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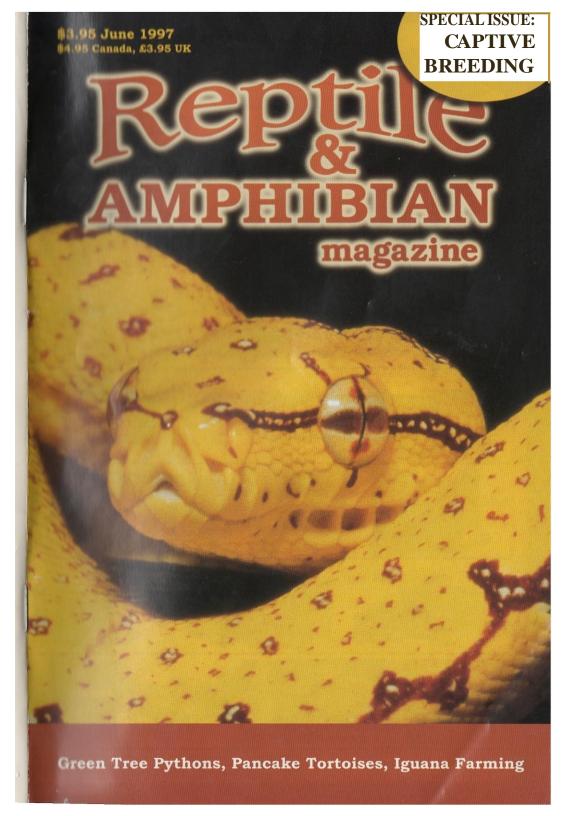
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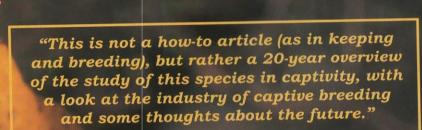
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A Two-Part Feature

by Trooper Walsh Department of Herpetology National Zoological Park Smithsonian Institution Washington, D.C.



PARTI GREEN TREE PYTHONS IN CAPTIVITY

I have been involved with herps for well over 30 years, 22 of which have been spent at the Department of Herpetology (DOH) at the National Zoological Park (NZP) in Washington, D.C. At the NZP I am officially called a biologist, but what I am is a reptile keeper. lconsider myself first and foremost a private reptile collector/breeder. This is where my roots are, and my work is simply an expression of my personal passion for the animals I work with. I suppose that qualifies me as a herpetoculturist in today's terms.

I have worked with Green Tree Pythons, Morelia viridis-ahighly special- ized, beautiful, arboreal boid found in the rainforests of Indonesia, New Guinea, and Northern Australia-for over two decades. I am fortunate to have been involved with



much of the pioneer behavioral and reproductive work with these serpents from the onset.

I am fascinated by M. viridis. I love producing these animals, watching, learning, and collecting data to share with others of like mind. Working both privately and in a zoo has allowed me the opportunity to establish groups of Green Tree Pythons with a wide range of people from all over the world. I am a preservationist at heart and my goals , are simple: I hope that when I leave this world there will be more M. viridis thriving in captivity for people to enjoy than when I first started working with them.

THE EARLY YEARS

For me the Green Tree Python passion began when I saw my first specimen in a private collection in 1975. It was a young female with a forest green ground color, bright blue mid-dorsal diamonds, and great flared nasal scales which gave it the appearance of a benevolent dragon. She was beautiful. I knew then and there that Green Tree Pythons were to become a big part of my life,

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but I had no idea how or to what extent!

At the time there were probably only a handful of these serpents in the United States in zoos and private collections combined. This was back in an era when terms such as "herpetoculture" were nonexistent; the field had yet to be pioneered. The act of simply keeping alive a highly specialized reptile such as this was considered a major accomplishment. Actually breeding Green Trees in captivity was a dream.

I remember clearly the days and weeks that followed my first Green Tree Python encounter. I spent most of my waking hours thinking of the pythons and investigating potential sources for these rare reptiles. There was limited literature available on the species at the time, and even fewer animals to be found. I finally located two snakes which had just been imported by a West Coast dealer. I ended up trading away the gems of my current reptile collection and pulling a few favors, but indeed Idid secure my first M. viridis.

Catastrophe hit from the start. The serpents were sent via air cargo to Washington

D.C. in February. The animals had been mistakenly packed into an unheated area in the belly of the plane, and the shipping container was accidentally crushed. Upon arrival the two pythons were literally frozen stiff. Irushed to my house and slowly warmed the serpents in a homemade environmental chamber.

Amazingly, within an hour both animals exhibited eye movement, and shortly thereafter came very slow tongue flicks. With much TLC, a course of antibiotic therapy, and time, the pair recovered. Within a year, one would go on to produce some of the first ever captive born and bred Green Tree Pythons in this country, and become founder stock for animals which are well represented in U.S. collections to this day.

A PASSION & OBSESSION!

More Green Trees began to trickle into the hands of American dealers and I was on each shipment as it arrived. Within a year I had converted my entire reptile collection and all of my cash assets into Green Tree Pythons. In a round about way I even traded in my first wife for a life with Green Tree Pythons. Yes, I was obsessed.

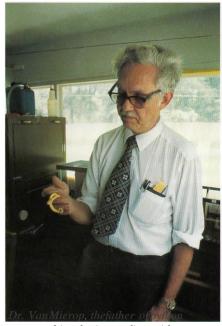
By late 1976 I had accumulated on upwards of two dozen Chondropy thon viridis in a basement vivarium at my parents home. Just for the record, I will always have Chondropy thon in my basement, although for this article I have accepted the new nomenclature Morelia viridis. In early 1977, I hatched out my first clutch of M. viridis as a private breeder (Walsh, T. 1977). By this time I was also a fledgling keeper in the Reptile House at the National Zoo, and shortly thereafter convinced this branch of the Federal Government that they too needed Green Tree Pythons in their lives.

COLLABORATION WITH RESEARCHERS

About this time Imet up with two gentlemen who were to play a long-standing role in my life and work with Green Tree Pythons: Dr. L.H. S. Van Mieropand EugeneBessette, both of Gainesville, Florida. Van Mierop was the head of a medical department at the

University of Florida and had somehow tied in his study of the human cardiovascular system with that of metabolic rates of female pythons brooding eggs. Bessette was the owner of Ophiological Services, where he and Van Mierop performed early studies on python thermoregulation with Python molurus and Python regius (Van Mierop, et el, 1978 and Van Mierop, et el, 1981).

My introduction to this team was a phone call from Van Mierop, who had shifted his inquiries into the secret workings of Green Tree Pythons. In a thick Dutch accent, Van Mierop explained to me his interests and



maternal incubation studies, with a hatchling Green Tree Python

frustrations in locating research specimens. That phonecall led to a 19-year collaborative study of Green Tree Pythons between me (as a private breeder), the National Zoological Park, and Ophiological Services.

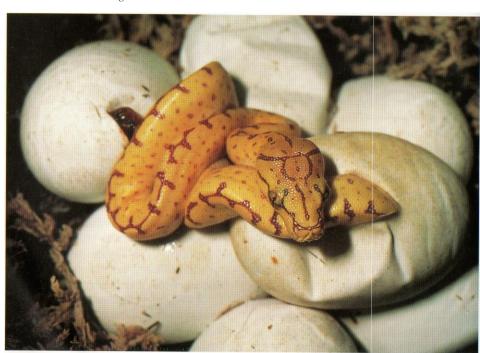
We began by watching female pythons incubate their eggs and asking questions: At what temperature do they incubate their eggs, and does this temperature change throughout



Above- Van Mierop's first nest box for maternal incubation; thefemale's coil temperature was taken several times daily during the 49-day incubation; below-clutch hatching

incubation? What are the ideal ambient environmental conditions for maternal incubation? Why do they completely envelop the eggs in coils forming a bee hive-like arrangement? At what point in incubation do the eggs begin to generate their own heat, and how important is critical mass (of the egg clutch) to this activity? Together, we have answered many of these questions. (Walsh, 1979; Van Mierop et el, 1983)

It was determined that the temperature needs of the Green Tree Python eggs change throughout incubation and are quite precise (based upon monitoring multiple females on eggs). The female seeks out an environmentally stableplace to lay and incubateher eggs. Female Green Tree Pythons on eggs actually become "warm blooded" in a sense as they areable to increase their body temperature by as much as 13°C (7°F) with muscular contractions (many other species of python scan do this as well). Studies show that during the first week of incubation the females "form up" the egg mass into a round cluster which are usually adhered together. She totally envelops the eggs with her coils forming a 'bee



hive". A good mother will hold the eggs in such a way that none of the eggs contact the substrate, allowing total atmospheric control of egg mass (temp, humidity, gas exchange).

Green Tree Python eggs maternally incubated take 49-50 days to hatch. In the first week the female slowly increases the temperature to a fairly stable 30°-30.5°C (86°-870F). Over the next five weeks she cycles the eggs with temperatures of 32°C (90°F) during the day, dropping to 30.5°C (87°F) at night. In the seventh and last week, the female slowly brings the clutch mass down to about 29°-29.5°C (84°-85°F) during both day and night. If the eggs are not cooled, the full term young will suffocate in the eggs. It appears that Green Tree Python eggs actually start generating their own heat at around day 21, particularly if eggs are left in cluster mass. The bigger the mass, the more heat is generated and retained.

From information gleaned by watching femaleM. viridis brood their eggs, we developed a protocol of temperature regimen to incubate eggs artificially with the same excellent hatch results that we have learned to enjoy with maternal incubation (Walsh, 1994). Currently we use high tech equipment for incubating Green Tree Python eggs, such as the Forma lab incubator (Model #3029, Forma Scientific, Inc., Marietta, Ohio), which allows us to control and record temperature, humidity, and gas exchange with hairsplitting accuracy. With fancy equipment like this and the Raytek infrared temperature gun (Raynger Series, Model #PM40LZTR, Raytek, Inc., Santa Cruz, California), we are now able to ask detailed questions about the eggs themselves: If the eggs are separated and incubated flat on a shelf, rather than in a cluster ball mass, do we have to compensate in temperature for the loss of critical mass? What about the actual gas exchange through the egg shells-does this change throughout incubation, and how does the buildup of CO2 gas towards the end of incubation influence the eggs?

In the captive setup the ideal conditions for an egg laying cage are temperatures of



Above-at the NZP the author sets up hatchling pythons individually in gallon jars; below-high tech incubator used by breeders such as Ophiological Services



 $26^{\circ}-29^{\circ}$ (79°-84°F) night/day, high humidily, bul a bone dry nest box with a laying med i u m such as sphagnum moss. Gene Besselle and I have worked out a temperature regimen formula to artificially incubate Green Tree Python eggs without doing the day/ night temperature drop that takes place in the mid, five week period. For the first seven days temperatures should be set at 30°-30.5°C (86-87°F), following with the next fiveweeks at a constant 31.5°C (89°F). Scale down the temperature in the last week to 30°C (86°F). These are actual egg surface temperatures which will be different than incubator temperatures (higher egg temps amount to about 1°C (2°F) depending on air volume in incubator, eggbox air volume, clutch mass, etc...).

In the continuing search to answer these questions and others, we have found ourselves looking to specialists such as Drs. Geoff Birchard and Michael Grace. Birchard is an Associate Professor at George Mason University, and one of his passions is the study of the metabolic rates of reptiles and their eggs (Birchard, et el, 1995). Grace is a Research Assistant Professor at the University of Virginia in Charlottesville, and he has a special interest in studying the reptile lightand heat-sensing abilities (Grace, 1996). We hope to apply the knowledge of these two researchers to help us find out more about Green Tree Pythons. It seems the more we learn, the more we find to question. Today we find ourselves with more questions than ever about this secretive rainforest serpent from half a world away.

Over the years we have produced many hundreds, if not thousands, of *MoreLia viridis* for a worldwide market. To keep track of all thesesnakes, Ophiological Services engaged a computer software writer to develop a pedigree program which allows us to trace the lineage of our snakes back 10generations and two decades to wild-caught founder animals. This software writer spends her days producing Government software on how to fire Tomahawk missiles at enemy targets, so the pedigree program was a welcome change of pace. A complete animal history (kept on

data cards), care sheets, and a pedigree, are some of the credentials which today 's "Chondro connoisseur" has come to expect when obtaining captive-born Green Tree Pythons from professional breeders.

PART II THE INDUSTRY OF CAPTIVE BREEDING

Most of the Green Tree Pythons which entered this country in the 1970s arrived in poor condition and did not thrive. The majority were highly stressed wild-caught adults, often in a poor state of nutrition, dehydrated, and full of parasites. There was no locality data available, as they were brought to the Indonesian dealers by snake hunters from many of the hundreds of islands where *M. viridis* are found. The snakes were piled together in crude chicken wire cages until a full order was available for export. It is amazing that any of those snakes survived to add to the captive gene pool.

In fact, most did not survive. My own collection was a testament to this. Even with much care, none of my original group of 24 snakes lived beyond three years. Of the survivors, only one pair successfully reproduced. However, those first offspring would form some of the founder stock which I still have in my collection many generations later.

Between the mid-1970s and the mid-1980s, a handful of breeders and zoos in this country successfully reproduced Green Tree Pythons. Although few founder females survived more than one breeding, the captive offspring proved to be hardy and colonies were established. (Blake, H. 1992, Ross, R.A., and G. Marzec. 1990, Zulich, A. 1984, Zulich, A. 1990.) By the time the moratorium on imported *M. viridis* was imposed in 1979, a healthy population of Green Tree Pythons had been established in the United States from wild-caught animals. Still, there was a need for "new blood" in captive colonies.

Since the late 1970s, Green Tree Pythons have been protected by Indonesian wildlife authorities, and they are classified as Appendix II wildlife by C.I.T.E.S. Although

Green Tree Pythons are fairly common throughout their range, the Indonesian government decided to regulate trade of these snakes around 1979 by allowing only captive-bred specimens to be exported.

This ruling is not true for all C.I.T.E.S. II wildlife, but is an option open to countries of origin . For most other C.I.T.E.S. II wildlife, an annual quota is established which does allow export of a set number of wild caught animals. As there was no captive breeding of Green Tree Pythons going on in Indonesia in the 1970s and 1980s, no snakes left the country-or at least no Green Tree Pythons entered this country *legally* during this period.

INDONESIAN BREEDERS & LOCALITY-SPECIFIC PYTHONS

Enter Frank Yuwono and Kamuran Tepedelen. Frank owns an animal export

business on Java called Terraria Indonesia. I first met him in the United States in 1993 with his American associate, Kamuran Tepedelen of Bushmaster Reptiles, which operates out of Colorado. They explained how and why they had set up the first Green Tree Python breeding venture in Indonesia.

Yuwono was raised in Indonesia but went to school in the United States at Loyola and UCLA. It was during these years that Frank became familiar with the herp scene and met up with Tepedelen, an all-American kid who I had first met two decades ago when he volunteered at the NZP.

In the late 1980s, Frank Yuwono began to enjoy some success breeding Green Tree Pythons at his "farm" in Indonesia. In 1991, Tepedelen made his first visit to Indonesia to travel with Frank to different localities to procure new breeding stock, and the two

began "locality specific" breedin g. Together they ventured throughout eastern Indonesia to many of the hu ndreds of islands which are home to the serpent. They collected animals from the Aru Islandsgroup and Biak. They visited port towns around the island mass of Irian Java, gathering animals from local hunters at places like Sarong, Mera u ke, Timika, and Jayapura.

Back at his farm outside of Jakarta, Frank began locality-specific breedin g of Green Tree Pythons with small groups of between five to 20 animals from each area. Frank hired alocal man by the name of Gun (pronounced Goon) who has a green thumb



for caring for and breeding these pythons. By early 1992, Yuwono was exporting limited numbers of $F_{\scriptscriptstyle \parallel}$ locality-specific Tree Pythons to Bushmaster Reptiles. Here in the States the time was right for marketing Indonesian-farmed pythons, particularly ones of locality-specific origin.

In late 1995, I visited Yuwono and his facilities at Terraria Indonesia. I spent the day watching Gun care for his charges and was told that he views his job as a spiritual experience. Gun knows when it is time to pair up certain snakes for breeding and when to look for eggs. Once the eggs are laid they become Yuwono's responsibility. Today the eggs are incubated artificially in a simple but effective room within the compound.

When clutches hatch, they are photographed against a dated newspaper . As it did with the Beirut hostages, this method offers proof of existence according to a dated time line. *In situ* captive breeding of Green Tree Pythons had become a reality, and began to fill a void in the importation of new genetic stock into the United States for the first time in over a decade.

MISREPRESENTED SPECIMENS INFILTRATE THE MARKET

Other Indonesian animal dealers soon began exporting supposedly captive-born Green Tree Pythons to dealers in the States. However, most of these "captive-born" animals were full-sized adults, often complete with the noose marks of capture, and a variety of internal and external parasites common to wild-caught animals.

Because these animals come into the country with valid Indonesian paperwork, there is little the U.S. Fish & Wildlife Service can do to shut down these obvious wild-caught imports. Many of the Green Tree Pythons now entering the country die in the hands of U.S. dealers. Worse yet, they die in the hands of customers who believe they are buying captive stock on par with what they are accustomed to seeing from U.S. breeders.

Another form of misrepresentation creeping into the market is the term locality-specific. As has happened with other com-

mercially bred herps, this term has become a much abused ploy for marketing Green Tree Pythons with certain color and pattern attributes. Based upon the numerous "locality-specific" Tree Pythons advertised for sale in magazines and at shows, one might think that these animals are being cranked out in Indonesia like Corn Snakes are produced here in the United States.

I recently asked several commercial breeders how many locality-specific Green Tree Pythons they thought had come into the U.S. in the past few years (captive-born, of course). All agreed that a flood of these snakes had entered the country between 1995 and 1996. For 1996 alone I heard guesses between 2,000 and 10,000 specimens!

My curiosity now aroused, I decided to do a little investigative work to determine the real numbers of Green Tree Pythons coming into this country from Indonesia. I started my quest with a contact at TRAFFIC USA (a WWF/IUCN sponsored group that attempts to track global trade in fauna/flora in cooperation with the C.I.T.E.S. Secretariat). I was given import numbers through 1994:

1992-14 specimens 1993-118 specimens 1994--110 specimens

I was also told that, as of 1994, the import listing only accounted for a part of the actual number of animals brought into this country. It seems that a few years ago the U.S. Fish & Wildlife Service began using a U.S. Customs electronic clearance system, Automated Commercial System (ACS). The problem with this is that all entries cleared via ACS are no longer entered into the Fish & Wildlife Service database, Law Enforcement Management Information System (LEMIS). Therefore, LEMIS data are no longer complete (maybe 50-70% of imports), and USFWS has little or no ability to routinely collect data from ACS, a system closely guarded by Customs. By "guarded" I mean that Customs maintains that this information falls under their exception to Freedom of Information Act (FOIA) requests, because the information is protected trade data (yes, we are talking snakes here, not nuclear warheads).

A contact at the Fish & Wildlife Service confirmed the above information and stated that he could account for 651 legally processed Green Tree Pythons between May of 1991 and August 1996, plus 24 specimens seized without proper documentation. This agent guessed that a realistic number of imports for 1995-1996 would be 400 per year.

No matter how you look at it, 400 snakes is a far cry from the 2,000 to 10,000predicted by my breeder buddies. One guess is that people are seeing the same few hundred serpents advertised and moved about from one show to the next. On the other hand, I know that Frank Yuwono has produced no where near any of these numbers at his farm, and Kamuran Tepedelen has imported only a fraction of the quoted "local specific" animals that we see listed for sale.

To my knowledge there is no one else legitimately breeding Green Tree Pythons in Indonesia besides Frank Yuwono. Interestingly, last year Gene Bessette was approached on behalf of another Indonesian exporter asking for photos of Ophiological Service's Green Tree Python facilities to use as "proof' of his own breeding venture. Needless to say photos were not provided.

THE BOTTOM LINE

There are quite a few Green Tree Pythons being misrepresented as captive-born in Indonesia, and as locality-specific individuals. Remember, you get what you pay for. Serious Chondro connoisseurs know the market value of a truly captive-born python from established breeders. If the price looks too good to be true, *itprobably is*. And unless the serpents came through Bushmaster Reptiles, or the progeny thereof, I doubt that the animals can be honestly identified as locality-specific.

I hope that more Indonesian dealers will take up *in situ* captive breeding of pythons, and other animals as well. This is being done with notable success with Komodo Dragons at The Gembira Loka Zoo in southern Java. I believe *in situ* captive breeding may be the hope of survival for many threatened animals

around the world. Captive breeding facilities in countries of origin create paying jobs for local people, and will not adversely effect wild populations if only young specimens are removed from the gene pool. Indigenous captive breeding provides new blood lines for breeders in foreign markets. And we all know that captive born animals are less likely to be stressed in shipping and adjust much better than wild-caught adults.

Captive-born Green Tree Pythons make magnificent vivarium additions. We have learned a lot about these serpents over the last two decades, and there are many more secrets yet to be revealed. However, they are not for everybody, and a "good python breeder" does not necessarily make for a good "Chondro breeder". Pythons in general and Green Trees really are apples and oranges. A healthy captive-born Green Tree Python with a history and a pedigree is worth its weight in gold, compared to the lumps of lead with a "locality" tag being marketed by many dealers.

Hopefully in the near future the U.S. Fish & Wildlife Service will find a way to ban the importation of wild pythons coming in as captive born, but this is a tall order and will not be easy to implement. Perhaps the Indonesian wildlife management will once again allow and regulate the exportation of wild Green Trees. I do not so much have a problem with wild-caught animals entering the trade as I do having them misrepresented as captive-born. This is not fair to the serpents or their potential owners. In my opinion, the Frank Yuwonos and Kamuran Tepedelens of the world will be the wildlife pioneers of the 21st Century with in situ captive breeding of wildlife to meet the demands of the animal trade, and to help ensure the survival of many species.

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