn gray and the neonates must begin to breathe on their own. It is not unusual to lose one or two full-term neonates for no apparent reason, even after the eggs have been manually pipped and all neonates are determined to be alive. It is probably rare for wild green tree pythons to hatch 100% of their eggs, and losses are a part of nature and must be taken in stride. If the majority of the clutch hatches and the babies are normal, then you have done all that is possible and you should have no regrets.

Babies will almost always begin to exit the eggs after the lights go off at night, although occasionally one or two will do so during the day.

Hatch tub setup used by the author for pipped eggs. The eggs have been placed on deli cup lids to keep them from contact with the wet paper towel substrate. New hatchlings must have a very humid environment.

My practice is to remove babies from the hatch tub as they emerge, but they can be left in overnight. If you leave them, provide a few perches so they don't end up coiling in a mass on top of eggs that still contain neonates. It pays to be observant while the babies are leaving the eggs and crawling around; on more than one occasion I have had a roaming hatchling invert an egg and drown a sibling. Use extreme caution when removing babies from the hatch tub so they don't damage themselves. I use a small hook to lift them free one at a time. Some will balance on the hook but a few will be very nervous and may jump or fall. Although I employ a strict hands-off policy with babies, it is better to lightly restrain one than to allow it to fall to the floor. As I remove each hatchling, I weigh it on a balance beam gram scale and record the hatch data on the baby's card. A data card is set up for each hatchling and pertinent data such as clutch and hatch dates,

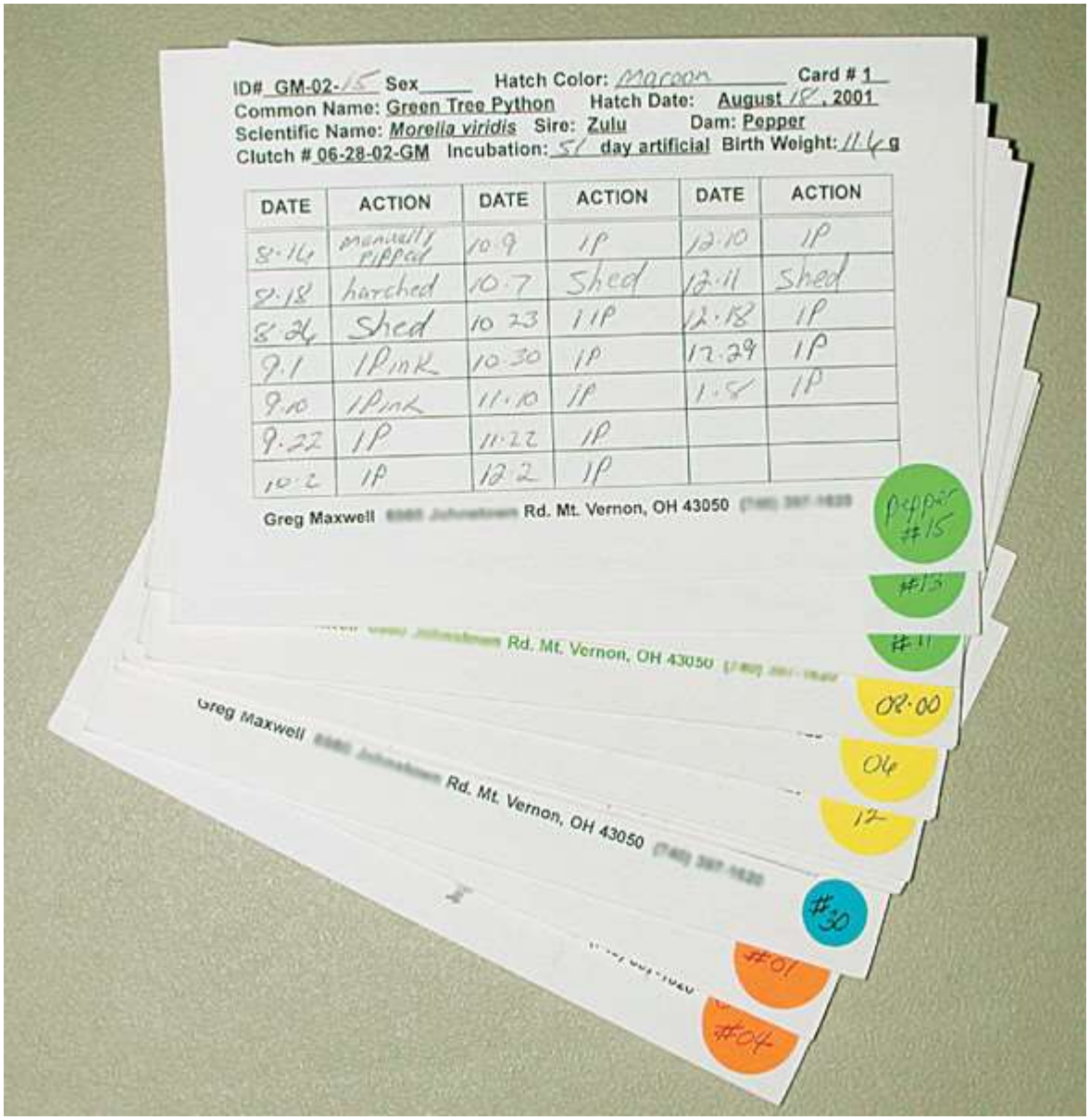
parentage, and the baby's hatch number are recorded on it. I use the system "GM-02-25" to identify hatchlings. This means Greg Maxwell is the breeder, 2002 is the hatch year, and this baby was the 25th hatchling that year. Then the baby goes into its own tub labeled with its ID number and with a colored sticker that identifies the bloodline.

Most babies will have absorbed their yolk, but occasionally one will not have and will weigh less than the normal hatch weight of 10-12 grams. Some babies will be dragging a bit of umbilical cord. Do not attempt to pull or cut this unless it is excessively long and appears to be giving the neonate trouble. Small lengths of umbilical cord will atrophy and fall off within 24-48 hours of emerging. If you need to cut a long cord that is attached to the yolk or egg, tie it off with a piece of dental floss first to prevent hemorrhage. This rarely needs to be done. Seeing an attached umbilical cord can be alarming, and it can appear that the cord is about to pull out the intestines of the new hatchling. Don't worry; leave the hatchling alone and don't try to help! The cord will come off quickly without leaving an open sore. Babies with mild to severe birth defects are not uncommon, and head deformities, including missing eyes and missing lower jaws, are the most usual, followed by kinked spinal columns. Euthanize any deformed babies by putting them in a plastic container and freezing them. This may seem heartless, but there is no good reason to keep one-eyed chondros or those with other oddities. These defects may or may not be genetic in origin (as opposed to being caused by incubation problems) but there doesn't seem to be a valid reason to keep defective animals alive.

This is one of my favorite photographs, and the diversity and unusual appearance of this clutch has been matched by the extreme animals that developed

from it. Ella-Diablo (GM-04-47, pages 27 and 125) was one of the very red babies in the group, which features several baby phases.

Scales used by the author: The balance scale is used to weigh babies, and the digital platform scale is great for yearlings and adults.



Data cards are kept for each neonate. Numbered color stickers are used on cards and tubs to indicate the bloodline or clutch.

HOUSING NEONATES

I have small plastic tubs set up in a heated rack ready for my new babies. These have a damp newspaper or white paper towel substrate, a small water dish, and a perch made of plastic coat hanger pieces. The temperature gradient is established and maintained at 82°-86°F using a thermostat. Most babies will perch in the familiar inner looped position familiar to all chondro keepers, but some will prefer to lie on the floor of the tub. A few babies have a “tired” appearance, coiling in a loose manner and even laying their head sideways. Most of the time these weak babies will be fine and they will strengthen and perch normally within a few days. Make sure to keep your newly hatched babies damp at all times, and never allow them to dry out completely. They will all shed about ten days after they hatch, and a good shed is critical to their starting out on the right foot. I begin misting newly

hatched babies when I place them in their new tubs. Don't blast the water directly at them; start to one side and waft the spray across the baby, wetting it and dampening the substrate. Be extremely careful when moving or working with hatchlings! They are very fragile. Never pull or stretch them, and always allow them to crawl where you want them, i.e., on and off hooks, perches, etc. As a rule-of-thumb, treat them as if they were made of wet tissue paper and you will avoid injuring them. Once you have the clutch set up in their tubs, it is best to not disturb them other than for daily misting and inspections until they shed.

Nothing beats a rack full of plastic shoe box tubs for raising baby chondros. Each tub has a removable plastic perch, paper substrate, and a water dish. I never allow baby tubs to completely dry out.

Feeding Trials

Some breeders offer food to new hatchlings right away, but I wait until after they shed to begin offering food. They usually have bellies full of yolk when they hatch, some will need a few days to acclimate to life outside the egg before they begin to perch normally, and they will all be opaque very soon. Even established babies often won't accept food when opaque, and I see no need to rush things with new babies. I like to have the best chance for initial success when beginning feeding trials, and most babies are much more alert and snappy after the first shed. This usually takes place ten to twelve days after emerging from the egg. It must be emphasized again that keeping new hatchlings in an elevated level of humidity is

important while they prepare to shed. Dry sheds can be dangerous to little babies, are more difficult to remove than from older animals, and make a horrible start in life for the little neonates. Don't keep them constantly wet, but err on the damp side until you gain some experience.

When the day of first feeding trials arrives, I set aside some relaxed time in the late afternoon. Feeding new hatchlings is not something to be rushed through or checked off your to-do list, and the first ingredient to success is having the right frame of mind. If you are irritable or just plain tired, the babies will definitely pick up on it and react accordingly – with predictable results. So plan ahead and try to have several quiet hours without noise and distractions for the first few feeding sessions. I have experimented with different feeding times, and I have settled on late afternoon as the best time for me. Disturbing the babies while they are quiet will often work better than trying to corner them once they become active at night. Having some soft music playing in the background can help with maintaining a relaxed atmosphere, and I like using a thunderstorm CD. Trooper Walsh told me that during his years as a keeper at the National Zoo, he would trickle water from a hose while feeding babies, finding the sound of the water soothing. It is not critical to begin feeding babies on the day they shed, and having the right frame of mind and plenty of unhurried time is much more important than how quickly after the shed you start.

I begin my feeding session with a plastic shoebox full of hot tap water and a dozen or so thawed pinkies floating in it. I find I get the best strike responses from using warm pinkies and throughout the session I replenish the hot water as it cools. Use forceps at least 8" long. (I prefer 12".) These allow presentation of the food without the movement and heat signature of my hand causing a distraction. Personally, I can't get the quick release I need to successfully feed difficult neonates when using scissor-type hemostats to present the food item. The forceps allow a much faster release, and this is an important key to successful technique. While I am waiting for the pinkies to thaw, I dim the room lights where the babies are located. You will need some low ambient lighting to see what you are doing, but normal room or outdoor lighting is too bright. In my baby room, ambient light from adjacent cages is enough once I turn off the main ceiling lights. I also get some chick down from the freezer and place it in a deli cup with the lid set loosely on. Down is the fluffy stuff on baby chicks before they grow feathers, and it is the best scent to use for new babies that won't take an unscented pinky. More will be said about using scent later in this section.

I work with one hatchling at a time in its own tub, which I slide out of the rack about halfway. Begin by presenting the pinky, still warm and wet, to the baby for inspection. Many babies will come to alert when disturbed, extending the front third of themselves forward and tongue flicking. Try to get these babies to flick the pinky with their tongue and note the response. A few of these alert babies will show interest in the scent of the pinky and take it, some will seem mildly interested without striking, and many will draw back. Other babies will ignore you and the pinky and will simply stay tightly perched without moving. These babies will need

to be provoked, and generally fall into three categories: easily provoked, nearly impossible to provoke, and “runners.” The first response is the most common; the latter two require special instructions and will be dealt with separately. “Easily provoked” is a relative term, and one of the most common reasons for failure to get baby chondros to eat is the keeper not being aggressive enough with pestering babies into striking. It is rare to have a neonate GTP that will refuse to bite if it is disturbed sufficiently. The notes below relate to the majority of babies, followed by some advice for how to deal with the really tough cases.

Begin by holding the pinky in such a way as to cause the snake to grasp the head when it strikes. Offer the warm pinky to alert babies, and if they pull back, bump them with the pinky to elicit a strike. Try bumping them in the nose, on the side of the body, on the neck, or on the tail. Alert babies will usually begin striking easily; some will grab and hold the pinky, and some will hold it for a second or two and then drop it. Try giving them the food again, and do so several times. If a baby grabs and drops the food several times, I switch to a scented pinky, usually with good results. Use this same bumping technique to disturb babies that stay tightly perched when you open the tub. Poke and prod them with the head of the pinky, using the forceps to hold it. If the baby buries its head, keep at it and get more aggressive until the animal comes unglued and begins striking. If you stop while the head is buried in the coils, you have quit too soon. Once the baby strikes, offer the food again and again until it holds on. Repeated strikes and drops call for some chick down.

Correct presentation is a key factor in successfully feeding new hatchlings. Grasp the warm pinky by the body, and try to get the chondro to strike at the head. Instantly release the pinky as the snake strikes it and don't move or make eye contact with the baby.

Once the baby is holding the food in its mouth, freeze and don't make eye contact. Animals are very aware of eye contact, and I squint with my eyes and look slightly away when the baby has the food in its mouth. It is very important to get a feel for instantly releasing the pinky as soon as the chondro bites it. If they feel the least bit of resistance they will usually drop the food. (If they do, give it back to them.) The spring action of forceps makes the quick release easier for me than scissor-type tongs such as hemostats. Excessively large forceps can feel too hefty in the hand for the sensitivity needed to perform the job of feeding babies. I stay completely still until the baby begins to swallow the food or wraps it up. If the baby throws a coil between its eyes and me, blocking its vision, I take the opportunity to quickly back away and leave the room. Otherwise, I move away extremely slowly because babies will usually drop the food if they see you move at all. Once they begin to move their jaws over the head of the pinky, you can usually slip away. I read a book or do light computer work while babies are swallowing, setting a timer for 5-10 minutes as a reminder to check on the progress. (Yes, at times I have forgotten that I was feeding, and discovered my mistake only after the youngster had made an inspection of my room.) After the meal is nearly or completely swallowed, I close the tub, note the meal (along with any scent used) on the data card, and move to the next hatchling. It can take fifteen to thirty minutes per baby to tease them into taking the pinky and allowing them to swallow it. If a baby strikes but refuses to eat despite my best efforts and the use of chick scent, I move on and try it again the next time, which is usually seven to ten days later.

If you can get the baby to hold the food in its mouth for a few seconds without spitting it out again, chances are good that it will eventually swallow the food. Sneak away and check on it several minutes later.

Babies that simply refuse to strike will eventually require assist feeding. However, it is very important to distinguish these babies from those that are merely stubborn about striking. I say this because a great many of those I have helped with feeding babies think all of them are in the first category. I have helped multiple keepers who were facing feeding difficulties, and have been told many times that a particular chondro "refused" to strike. Virtually without exception, I can have such animals eating in front of the astounded owner in less than five minutes. In nearly every situation like this, the owner tells me that I was much more aggressive with the animal than they had been, and therein lies the key to success. Don't confuse the fragility of babies and admonitions to use great care in handling them with an inability to aggressively pester the heck out of them until they lose patience. However, there are a few babies that simply will not bite no matter what you do. I assist feed these babies once I convince myself that my best efforts are not making any progress. See notes on assist feeding below.

I describe babies that drop from the perch and flee or thrash as "runners." The worst cases are those that show this response to the least little contact from the food item, although some runners will allow a couple of light prods before they go ballistic. Runners are the most difficult type of baby to deal with and will almost

always require assist feeding eventually. There is usually one runner in every large clutch, and some entire clutches tend to behave in this extreme manner. The best way to attempt to feed a runner is to open the tub with as little disturbance as possible and offer the food to the baby as described above. Use no physical contact at first and try to get the baby to tongue-flick the food. Use chick scent if unscented food is rejected. Use only the lightest of contact to provoke strikes, and back off at the first sign of thrashing. Some mild runners can be backed into a rear corner of the tub, where they will stand their ground and strike at anything. This is a good development, and I can get some of them to hold the food as long as they stay in the rear of the tub.

Fortunately, the majority of hatchlings will not fall into either of these two extremes and can be made to at least strike at food items. It is important to try to end each trial on a positive note with each baby, because I have found that both progress and stress reactions can be cumulative; that is, the baby often develops response habits based on what happens in previous sessions. If progress was made, you can usually get back to where you left off fairly quickly. Progress can be defined as any small step which gets you closer to success. Striking, holding, and wrapping of food items are all signs of progress, even if ultimately a meal is not taken that particular time. Conversely, you can actually lose ground by overstressing the animal, programming it to react negatively the next time around. This is something that must be gauged by experience, and my observation is that most new breeders err on the conservative side. Sometimes I pester hard-to-feed babies until they are almost at the point of exhaustion, at which time they stop fighting and hold the food in their mouths until the swallowing reflex takes over. With experience, you will learn when to stop and when to keep going as you work with each baby.

SCENTING

Without question, chick down is the most effective scent I have ever used. I keep a chick in my freezer and pinch off a small bunch of down for use at feeding time. Don't thaw the chick, just pinch off some down and return the chick to the freezer. Thawing increases the risk of Salmonella growth, and makes the down wet and sticky. It doesn't take much down to scent a few pinkies when feeding a clutch, and I put a small pinch or two into a deli cup and lid. Down blows away at the least hint of air movement and the lid is required to prevent this. To use the down to scent a pinky, I dip the head in water, shake off the excess, and press the nose in the down to get a few wisps stuck in place. You don't need to coat the head of the pinky, and your goal is to have a few strands of dry down sticking out from the nose or head.

Offer the scented pinky in the forceps as described above and try to get the neonate to tongue flick the wisps of down. If this scent trick is going to work with an individual baby (and it often does), the response is usually immediate. A few babies that struck and dropped an unscented pinky will seize a chick-scented one

without hesitation, and some babies will show a mild interest in the chick down and will respond to the tease-feeding method described above for unscented food.

With the exception of chick down, which I always use from the very beginning of feeding trials, I don't get into using a lot of different scents on troublesome babies until I have worked with them a while and have exhausted the possibility of them accepting unscented and chick-scented pinkies. This is not because I am opposed to scenting, but rather because in my experience little else besides chick down works very well. I do try gerbil and hamster fur, and while success using either of these is sporadic, I have had an occasional baby that will take a pinky scented with one or the other of them. I keep a frozen chick, hamster, and gerbil in my freezer year round, and one of these three scents will eventually give good results when working with difficult babies, except for hardcore runners, which almost never respond well to scent. Other breeders have reported success using frogs, lizards, rat fur, and other scenting materials, but I have tried all of these with repeated failure. I have used skinks, Anoles, tree frogs, and Horned ("Pacman") Frogs; none of these has ever worked for me, and to be honest, I don't like to kill the little creatures for no reason and have stopped using them as scent tools. This lack of success with frogs and lizards has always puzzled me, since chondros are known to eat these items. Once a customer of mine reported that a baby chondro had eaten his pet Anole that he attempted to cohabitate with the little python. Nevertheless, these scents are rejected by my neonates. I have had babies recoil from Lizard Maker liquid scent as though it were gasoline!

Keep in mind that the goal of scenting is not to make the chondro think, "Hey, I hate pinkies but I love gerbil!" One very important element to success when starting a clutch of new hatchlings is getting past the mentality that the chondros should be "interested" in pinky mice. Neonates do not eat mice in the wild, and most of them will not recognize the scent of mice as a food item until they are trained to do so. Almost to a person, the most common remark I hear from frustrated new breeders is, "The babies just don't seem interested in eating." Baby chondros aren't interested in eating for two reasons: First, they aren't used to eating baby mice; second, they are focused on us when we open their tubs. As long as you are expecting the babies to "get interested" in your food item, you won't have much success with feeding attempts. You need to teach them to eat pinkies; a more accurate way to say it would be to *make* them eat pinkies.

The goal of scenting is not so much to get them interested in eating as it is to cause them to strike the food and maybe hold on long enough to begin swallowing. You may luck into something that works very well with a particular clutch, but don't be in a huge hurry to get creative; other than chick down I have not had scenting help all that much. Scenting is not going to eliminate or even reduce the need for you to develop feeding skills; it is not a miracle cure for the woes of starting new chondros. But using scent can really help at times, and I always try it with difficult babies. Whatever you do, do not feed whole frogs or lizards to baby chondros, because they can infect your chondros with disease or parasites. If a baby will eat a frog, it will eat a pinky scented with that same frog. It can't be

emphasized enough that most new breeders have more trouble with technique as opposed to lacking some magic-working scent. The two most common mistakes are expecting that baby chondros will recognize pinkies as food, and failing to be aggressive or persistent enough in eliciting strikes.

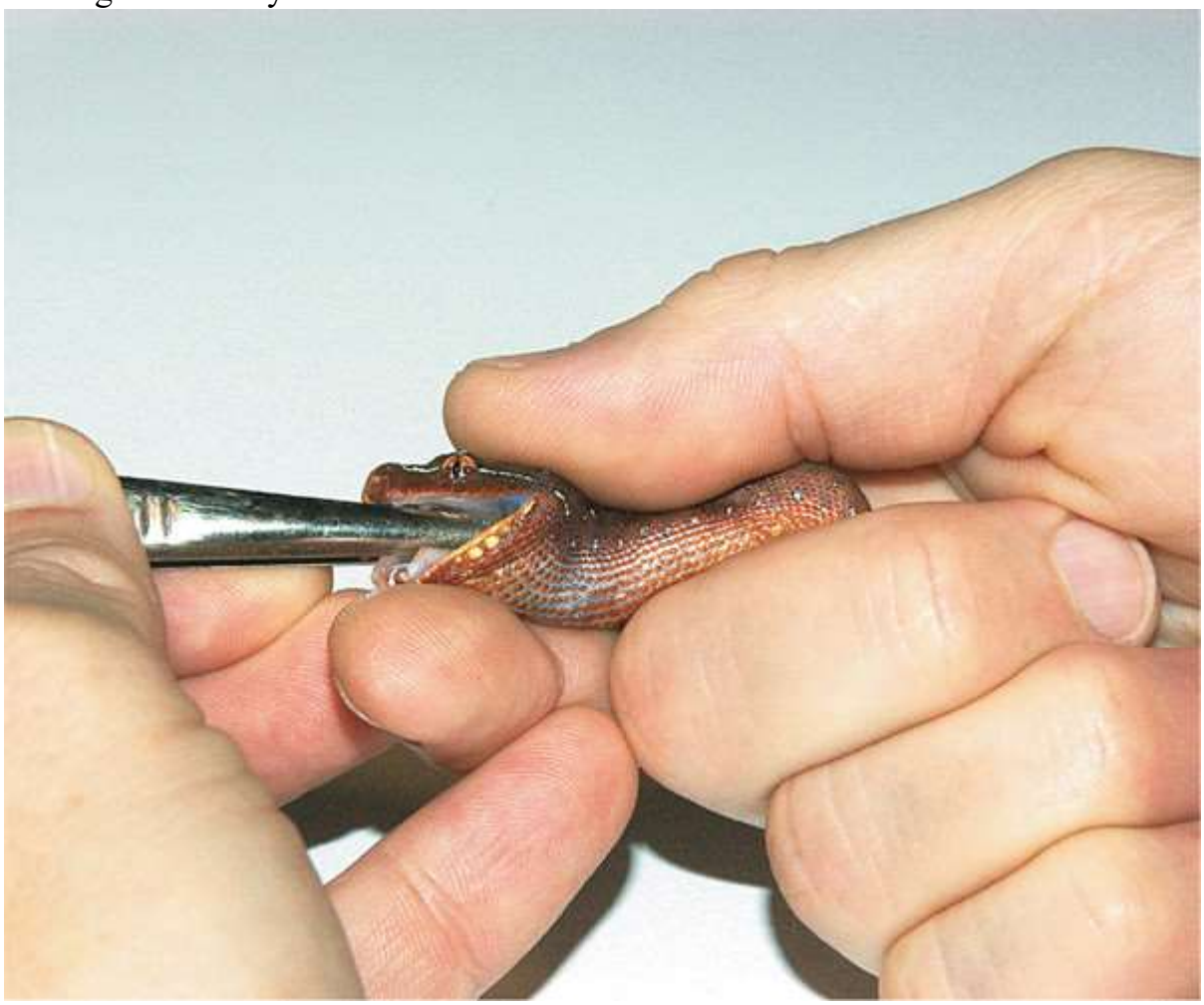
ASSIST-FEEDING

It can take quite a bit of work to get the majority of a clutch going, and often 6-8 meals are required before much of a feeding response is obtained without a lot of teasing involved. I don't consider babies to be really established until they have accepted a few meals with little or no effort, and it can take a dozen or more before the babies really start to get the idea and begin looking expectantly for their food when the tub is opened in the evening. Once they reach this stage, it is possible to feed a lot of babies in a short time, and the responsibility of the breeder shifts from feeding trials to poop cleaning trials!

There will usually be one or two tough nuts to crack in any given clutch. I am not in a hurry to begin assist-feeding troublesome babies as long as they hatch with a normal weight of eight to twelve grams. Such babies can easily go 8-10 weeks without feeding, although I may choose to assist-feed an animal sooner than that. Usually it is when I conclude that my best efforts just aren't making any progress at all, or I feel the animal is beginning to go downhill and needs nourishment to survive. I may also assist-feed small babies that hatch as runts and don't accept food in the first couple of weeks after they shed. It is important to state that assist-feeding requires skill, and it is not a quick fix or a replacement for learning how to feed babies normally. There is no reason to think about assist-feeding a healthy baby chondro any earlier than 8 weeks of age, and sometimes I wait longer than that depending on individual baby progress. Assist-feeding is stressful on both the keeper and the baby and can harm the animal if not done properly, but it can be the best way to save a few stubborn animals that won't live if something different isn't done.

I use small, blunt-tipped forceps to assist-feed whole tiny pinkies, moistening them with water and inserting them in the mouth, then slowly and carefully pushing them past the rear jaw line and into the throat. The animal is quickly set on the floor of its tub with perch and water bowl removed and is left alone to swallow the meal. If it doesn't, I insert the pinky again, pushing it as far down the throat as I safely can. The first time or two is the most difficult with any given baby, and by the third assist the process is easier. I have a rule when I assist-feed: "Greg always wins." Babies hate being assist fed and will resist vigorously. I assist-feed to save them, and capturing, restraining, and forcing food down their gullets does expose them to risk of damage. I am not going to put them and myself through that and then fail too! So, I assist-feed an animal as many times as necessary until it swallows the food. Use the smallest pinkies you can find, and push them as far into the throat as you safely can. Once the baby swallows I replace the perch and water bowl, but I leave these out until the meal is swallowed because babies seem to spit out the food more easily if they have stuff to grip for leverage. Often a few assist-

feedings will jump start the baby to eating on its own, but I have had occasional babies that took over a dozen such efforts before finally accepting food. In my opinion, assist-feeding whole pinkies is much more beneficial than using a pinkie pump, both nutritionally and in advancing the goal of getting the animal to feed on its own. Some breeders find that assist-feeding pinky heads is easier and less stressful; babies also seem to have more difficulty spitting out the heads. I offer food to stubborn babies each time I feed the rest of the clutch, and set aside some relaxed time to assist those that refuse. Not all assist-fed babies will begin eating voluntarily, but those that do are worth saving and usually catch up in growth with their siblings eventually.



It is important to get the pinky as far down the throat as you safely can when assist-feeding a neonate. This reduces the chances of the baby spitting it back out. Grip the body with your fingers to keep the neck straight and the rest of the snake under control.

It is worth repeating that establishing chondro neonates is very much a learned art, and there is a lengthy curve to navigate before you will be skilled at it. There is a limit to how far you can get by reading about it; it is far better to observe an experienced person if you are able. Ultimately, you must learn the finer points on your own, with trial and error. Breathe deeply, be patient, and believe in yourself… you can do it.

GRADING BABIES

I want to conclude this Breeding Section with a few comments on grading babies. There is a perception among some people that I possess a magic skill in choosing babies that turn into the best adults. And while there is no denying that I have made some good picks and have been very blessed, the most important ingredient in determining the potential of offspring are the parents and other members of the family tree. When I started collecting chondros I made a strong effort to obtain founder stock from some of the best bloodlines in the US. I built on this foundation to develop outstanding projects of my own; it's no wonder that some of my holdbacks have turned out to be spectacular when you consider some of the parents I started with! I am always a little perplexed as to how to respond when I am asked to help someone choose a keeper from among similar looking babies that came from normal parents, with the buyer repeating comments about my supposed prowess for always picking the best keepers. I never want to hurt anyone's feelings or cast doubt on any breeder's results, but the most important aspect of making a great baby pick is obtaining a baby from great parents. Nonetheless, there is often quite a bit of variation within a given clutch, especially those produced from designer parents. And while nobody has the ability to look at a group of babies and pick the best future adults from among them with anything approaching 100% accuracy, there are things that I look for when selecting babies for purchase, or to keep back from my own clutches.

It is important to wait until the babies shed before getting serious about choosing keepers. The first shed can reveal a surprising transformation in a baby, and color tones and subtle markings that were not visible before often become apparent afterward. Maroon or brown babies are especially prone to look much nicer after they shed, and these have a dull waxy appearance that gives way to a deep, richly colored sheen after they shed for the first time and rid themselves of the dried *egg* fluids. Once this takes place I look over the clutch to see if any babies really stand out from the rest. Be sure to use good lighting; GE Reveal incandescent bulbs are my favorite. Several factors can cause a neonate to stand out from its peers, including having no markings or having an unusual number of them, showing high contrast between the body color and the markings, babies having any unusual colors, those having unusually shaped markings, stripes, borders around markings…anything that catches my eye or looks unusual. If all the babies in a clutch have yellow markings, and one has orange – then that one stays.

“Darth Maul” (GM-02-12, page 108) is an example of a “no-brainer” keeper. I look for any traits that appeal to me when selecting babies to buy or hold back.

One of my all-time best productions, “Calico Junior” (GM-99-09), was a very dark, almost black neonate with very few light markings. (See the photo in Chapter 4.) He was not necessarily the most stunning baby I have ever seen, but he was unique and different, and that’s what I look for. One of his 2004 offspring was a very reduced pattern red baby; again, I look for such unusual animals to hold back and this red one was no exception. It ended up being a chip off the ol’ block! (See photo on page 115.) One of my blue males, “Blue Frost” (GM-01-30, page 107) was a little brown baby with few markings. Other high-end adults in my collection came from very boldly marked babies, such as “Goldenrod” (GM-02-04, page 80). What do all these baby-turned-yowza adults all have in common? They came from special parents! Don’t believe those who state that it isn’t necessary to invest in high-end bloodlines to get high-end animals. No sensible person would advise you to breed normal Ball pythons with the expectation of producing piebald or spider specimens; it is equally nonsensical to claim that high-end chondros can be expected to come from normal parents.

If the babies from a clutch all look pretty much the same, then you can select yours based on feeding response or size. In fact, these are the criteria that some

breeders use to choose most of their future breeders. That makes sense if the main priorities are developing bloodlines that tend to large size or that feed easily. I haven't seen any conclusive data proving that keeping easy feeders will produce more of them down the line, although it certainly may. I selectively breed for morphological traits; therefore, feeding response is of secondary importance to me. Give me the extreme specimens, and I'll happily deal with the feeding issues. (Okay, not happily…but willingly!)

GOOD LUCK!

I personally wish you the best of success in your life with Green Tree Pythons and with your own efforts to reproduce these wonderful and fascinating pythons in your home. It is my sincere hope that I have passed on to you in these pages some of the passion that I feel for chondros, and that I have stirred you to consider the ethics and responsibilities that come with GTP ownership and reproduction. I may have even irritated someone with an opinion or comment here and there. If so, it was never my intention to be offensive, but rather, to argue for what I believe to be the truth, for what is important, and for what is honest.

We all have a great deal more to learn about these green snakes that so inspire us. Keeping an open mind and maintaining a posture for learning is important to making advances. It goes without saying that no one has a monopoly on knowledge or expertise with chondros and you may be the person to contribute some new technique or gain a fresh insight into solving the many challenges this species presents us with. While there is no need to reinvent the wheel when it comes to the basics of husbandry or breeding, there is still much valuable work to be done. Have fun, enjoy your chondros, and always remember…

Quality is Contagious!

APPENDIX A. SOLVING COMMON PROBLEMS

If you keep GTPs for any length of time, sooner or later you will have a problem to solve. That's just the reality of working with this species. I will briefly discuss some common issues that will eventually come up in the day-to-day husbandry of chondros. These are guidelines, and it is important to find a knowledgeable veterinarian that you can work with, before you need one. An excellent place to find a reptile vet is on the Association of Reptile and Amphibian Veterinarians web site (see Appendix B). It is beyond the scope of this guide to diagnose and offer treatment for all the possible things that can go wrong with chondros, but the basics are covered here to provide you with a good foundation for treating common troubles. Many of these are preventable with sound husbandry practices, but anybody can slip up now and then and even veteran keepers experience health problems and losses from time to time. The comments below relate mostly to outwardly healthy captive bred animals. Farm raised and wild caught imports require special considerations; some guidelines for dealing with them will conclude this section.

DRY SHEDS

Chondros are thin-skinned and prone to shedding problems if the humidity level of their cage is too low. With yearlings and mature animals, this is more of a nuisance than a health threat, but stuck sheds can severely stress and dehydrate smaller animals. Fortunately, the situation is fairly easy to resolve in either case, as long as the condition is treated promptly. The longer the time between the bad shed and treatment, the more difficult it will be to remove the old dry skin. Treatment within twenty-four hours is best, and prevention is the best cure.

Deli cup setup to soften neonate dry sheds.

Neonates: Place small snakes in a deli cup or small tub along with some saturated, wadded up paper towels. Make sure there is no more than 1/8 inch of water in the bottom to prevent drowning. Place the cup, with the snake inside and the lid on, in a warm place (84° or so), and the shed should come off within 24 to 48 hours. A heated rack makes a great location for the cup. Cover the snake with the saturated paper towel occasionally to encourage it to rub its way out, which will help the skin come off.

Larger Chondros: Place yearlings and adults in a three-gallon tub and cover them with a folded soaking wet terry-cloth or cotton bath towel that doesn't have any fabric softener residue on it. Again, make sure there is very little standing water in the tub, but make sure the towel is saturated and the snake is covered. Place in a warm area (a heated rack is ideal), and the dried skin will soften and come off within 24-48 hours in all but the most severe cases. Keep the towel over the snake to encourage rubbing, replacing it on top of the animal as necessary. In a few cases you may have to help peel off some of the old skin after it has softened enough.

Wet towel and tub setup to soften dry sheds from adults. I prefer this method to using a wet pillow-case, because the snakes don't rub their noses and there is no chance of suffocation. Replace the towel over the snake as needed.

These methods work best when the dry shed is treated within one or two days; really dried-on sheds may require an even longer soaking. Be very careful when attempting to help a neonate shed, as they are very fragile. Do not attempt to remove unshed eye caps from chondros; these will come off with the next shed, as will any really stubborn patches of skin, as long as the humidity is boosted during the process. Dry sheds are much more easily prevented than treated! I always pay close attention to the cage humidity of opaque specimens, and I do not allow neonate tubs to dry completely. A few chondros seem to always have problems shedding even when humidity is adequate. Some keepers advocate not misting directly on opaque specimens; they feel that evaporation may contribute to dry sheds.

Swollen Head

Actually, this is not a problem, but it can frighten inexperienced keepers the first time they see it. Some chondros experience a swelling of the nose and head during opaque periods prior to shedding. The swelling usually persists even after the opacity clears up, and it can look like a serious problem. The swelling is caused by

fluid retention, and it will disappear without any further issues once the old skin is sloughed.

Rectal Prolapse

Chondros prolapse part of the bowel each time they defecate; the trouble occurs when the bowel fails to retract and becomes swollen, setting up a potentially fatal condition. It is critical to catch a prolapse early, before the tissues dry up and die or the swelling becomes intense. Prolapse usually takes place during the nighttime activity period and is discovered in the morning, so AM inspections are important to catching and treating this condition before it has become life-threatening. Specimens that have experienced a rectal prolapse will usually hang the tail down or go to the floor of the cage. Any odd posturing should be checked out, as some smaller cases of prolapse may be difficult to detect. It should be noted that the habit of tail hanging by some captives is usually not an indication of impending prolapse.

If you discover a prolapse, immediately move the specimen to a plastic tub with a shallow amount of clean water in it. Use just enough to keep the tub floor and the prolapsed tissue wet. Make a thick paste of powdered or granular sugar and water, and apply this paste directly to the swollen tissue, using an eyedropper or a large syringe minus the needle. The sugar paste will help to draw moisture from the swollen tissue and reduce the swelling. Apply more sugar paste as the animal moves around and dissolves the former applications. Do this for a few hours or overnight. This treatment works some of the time, and usually helps to reduce the swelling to the point that the tissue can be reinserted. Soaking and application of sugar alone is usually insufficient to affect a cure, but it is the first step. If the swollen tissue is not too large, I skip the sugar and proceed with reinsertion. The sooner the prolapsed tissue is inserted after it is discovered, the better things will go and the smaller the swelling is likely to be.

Unless you are experienced, it is best to have a veterinarian perform this technique, which involves using a blunt probe to push the tissue back in. I use a lubricated sexing probe for young animals, and a section of plastic coat hanger with the tip rounded smoothly for mature specimens. You need a probe that is large enough to push the tissue back in and using something with too small a diameter won't work and may puncture the tissue. The prolapse may need to be inserted farther than you may think, because the external tissue is inside out and the outermost part goes back into the body the farthest. I insert all my own cases of prolapse these days, but a large adult with a bad swelling almost always requires professional care and maybe even light sedation to get the tissue back inside. Insertion is not easily described and takes experience, but you need to be patient and work at it from several angles. Sometimes you will just be on the verge of giving up when the swelling will miraculously pop back in. I try to find the rectal opening and use that as a starting point when using the probe, but sometimes pushing the tissues from the side and massaging them back in will work best. When the tissue does reinsert into the body, gently push it as far in as you can

without using force. On a 1000 gram adult, this will be several inches. If you don't get the tissue all the way in, it will very likely pop back out. If it does, insert it again. I try to avoid puncturing the swollen tissue, but if this happens it does not seem to cause any real damage. It is important to get the swelling reduced as much as possible before inserting it. Some keepers have reported success using a hemorrhoid cream such as Preparation H. Rinsing the tissue with cold water may help too. It is a judgment call as to when to begin inserting the tissue; waiting too long on a mild case may actually increase the swelling. If I feel I can insert it without soaking, I do it.

Early treatment and keeping the swollen tissue moist are critical elements in successfully treating a case of rectal prolapse. The tissue in the photo is small enough to be reinserted. Photo by Tim Graichen.

Depending on the nature of the case, some animals may need a "purse string" suture to temporarily keep the bowel from prolapsing again. Other keepers use a small piece of surgical tape over the vent. Regardless, keep animals that are recovering from prolapse in a tub with damp paper substrate and no perch. I keep them in such a setup for at least several days. Withhold food for two to three weeks following the prolapse, and then begin with small meals until normal defecations

are observed. Prolapse can be very frightening to those experiencing it for the first time, but most cases are very treatable. It is possible that stress is the cause of some cases of prolapse, but dehydration, obesity, or overfeeding may be contributors. It must be emphasized that prolapse can happen to experienced keepers and to animals kept in apparently ideal conditions. The condition does not necessarily reflect poor husbandry. Specimens that repeatedly suffer prolapse may have deeper health issues. Adult females can recover from prolapse and go on to successfully lay eggs if given ample recovery time. Inordinate fears about rectal prolapse should not cause keepers to underfeed their animals. Most of the adults in my collection have never suffered a prolapse, and all are fed according to the guidelines and schedule outlined in this book.

Non-Feeders

There are four distinct categories of healthy non-feeding chondros: Opaque animals, seasonal male fasting, non-established neonates, and unexplained food refusals that do not fit into either of the first three.

For help with non-feeding babies, see the section on managing neonates in the previous chapter. Know whom you are buying from. Do not buy hatchlings that have not eaten at least ten times unless you know the breeder well. Even some established babies will temporarily go off feed when shipped or moved; if this lasts more than a couple of weeks, it is almost always due to the technique of the new owner. Customers should expect help from the person who sold them the baby.

Opaque chondros usually refuse to eat and can begin the fast several days before any outward signs are apparent. This is normal and expected. Some chondros may also take a few days to resume normal feeding cycles after shedding.

Seasonal fasting is just a fact of life for those keeping mature male chondros. It usually lasts several months, with no harm caused. The male will resume feeding when he is ready, and if he was eating rats when he went off feed, he will eat rats again when he is ready for food. No fancy tricks or special food items are needed. Most of the time these tricks don't work anyway. The male is off-feed because his instincts are telling him not to eat, and he hasn't suddenly lost his appetite for rats. The best thing you can do is relax! Males can begin fasting as early as a year and a half in age, and fasts of two to five months are common. I offer fasting males food each time I feed the collection, and suddenly one night they will resume eating, just as if they had never stopped. Males can go off feed at any time of the year, but most individuals will fast the same time period each year. I repeat this advice many times each year, yet some keepers become almost frantic when one of their animals refuses food for a month. You must accept fasting as a normal part of life with chondros, especially males. Fasting males do not cause me a bit of concern.

When the occasional healthy adult chondro stops eating for no apparent reason, including those listed above, there is rarely any reason for alarm. Chondros are sensitive animals, and some specimens can go off feed over such a simple thing as being moved to a new cage, even one of the same type they were kept in previously. Newly acquired animals should always be given a few days to settle in

before being offered food. Animals that have been shipped or moved to a new location will sometimes refuse food for a while. If the snake is healthy, there is no reason to be concerned. They will eat when they are ready. This can be difficult for a new owner to accept, but it is part of chondro keeping. I have found that offering live preweaned rats or mice can help in really tough cases, but always use caution when offering live prey. In the great majority of cases, you just need to be patient. A couple of years ago, I moved a young but mature female from a smaller cage to a new, larger cage that was located less than sixty inches away from her former cage and that was about twelve inches longer. Both cages were of identical construction and had identical setups of heaters, plants, etc. The female went off feed for almost three months in protest over being moved. I gave this little thought, and one night she resumed feeding and has fed regularly ever since. I often thought about how many keepers would have been wringing their hands over this situation, yet just like most instances of adult fasting it resolved itself.

Constipation and Lethargy

I have grouped these together because I feel they are related. How many of us have moved an animal to a new cage, or stripped and cleaned the current one, and had the animal defecate that night? Environmental stimulation is an important ingredient to successful husbandry, and anything we can do to encourage activity is good. Extra spraying, small temperature changes, new water and substrate, handling, and different caging can all induce more activity. Many keepers incorrectly believe that their chondros are constipated if they don't have frequent defecations between meals; the fact is, older animals have a slower metabolism and often do not defecate frequently. The habit of tail hanging prior to defecation does not necessarily indicate the animal is constipated. If you feel your animal is truly constipated and is showing distress; if it has a partial defecation and it is obvious there is "more to come"; or if there are fecal or urate smears around the cage from attempts to pass stool unsuccessfully, then some action is needed. The best remedy is a long soak in warm water; this alone often does the trick. It may take several such soakings, combined with gentle handling and manipulation, to cause the bowel to empty. In case of a serious blockage, consult a vet. I have remarked that sometimes the best assurance of getting a defecation from an animal is to clean the cage just prior to important guests arriving to see the collection! Letting the animal crawl on your mother-in-law's white sofa works very well too.

Aggression

Some chondros are quite high-strung, and this must be accepted. However, most yearlings and adults will respond to gentle, consistent handling. I do not believe in forcing a chondro that is obviously stressed into submitting to being handled. Some nervous animals will be much more at ease in a large, front-opening cage. Smaller cages and/or overhead exposure from top opening cages and tubs can turn mildly jumpy chondros into biters. Also, keep in mind that females usually undergo a personality change when gravid, but calm females will usually revert to their good-

natured selves afterwards. Most babies are very snappy, and even those that aren't should not be handled unless necessary. Many chondros will automatically calm down and will tolerate some gentle handling once they are twelve to eighteen months of age, without any special taming techniques. It must be accepted that a few animals are better left alone as display animals. If a calm temperament in your animals is very important to you, it is best to buy only tame yearlings or young adults, and do not breed them. If an aggressive chondro in your collection becomes very agitated for some reason, cover the glass or tub front with paper until it settles down again. Chondros can suffer damage from striking their noses against glass. All chondros should be approached with caution as late afternoon gives way to evening. Some of my animals assume a hunting posture before the lights go off at night.

Respiratory Infection

RI is not uncommon in chondros and it appears to be a common result of the immune system being compromised from stress or parasites, although it can show up for no apparent reason, just as in humans. Symptoms include wheezing or a rattling noise while breathing and excess mucous in the mouth or nostrils in advanced cases. Sometime a cough can be heard coming from the cage of an infected animal, and white droplets can sometimes be seen on the cage interior surfaces or glass. During a consultation with a well-known reptile veterinarian, my own vet (who is excellent in every way) was told that sporadic cases of RI occur in almost any large collection of green tree pythons. This vet stated that the relatively low incidence of RI, combined with the excellent breeding results and general longevity experienced by many breeders, is a testament to the outstanding husbandry that such keepers provide.

RI usually responds well to antibiotic therapy, but such medications should not be used indiscriminately. The incorrect use of antibiotics can contribute to the development of resistant strains of bacteria. It is a good practice to always have a culture performed by your vet before treating RI cases. The culture can help to identify the possible cause of the infection and will suggest the most effective medication to use. Depending on the results of the culture, I use Baytril or a combination of Amakacin and Fortaz (Cephazolin). Subcutaneous injections of sterile fluid must be given along with Amakacin to keep the kidneys flushed since this drug may be potentially damaging to the renal system. See Appendix C for dosages. Consult your vet for a treatment regimen that he or she recommends. Mild cases of RI can sometimes be treated successfully by boosting the heat temporarily to the upper 80s or low 90s, with a cooler gradient of course. Seek treatment if the animal worsens, or if it doesn't respond in 48 hours or so. Incidentally, it can be categorically stated that thermally cycling healthy animals for breeding does not cause RI, despite the claims of some.

MITES

Reptile mites come from other reptiles, not wood or substrate. With proper precautions, it is entirely possible to never have to deal with mites; I have not had a mite in my collection in years. Know that mites are present at every reptile show and most pet stores, and act accordingly. If you find mites in your collection, there is just one solution: Provent-A-Mite, from Pro Products in Mahopac, NY. (See Appendix B for the address.) I must insist on being firm about this, because for some reason there are a few folks in the herp industry that keep insisting on recommending alternatives to killing mites instead of using the only product tested and licensed for the purpose. Forget all else. Provent-A-Mite works, is completely safe when the directions are followed explicitly, has residual killing power, and by doing so you will be supporting a fellow herper who has spent thousands of dollars to develop and improve a much-needed product. Mites are not a game or a little nuisance! They can potentially carry deadly disease. The use of other products can actually contribute to the development of resistant strains of mites. Some insecticides kill mites quickly but have a very short half life, which means they lose killing effectiveness in as little as twenty minutes. The remaining mites and eggs then begin to develop resistance to the diminishing active ingredient. Furthermore, it is illegal to use (or to suggest for use) any insecticide in a way that it has not been tested and licensed. Before the days of Provent-A-Mite, we were forced to use whatever products we could find to try and eradicate snake mites; most of these were dangerous if they worked on the mites or were ineffective if they were safe. This product is a powerful and effective tool in the war against mites; use it!

KIDNEY STRESS

This shows up most frequently in neonates that have been stressed from disease or exposed to toxins such as flea medication. It can also result from extreme dehydration or extremely poor environmental conditions. Kidney damage is also common in wild caught imports, presumably due to dehydration during periods of containment and shipping without access to drinking water or proper humidity. These animals can expire from the damage months later. Symptoms in neonates include a dry, wrinkled appearance not related to a dried-on shed, and a tendency to retain fluids. Extreme cases result in the little animal looking like a water balloon, especially in the rear half of the body. As long as the actual cause of the stress is resolved, such animals can often be salvaged. Hydrate them well, making sure to mist clean water directly on them a couple times daily. Keep meal sizes small, as digesting large meals further taxes the renal system. Incidentally, since switching to RO filtered water for drinking and spraying, I have experienced a virtual elimination of this occasional problem in my babies. The worst case I ever saw of this condition involved a neonate that was being kept in a bone dry plastic tub at floor level and directly adjacent to the cat's litter box. There was litter dust all over the lid of the tub, and the little bloated baby looked to be near death. With

several weeks of tender care, it shed, began eating normally, and developed into a healthy adult.

Skin Disorders, Burns, and Eye Infections

The most common skin problems are abrasions caused from rubbing against part of the cage. These are seen most commonly in the nose, eye, and head areas. Chondros have a tendency to rub a raw spot on top of the nose or in front of the eyes when they get too active. Make sure there are no rough textured areas in the cage, such as screening on which the snakes can rub. Neonates seem more prone to this practice than adults. Feeding them more frequently can often calm such animals. Move the water bowl away from tub sides so animals can't force their heads in between them. Surface infections can be treated with a topical antibacterial, and usually clear up when the source of irritation is eliminated. Burns should never occur, because you should never have anything hot enough inside an arboreal cage to injure the animal. The use of heat panels eliminates the risk of burns from heating devices. Treat small burns with Neosporin. Fungal attacks are the result of unsanitary cage conditions or excess wetness in the cage from over misting or inadequate ventilation. If you correct the environmental problems, the skin will usually heal itself with a shed or two, but it may be best to have your vet look at it too. Scars from abrasions, cuts, or surgical incisions often heal with a different color than the rest of the animal. I have seen yellow, blue, white, and black scar tissue. Swollen eyes can be caused by a number of things, including rubbing, infection, and congenital birth defects, and for these problems it's best to see your vet.

Spinal Kinks

Although these are not normally a health issue, they often cause concern among keepers, most frequently regarding breeding ability. In my experience, if the kinks are not causing other problems, such as nerve damage or bowel movement trouble, then copulation and egg deposition will not be a problem. I know of a large female with a horrible kink just in front of the vent that laid large clutches without any problems. By the way, it should be mentioned that kinks are almost always the result of improper handling, and especially from sexing of neonates. Kinks frequently do not show up until the animal matures, but seem to be more cosmetic than dangerous. However, I did see a Lemon Tree male that was so badly damaged from being "popped" to determine sex that it was unable to move the rear third of its body, and eventually it had to be euthanized following a massive prolapse. Never buy sexed chondros less than one year of age, and don't be fooled by claims that the practitioner has special abilities to perform the procedure without harm.

A male chondro with a moderate kink at the base of the tail. Such kinks are frequently caused by sexing neonates, but may be caused by handling or can even be self-inflicted. Neonates are very fragile and any pressure to the tail area may result in kinks developing later. This animal was not sexed as a baby, and the cause of this kink is unknown.

One other odd spinal irregularity that warrants mentioning is what some call "cigar back" syndrome. Some juvenile chondros have what appears to be a weak or double-jointed area of the spine approximately one-third of the distance back from the head. The animal develops nicely for a couple of months after hatching until the muscular structure gets to a point where it is stronger than the double joint. Then the animal suddenly bends over backward during strenuous activity, such as during feeding time or from striking during cleaning or spraying. The appearance is horrible and looks as if the animal has broken its back. If the animal is allowed to return to a resting posture undisturbed, the joint will often return to normal with no hint of permanent damage. If the animal continues to flex backwards when disturbed in the future, the ribs will flare and the spine will develop a small dent, giving the slang name to the condition that was mentioned above. This is because the flat area looks like a place to lay a cigar. Be very careful to avoid letting your neonates bend over backwards when trying to escape from a tub or from becoming excessively agitated. Chondros seem to outgrow the danger of this behavior as they approach yearling size. Two vets have told me they do not know what causes this, and it does not seem to be hereditary. Several breeders have told me they have seen this behavior; Tim Morris coined the slang name for it.

Grounded Chondros

Some chondros like to lie on the ground at times. This is a normal behavior and there is no reason for alarm if all else appears well… that is, if the animal is coiled normally, is alert, remains active at night, and is feeding. Sick animals look and act sick, but a grounded chondro looks like a healthy animal lying on the ground. Most grounded chondros will return to their more normal arboreal habits after a brief time, but a few will decide to make a semi-permanent resting place of some dark corner of the cage, at least during the day. Why? They are just being chondros.

Acclimating Imported Chondros

Although true farm bred chondros (such as those supplied to US consumers from Bushmaster) are definitely better than any wild collected animals, all imports should be given the same precautions. These are quarantine, adequate hydration, fecal checks, and protection against stress. In fact, any new animal coming into an established collection should be quarantined. This is because even outwardly healthy appearing animals can become ill from the stress of shipping or being moved. Trooper Walsh once told me that he quarantined his own animals when bringing them home from the National Zoo where he was employed as a reptile keeper. Quarantine should last at least three months, or until several fecal checks have come back negative. Fecal tests can reveal the presence of parasites. Small bumps under the skin are also usually indications of parasites. Be sure to provide clean drinking water to all imports and mist them daily to encourage more drinking. Many imports will be more stressed than domestically bred animals, because of climate and seasonal changes, overseas shipping, and possibly being taken to multiple reptile shows. Many farmed GTP brokers don't specialize in chondros and may not provide them with ideal conditions prior to selling them. Because of these and other factors, give imports plenty of privacy, placing cages out of high traffic areas and covering the front glass with paper.