



# Varanews

Volume 4 Number 2/3  
26 May 1994

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Please check the mailing label for renewal information

Varanid  
Information  
eXchange

See the inside front  
cover for answers to  
common  
questions  
and general  
information  
about Varanix,  
including  
membership,  
back issues,  
editorial and  
artwork submissions  
for publication, etc.



## Metamorphosis Issue

### From the Editor: The state of the eXchange

You may have already noticed a few changes in Varanews. (If not, good thing it doesn't have jaws like the Nile monitor pictured above!) I don't like to take up space with "administrative" clutter, preferring to fill these pages with real monitor talk. This is one of those random occasions it's worth updating readers on what's going on. (Besides, there are extra pages to work with.)

May 1990: The first issue of Varanews, Number 0, was sent to perhaps 100 herpetological societies requesting they let their members know about the idea of a varanid information exchange. Similar to the comments in many readers' first letters, I was looking for sources of information about monitor lizards and wondered where other people interested in monitors were to be found. (A copy of Number 0 accompanies this issue.)

Varanews has undergone very little change in the past 4 years. This issue is an example of adaptive behavior. Among the reasons, the general info page was already pretty crowded and more needed to be added. Readers asked for more photos and more pages. The new design offers quicker reference to article content. The goal now is to maintain 12 pages per issue, so keep the material coming. (We'll have to wait till the next newsletter metamorphosis to satisfy readers who "complained" the newsletter is not produced monthly... the complaints were taken in a positive tone.)

### Varanix is...

a worldwide network of people interested in monitors. Membership spans the globe and ranges across all levels of experience, from the person having just encountered his/her first monitor to the veteran herpetologist with decades of experience and training. The single largest group of the 400 +/- members are private individuals and families caring for at least one monitor.

(continued on page 3)

Varanix: devoted to the study and captive care of monitor lizards

## Membership

One-year membership in Varanix:

USA: \$12

Foreign: \$15 US

(Postal money order in US funds, please)

Members receive Varanews, published 6 times per year, and supplemental publications as they become available.

- Newsletter exchanges with other herp societies, conservation organizations, etc. are considered.
- This newsletter is offered free to zoos willing to occasionally share their experiences in the pages of Varanews for the benefit of other readers (and especially their monitors).

Address all memberships and correspondence to:

**Varanix**  
8726D S. Sepulveda Bl. #243  
Los Angeles, CA 90045 USA

## Inquiries & Correspondence

Letters to Varanix often contain information of general interest to Varanews readership. When writing, please indicate if you do **not** want to be quoted or have your correspondence reprinted in part or otherwise. (The author will always be contacted prior to publication of questionable or controversial topics.)

Telephone: (310) 768-8669

The phone line is provided to give prospective members a general overview of Varanix and to make it easy for members to leave short messages that would otherwise be sent in a letter.

Personal responses, either by letter or phone, are typically not possible. Many questions are of general interest and will be posted/responded to in Varanews. Best efforts will be made to address calls of an urgent medical nature.

Messages may also be sent via modem:

- CompuServe: user ID: 71320,721
- Internet: gjn@triple-i.com  
71320,721@compuserve.com

## Varanews

The intent is to send the newsletter out the beginning of every even-numbered month, though this is not always possible. For mailing information about the most recent issue of Varanews, you may call by phone and press 3 once the message begins. You are also invited to inquire via email.

**Back Issues** (some may only be available as photocopies)

Number 0: \$1.50;

Vol(num) 1(1) - 1(8), 2(1) - 2(6), 3(1) - 3(6), 4(1) - current: \$2 each

## Submissions for Publication

Contributing authors are always cited. When no author is listed, the material was prepared by the Editor.

### Editorial

- Submission in electronic form **preferred** on PC or Mac diskettes. Most data formats accepted, including Word, WordPerfect, ASCII. Typed or handwritten submissions are, of course, most welcome.
- Translations of non-English articles must be accompanied by a copy of the original work, including bibliography.
- Please indicate any special conditions of publication, such as withholding mention of name or crediting a person/publication.

### Graphics & Illustrations

Hand-drawn graphics: up to 11x17 inches

Electronic format: Most data formats acceptable (TIFF, EPS, GIF, PhotoCD, ...)

Slides/negatives: 35 mm color and b&w

Photos: Color and b&w up to 11 x 17 in.

## General Notes

All projects and publications of Varanix are done on a volunteer basis. The primary goal of the limited resources is to collect and disseminate information that helps members provide the best possible captive conditions for their monitors. To accomplish this goal, administrative tasks have been streamlined.

- Membership renewal is tracked by the volume(issue) of Varanews and not by date. [Example: 4(2) is vol 4, num 2 and not April 2nd.] No reminders are sent out due to the time and cost involved.

## PLEASE CHECK THE MAILING LABEL FOR RENEWAL INFORMATION

- Membership dues in the US have been \$12 US since mid-1993. If you sent in \$10, your initial membership will run five issues rather than six.
- Your membership may have begun with two issues of Varanews. There are a couple of reasons:
  - (1) New members often request back issues, typically beginning with the most recent ones.
  - (2) It allows grouping of member renewals to ease management of the member list. In both cases, this approach saves time. The only trade-off is that renewal time will arrive in less than one year.Overall, members have found this agreeable.

Efforts are constantly underway to expand projects and improve the publications. To this end, you are invited to send in your thoughts, ideas and suggestions.

If you have a project idea or want to get involved in any way, you are invited to contact Varanix.

## What you read in these pages . . .

Articles appearing in Varanews represent the opinions and experiences of the respective authors. Though best efforts are made to insure accuracy of contents, the reader must recognize that much of the information is based on individual personal experiences and therefore difficult to verify.

**The reader is well-advised to evaluate everything heard and read, regardless of the source.** Consult as many references as possible and never attempt any husbandry technique that is unfamiliar or you are not confident you are capable of performing. **This is especially true of medical procedures or when safety (monitor, personal and public) is involved.** If you read something in these pages you do not understand, question, or can add to, you are urged to respond for the benefit of other readers.

## Reprinting parts of Varanews . . .

**When submitting part of Varanews for reprint in another publication, please accompany it with a copy of this page.**

The contents of Varanews may be reproduced for inclusion in the newsletters of herpetological societies with the following provisions: the material is reproduced without change, appropriate credits are given, and a copy of the publication is sent to Varanix.

**When reprinting parts of this newsletter, you are requested to maintain the original context. This is especially important when the topic includes discussion of unfortunate experiences or how not to do something. (Taken out of context, a "how-not-to-do" may be interpreted as a "how-to-do".)**



|                           |  |
|---------------------------|--|
| Editor                    | Greg Naclerio                                    |
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| Editorial Review          | Frank Braun<br>Michael Fost<br>Robert Sprackland |
| Veterinary Advisors       | Scott Stahl, DVM                                 |

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**A primary function of Varanix is to build a collective knowledge base that will serve to further our understanding of monitor lizards. The goal of these efforts is to improve their chances of survival, both in captivity and in the wild.**

Also well-represented is the professional herpetological community, including zoo curators, reptile keepers, taxonomists and paleontologists. One thing most people writing in seem to share is the fascination, awe and respect commanded by these noble creatures.

The "eXchange" part of Varanix pretty much sums up what it's all about: provide a way for members to exchange experiences and education through Varanews and other special publications. Members are the reservoir of knowledge, Varanix is really only an avenue of communication.

Every Varanix project and publication is the result of volunteer time and effort. If you hear about a project idea in one issue and never hear anything again, it's either because no one has yet had the time or no one was interested in doing anything. There is no paid advertising. Paid memberships are the only source of funding to cover the cost of materials, publications, etc.

#### **Editorial contributions...**

on any topic are invited; there is nothing too short or too long. It's as simple as: you provide the material, we publish it and get it to other members.

If at all possible, it is most helpful to receive electronic submissions to save retyping time. Electronic mail is easiest for shorter pieces, email attachments are better for longer articles. If you submit on diskette, it will be returned. (Please see the *Editorial Submissions* section on the inside front cover for format details.)

#### **Easier than writing an article...**

is sending in clippings, photocopies of articles, etc. If you come across something that you can relate to your monitors, so will a lot of other people. (Please include publication information so we can pass it on to readers or in the event we need to seek reprint authorization.)

If you participate in electronic information services (Compuserve, America Online, Herpnet, rec.pets.herp [internet], ...), the people not yet online would greatly benefit if you could forward message threads and files that relate to monitors (see inside front cover for email address). I simply cannot check in as often as I would like, but know there is a lot good information rushing by, especially in the area of personal experiences and discussions on basic captive husbandry.

#### **Photos and artwork...**

in most any form will work. The back page of Varanews has been reserved for photos and illustrations of your monitors.

We're also trying to assemble a collection of sketches for each species, including a head profile and full body illustration, that will be

used as visual keys to accompany specie-specific articles (as well as the someday-to-be-completed care sheets). You are invited to send in your hand drawn or electronic submissions.

#### **English translations...**

There is a wealth of information on monitors that has been published in languages other than English, German probably the richest source. Good translations consume time, which is why people doing it for a living fetch from \$25-40 per page (last time I checked). Though it would be wonderful if we could afford to pay, this is not the case.

Let Varanix know if you would like to contribute your time and multilingual skills for the betterment of varanophiles and varanids world-wide. We have articles and papers, both short and long, to accommodate any degree of willingness to contribute.

#### **Future plans...**

include T-shirts (a couple are in the works and should be available by next issue), supplemental publications, full-color inserts to Varanews and posters. Consistent with the philosophy over the last four years, it's a matter of resources (= time, money and energy).

#### **No varanid symposium...**

Last year several members were considering organizing a varanid symposium to be held this summer. Nothing has been heard since, so maybe next year?

#### **Tegus...**

The offer to include articles on tegus has been extended several times. There were a number of responses indicating an interest, but no submissions. The offer still stands. In the event we do start receiving articles, we'll need a *Tupinambis* editor. Apply within.

#### **Crocodilians...**

Some time back I sent out a notice asking if there was any interest in doing something for crocodilians similar to Varanix. A recent mention in Reptiles magazine generated a couple dozen responses thus far. Let me know if you are interested, especially in a "pro-active" capacity, such as editor.

#### **Why the double-issue...**

More than normal demands of the bill-paying job and redesign of the newsletter pushed the date for the "true" volume 4 number 2 far enough back, it made more economical sense (both time and money) to do a combined, double-issue with numbers 2 and 3. You will also find an index to all Varanews articles, up to and including this issue. Juggling time and expenses without sacrificing quality and content is an ongoing battle. We hope you understand and find it worth the wait.

naclerio

This sidebar is used throughout the newsletter to highlight noteworthy facts and figures in the text.

Notations without an arrow appear next to the column referenced. Notations with an arrow reference text in the opposite column.  
Example:

← Editorial contributions

Metric/English conversion information is on page 14.

→ Wild  
*V. albigularis*  
observed  
copulating in  
trees

Jeff Lemm shares the following summary of his experience with eighteen White-throated monitors he has been caring for since they were hatchlings. Note how observations of *V. albigularis* in the wild were directly applied to the design and maintenance of the captive environment and the results he has had.

### Captive Husbandry of White-throated Monitors (*Varanus albigularis*) at the San Diego Zoo's Center for Reproduction of Endangered Species (C.R.E.S.)

Jeff Lemm  
Research assistant, keeper

In May of 1991, I found myself holding one of 18 newly-hatched white-throated monitors that I would be raising to adulthood at our lizard research facility at the San Diego Zoo. The neonate monitors were hatched by my supervisor, Dr. John Phillips, during the course of his savannah monitor research project in Namibia's Etosha National Park. The hatchlings, representing 6 different bloodlines, weighed in at about 20 grams (.7 oz) each and had an SVL of about 11.0 cm (4.3 in).

#### Housing

For the first few months, the lizards were kept outside in groups of 6, in pens that measured 12 x 12 ft (3.7 x 3.7 m). Each pen was equipped with a 50 quart cooler with a hole cut in the side as a door. The coolers warmed in the sun during the day, and maintained their temperature fairly well at night during the summer months.

When winter came, the monitors were moved into a large enclosure inside our *Iguana* and *Cyclura* greenhouse. They were equipped with heat lamps and a cooler for warmth. Ultraviolet light was provided through roof panels, constructed of ultra-violet light transmitting plastic.

For the past two years, the white-throats have lived in new outdoor enclosures. The 6 new enclosures each measure 12 x 12 ft, and are made with cement floors for easier cleaning. This also helps the monitors to wear down their nails. Each enclosure is furnished with a large rectangular hide box made of 1/4 inch plastic, which is large enough to hold 4 adult monitors. The boxes were made with a false floor so that underneath the box, a heat pad (or pig blanket) can be used as a winter heat source. The temperature in the box is controlled in the winter so that it never dips below 50 F, but remains cool enough to give the lizards a long

dormant season. (In Namibia, night-time temperatures dropped into the low 30's F (-1 C) during the 6 month cold season).

Each enclosure is also equipped with a series of logs, formed into a perch with a basking area at the top that is about 5 feet off the ground. They are mainly used for sunning, but in the wild adult white-throated monitors were found copulating in trees. Perhaps the availability of these perches will promote breeding behavior as well.

#### Diet

The monitors have been doing much better since they were permanently moved outdoors. The majority of them have reached adult size in the three years we've had them. Our largest male has a body mass of 10.2 kg (22.5 lb) and SVL of 72 cm (28.3 in), while our smallest, a female, weighs about 4 kg (8.8 lb) and has an SVL of 52 cm (20.5 in). The large size of these monitors in such a short time is due mainly to a steady supply of a somewhat natural diet. They are fed small meals every other day during warm months, consisting of eggs, garden snails, ground turkey, zoo carnivore diet, and occasionally road-killed snakes. The eggs are scrambled to reduce the chances of *salmonella* and some shell is added for extra calcium. Some people disagree with feeding eggs to monitors, but in the wild, eggs were among their favorite foods. I have also been questioned about feeding snails to the lizards. Land snails and insects comprised the majority of the monitors' diets in the wild during the 4 month wet season (Jan. - Apr.). All of my lizards will eat as many snails as I give them. The snails also provide calcium for the monitors, and egg-producing females will gorge themselves on whole snails to acquire the calcium from their shells for egg development. Although snails carry a number of internal parasites, none of my monitors have ever had a problem. One possible problem with feeding snails to monitors is the chance that the snails have been sprayed or baited with insecticides. Before feeding snails, the area where they are collected should be researched, as snails may carry pesticides in their bodies for up to 7 years. The ground turkey I feed, as well as road-killed snakes (which, without a doubt are the favored foods), are all frozen for at least a month to kill any *salmonella* these items may carry.

Many monitor keepers believe in feeding their lizards mice and rats, which may result in very obese monitors who eventually succumb to kidney failure. Although many monitors take them without any problems, I have been seeing more and more savannah monitors

→ *V. albigularis*  
captive diet  
close to natural  
diet: eggs,  
garden snails,  
ground turkey,  
zoo carnivore  
diet,  
occasional  
road-kill  
snakes.

Insulated  
cooler used as  
solar-warmed  
hide spot.

→ Hogwarmer  
heat pad  
used for  
winter heat  
source

→ Problems  
observed with  
captive  
savannah  
monitors  
eating rodents

(*V. exanthematicus* and *V. ionidesi*) who are dying due to hair impactions. My hypothesis is that many of the more aquatic monitors (*V. salvator*, *V. indicus*, *V. niloticus*) don't have as many problems with rodents because they ingest a lot of water which acts as a solvent that breaks through the hair impactions. Savannah monitors rarely enter the water and so may be more prone to these impactions. Further evidence that suggests rodents are not the most appropriate savannah monitor diet is that rodents are nocturnal, while monitors are of course, diurnal, so the two animals rarely encounter each other. During Dr. Phillips study, he observed the stomach contents of road-killed savannah monitors and rarely, if ever, found that rodents were being consumed.

### Behavior

The behavior of our adult savannah monitors has changed drastically in the past couple of years. Although they still explore their surroundings very frequently, they do it less frantically than they did when they were young. Aggression has become less common as well. Only during the warm season has any aggression occurred. Most conflicts occur about an hour after eating and usually involve a female attacking a male.

The adult monitors are still very tame and recognize certain individuals. There have never been any attempts to bite people, and even the largest five foot long male will sit quietly in my lap as a blood sample is being drawn from his tail. They are still very curious, climbing up visitors legs and backs, and tongue-flicking and



Author's girlfriend with 3 year old white-throat. Photo by author.

exploring, as well as marking any new objects with a vent drag.

### Breeding

We still haven't seen any copulation in any of the monitor enclosures. This is probably due to their young age, as well as behavioral experiments that we are conducting, but I believe that this year we'll see some breeding during the summer months. Courting behavior has been observed frequently during the last couple of months: males clawing at female's backs, scent marking of females and certain spots in the enclosures, and ejaculates that have recently been found in many of the enclosures.



Author holds female white-throat during ultrasound to monitor egg development. Photo by Lori Jackintell.

### Research

Although we wouldn't mind hearing the pitter-patter once again of juvenile monitor feet, breeding by itself isn't our main objective at this time. Our main goal at C.R.E.S. is to study all aspects of captive reproduction of large lizards. For the past year we've been following egg cycles in female white-throats, via ultrasound, as they near breeding age. We've also been collecting monthly blood samples to see how the hormones change during reproductive cycling. Blood has also been analyzed to see if being around a male all year has any stressful effects on the female monitors.

### Summary

Working with white-throated monitors is a very enjoyable and rewarding experience. If proper light, food, warm (and cold) temperatures, as well as a large enclosure are provided, successful breeding can be accomplished.

Savannah monitors are also a great "starter" lizard, as the majority of them are usually fairly tame, and I'm sure that anybody who experiences these lizards will be pleased with them overall.

← Rodents not part of natural diet; rodents are nocturnal, savannah monitors are diurnal

← More aggression during the warm season, usually shortly after eating.

Goal of C.R.E.S. is to study all aspects of captive reproduction of large lizards.

Keys to successful breeding

## The Papuan Monitor Lizard of New Guinea (*Varanus salvadorii* Peters and Doria, 1878): Notes on its mystique

Mark K. Bayless

The crocodile monitor, tree crocodile or Papua monitor lizard, *Varanus salvadorii*, was described in 1878 by Wilhelm Peters (1815-1883) and Giacomo Doria (1840-1913). This species is reported to be the longest of the family Varanidae, the longest unconfirmed specimen a male 3.53 m (11.6 ft) killed in Papua New Guinea (Wood, 1977). The largest skull measures 141.7 mm (5.6 in.) across from a 2440 mm (8 ft) long specimen (Mertens, 1971). The largest living specimen in captivity is 2530 mm (8.3 ft) (St. Pierre, pers. comm.).

The range of *V. salvadorii* appears to include Papua, New Guinea, having been found at St. Joseph, Sentani Sea, Kwawi, Jamur, Setekwa, Dinawa (Mertens, 1942); Stuart Island, Fly River (Mertens, 1950); Kikoni River, Kipi Village near Kikori, and Aird-Hill—Gulf of Papua (Mertens, 1971). In Irian Jaya, this species has been found in Hollandia (de Jong) and in Dore (Peters & Doria, 1878).

It is speculated this species dwells in the forest canopy of New Guinea and Irian Jaya (Sprackland, 1992). Their long tails are thought to be prehensile and used for balance as they climb through the high canopy. The scalation on the ventral side of their long tails may be used as a friction brake, as they climb through the tall trees.

Regarding its systematics, or placement within the family Varanidae, this species is unlike any other *Varanus* and has been placed into its own subgenus, *Papusaurus*. Distinctive to the Papuan monitor is its dentition and morphology of the skull and tail-base and total body length (Boulenger, 1885; Emberton, pers. comm.; Mertens, 1962). Similarities to other monitors include the emerald tree monitor, *Varanus prasinus*, which has the same ratio of the snout-vent length (SVL) to the total length. Both species also have similar ventral tail scalation and both curl their tail into a watch spring shape when alarmed or nervous (Emberton, pers. comm.) These similarities may be attributed to the fact both species are arboreal.

The teeth of *V. salvadorii* are large, fang-like only in the upper maxilla; their lower teeth are small and housed in fleshy sheaths. These teeth are probably developed to hold feathered, fast moving prey, as is the case with New Guinea's

green tree python, *Chondropython viridis* (Emberton, pers. comm.; Hoser).

This varanid's natural diet is definitely a mystery. Kempen (1993) speculates that Papuan monitors prey on naked-tailed rats. They may also prey on bats, as well as invertebrates, birds, and saurians (Sprackland, 1992). This varanid is New Guinea's top predator, and, like most varanids, it probably takes whatever prey it can overpower. In captivity, rodents are eagerly accepted (G. Balok; E. Berker; East Bay Vivarium; R. St. Pierre, pers. comm.).

These animals are greatly feared in New Guinea, but their skin is sought after for the production of drums for tribal functions and for tourist souvenirs. Its size and high cost alone make this monitor a suitable captive only for an experienced varanophile willing and able to provide a large, specialized captive environment.

*V. salvadorii* reproduced at the Gladys Porter Zoo in February, 1992. The single hatchling represents the first captive breeding of this species in North America, possibly the world. The juvenile is healthy and growing quickly (Hairston, pers. comm.).

I am interested in hearing from anyone who has had experience with *Varanus salvadorii*, especially observations in the wild, in preparation of a more detailed report in the future. Photographs and slides will be returned upon request.

I would like to extend my appreciation to the following people who helped in the preparation of this article: Colette Hairston at Gladys Porter Zoo, Gary Balok, Ennis Berker, East Bay Vivarium, Johnathan Emberton, Paul Gritis, Ron St. Pierre, and Robert Sprackland.

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*V. salvadorii*  
range includes  
New Guinea  
and Irian Jaya.

*V. salvadorii*  
is arboreal.

## Translation: fr -&gt; en

In July 1971 an article by Mamadou Cissé of the University of Dakar entitled *La Diapause Chez Les Varanidés du Sénégal* appeared in number 131 of *Notes Africaines*, published by IFAN. This article summarized field observations in Senegal, West Africa, focusing on the different behavioral adaptations of the savannah and Nile monitor lizards to seasonal environmental changes, specifically the hot, dry season.

The original article was broken down into four sections: general characteristics of monitors, systematic classification, morphology of the Nile and savannah monitors and diapause, or seasonal periods of inactivity, in these monitors. The following translation omits the bulk of the second section, which presents the systematic classification of monitor lizards, since there have been changes since the article was originally published. If any reader wishes to use this section as a basis for an article discussing the changes that have taken place over the past 23 years, I can provide a copy of the section, either in the original French or along with a rough English translation. Editor

From Webster's Ninth New Collegiate Dictionary (Merriam-Webster, Inc., 1988):

diapause - A period of physiologically enforced dormancy (as developmental arrest in an insect) between periods of activity.

## Diapause and the Monitors of Senegal

(Original article "La Diapause Chez Les Varanidés du Sénégal" by Mamadou Cissé)

English translation by Greg Naclerio

In this article, we intend to outline several aspects of the life of monitors, notably their behavioral and metabolic adaptations in response to seasonal environmental changes. Our studies cover the Nile monitor (*Varanus niloticus*), also known as the water monitor, and the ground [savannah] monitor (*Varanus exanthematicus*). It is well known throughout Senegal that these reptiles are more commonly seen during the winter/rainy season than during the dry season. During the dry season, they reduce activity levels in parallel to worsening environmental conditions. They retire to a "nest" [sheltered hide spot] for a variable period of time depending on the species. We observed many of these nests and would also like to report on the seasonal fast these animals undergo.

We will present our notes as follows:

- I. General monitor characteristics
- II. Monitors as they fit into the class of Reptiles

### III. Morphology of the Nile and savannah monitors

#### IV. Diapause in monitors

#### I. General Characteristics

Monitors are large lizards resembling agamas (margouillats) in general body shape but grow much larger, lengths attaining 1.6 m (63 in) for the Nile monitor.

The body is covered with soft scales.

The head is somewhat small compared to the overall size of the monitor. The tail is laterally compressed.

The tongue is forked and can be extended like that of snakes. The feet have five clawed toes. The front legs are shorter than the back.

On the underside, the cloaca is found at the back of the hind legs in a transverse slit. Males have 2 hemipenes, one on each side, that can be everted like the finger of a glove. During copulation, only one is used. Otherwise, the hemipenes remain retracted. This is why it is difficult to determine sex from external appearances. However, it is simple enough to evert a hemipenis by applying pressure at the base of the tail.

#### II. Classification

[begins with end of original section...]

The African species are *Varanus griseus*, *Varanus exanthematicus*, and *Varanus niloticus*.

*Varanus griseus* is found in sub-desert regions, in the southern part of north Africa from Egypt to Morocco, and into Mauritania, Mali and Niger. Adults are sandy-colored with dark marbled patches on the back. The young are brightly colored, with black and white bands crossing a yellow back. The tail is round with no dorsal ridge.

*Varanus exanthematicus* is the savannah monitor. It is not found in forested regions. In west Africa, it is represented by the sub-species *exanthematicus exanthematicus*, in east Africa by *exanthematicus microstictus*, in South Africa by *exanthematicus albigularis*, and in Angola by *exanthematicus angolensis*.

*Varanus niloticus* is found throughout all of Africa with the exception of the northwest.

The three African species can be distinguished from one another based on the following key:

- I. Nostril oblique/slanted
  1. Body somewhat slender, round tail or slightly compressed toward the tip *griseus*
  2. Thick-bodied, tail compressed with ridge along the top *exanthematicus*
- II. Round nostril
  - Slender body, tail compressed with ridge along the top *niloticus*

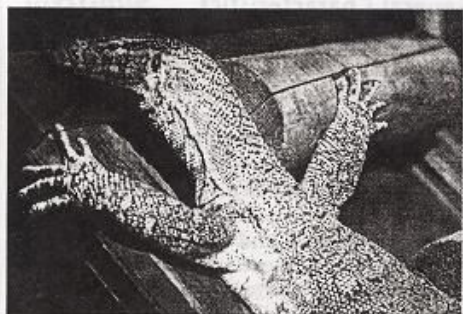
General physical description of monitors

Identification of 3 African species: *exanthematicus*, *griseus*, and *niloticus*

Key to 3 African species

### III. Morphology of the Nile monitor and the savannah monitor

#### 1) The Nile monitor (*Varanus niloticus niloticus* L.)



Captive *V. n. niloticus*, photo by nacterio

→ Physical description of savannah monitor.

Nile monitor is mostly aquatic.

→ Savannah monitors are found far from water; frequently climbs trees.

Physical description of Nile monitor.

This monitor lives near water and lives a mostly aquatic life. Locally, it is known as *nkana* in Bambara, *kaana* in Malinké, *ébalass* in Diola, *barr* in Wolof, *élo* in Peul (Foulani), *étias* in Sérér. [Editor: These are major traditional languages of the West African region including Senegal, Guinée-Bissau and Mali.]

The body is slender. The back of young monitors is a dark green and brownish in adults. Curved rows of yellow spots cross the back. The back of the neck has yellow chevrons angled toward the back.

The underside is light with black transverse bands.

The head is 2.5 times longer than it is wide. The snout is flat across the top.

The nostrils are rounded at the back and narrow at the front. They are slightly closer to the front of the eyes than the tip of the snout.

The eyes are ringed with yellow.

There is no external ear, the eardrum is on the surface.

The neck is relatively long.

The very powerful tail is laterally compressed. It is keeled along the top and measures just over 1.5 times the snout-vent length.

The scales on the head are polygonal and sub-equal. On the back, they are oval and encircled by granular rings. The underside scales are elongated, rectangular, soft and run in transverse rows.

The total length can attain 1.6 m (63 in). The water monitor is always on alert. At the slightest alarm, it will quickly disappear. It is capable of powerful blows with the tail and can bite.

#### 2) The Savannah Monitor (*Varanus exanthematicus* Bosc)

This monitor is only active during the winter/rainy season. It is known as *nkoro* in Bambara, *kouto* in Malinké, *goundo* in Peul, *mbeet* in

Wolof, *fassah* in Sérér; it is also commonly called "flat head".

This monitor is much bigger than agamas, but rarely grows longer than 1 m (39 in). This is a massive animal. The head is thickset.

The snout is rounded and convex.

The nostrils are slanted and much closer to the eye than the tip of the snout.

The eyes are red with a black pupil. The eardrum is oval. The neck is very distinct.

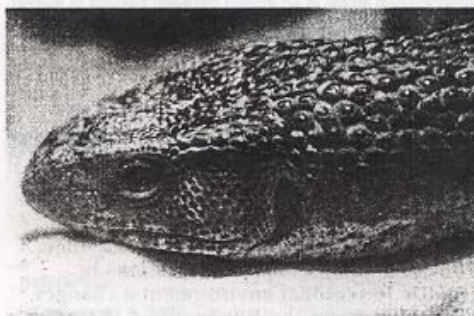
The tail is laterally compressed and keeled along the top.

The head scales are small. Those on the back are round and encircled by granular rings. The underside scales are rectangular. The back is gray-brown with 5 or 6 transverse rows of yellow patches. The stomach is light-colored.

A black stripe runs from the back of the eardrum to the base of the front legs.

This monitor lives a terrestrial life. It frequently climbs trees, but is not aquatic and is often found far from water.

This is a relatively inactive animal. If bothered, it moves quickly to get away and if it cannot escape, it adopts a menacing posture, lifting up on all fours, arching the back, the mouth wide open accompanied by loud hissing. It also may bite.



Captive *V. exanthematicus*.

photo by Andrea Smith

[systematics summary omitted]

Now that we have some background on these monitors, we present our observations on their nests and their seasonal periods of inactivity.

### IV. Diapause in Monitors

Our observations on monitor burrows were done in the Fissel-Diaganiao region of Senegal. This is a sandy region with numerous low areas which are covered with water during the rainy season and are, for the most part, temporary ponds.

In this habitat, the monitors rest in what we refer to as "nests", without implying the idea of reproduction. These nests are used both during the winter/rainy season and the dry season.

Savannah monitor is only active during the rainy season.

However, the manner in which the nests are used varies according to season and species.

#### 1. Winter nests

##### a) *The Nile (water) monitor*

During the rainy season, this monitor is quite active. It eats and reproduces. Its nest is a deep burrow, which the monitor digs itself, and is always near water. This is where the monitor spends the night and hottest times of the day.

We examined one of these burrows bordering the Naï Guitir river. The nest had 3 chambers and measured 3.8 m (12.5 ft) from the entrance to the end of the longest chamber. The depth was .5 m (20 in). We found the monitor in the burrow at the end of the primary chamber. Other burrows were much simpler; some had 2 chambers, others only a single one. All of them were longer than 2 m (6.6 ft). In one case, we found a monitor sharing a burrow with a tortoise of the genus *Pelomedusa*.

The Nile monitor will also rest in tree hollows; in general, each animal will have 2 nests: a burrow and a tree hollow, not far apart from each other.

As well, a Nile monitor's nest may be located near human habitations. One monitor was found in an empty hut in Soussoum, near the Fissel region. The monitor had dug its burrow inside the hut. Another monitor taken by surprise near a well took shelter in a burrow it had dug in the courtyard of a home.

We would like to point out that local customs do not permit village inhabitants to kill or eat Nile monitors. This may explain why the Nile monitor lives this close to human habitation. It is worth noting that this monitor will not hesitate to steal chicken eggs and even young chicks it finds in and near these houses. A short anecdote: In the village of Dengler, a local told us of a monitor he found in his house, which had been attracted by some chicken eggs. The villager caught the monitor, but since he did not have the right to kill it, he contented himself by tying it up and flogging it. Once released, this monitor has never returned inside the house, even though its nest is in a tamarind tree nearby. The lesson appeared to have been well taken by the monitor.

In winter, the Nile monitor's primary nest is sometimes a burrow, sometimes a tree hollow. In each case, the nest is always near water. The monitor emerges in the morning around 9h00 and returns around 18h00. Daily activities always begin with some time spent basking in the sun. Between 13h00 and 15h00, the monitor suspends activity and returns to the nest or a nearby bush. They do not typically come out when it is cool or cloudy. They also avoid windy days. Diurnal reptiles, they sleep at night.

##### b) *The savannah monitor*

The savannah monitor may also be found in the same region as the Nile monitor. Contrary to the Nile monitor, this monitor does not remain near water and seldom goes near human habitation. It prefers resting in tree hollows. It can sometimes be found in a burrow, most often that of a ground squirrel (commonly known as palm tree rat). Rarely, the savannah monitor may dig its own burrow if the ground is soft enough. This burrow is shallow and has only a single chamber.

This monitor is diurnal, so during its active season it is only out during the day. It leaves its hide spot around 9h00 and begins daily activities without first basking to warm itself. It avoids the hottest time of the day between 13h00 and 15h00 as well as days when there are strong winds. It returns to its nest around 17h00.

#### 2. Dry season nests

This is the season where life becomes difficult for these monitors; the ambient temperature drops below the monitors' optimal temperature range in December/January, followed by a time where it climbs above the optimal range; ponds continue to dry up; green vegetation begins to disappear, along with the invertebrates that are easy prey for the monitors; exposed to the intense sun, the naked earth heats up. The environment ceases to be favorable for an active life. The monitors respond to these changes by estivating. They cease all activity, return to their hide spots and undergo a fairly complete fast, varying somewhat with the species. We shall examine each case.

##### a) *Nile monitor*

During the wet season, we marked numerous Nile monitors, some found near a temporary pond in Diongol, others outside the village of Soussoum. All the marked monitors were captured on the ground, either in their burrows, between 13h00 and 15h00, or under a bush.

At the beginning of the dry season (December) we went looking for previously marked monitors. The water in the Diongol pond was beginning to recede and the surrounding ground offered little humidity. We did not see a single Nile monitor on the ground. All burrows we found were abandoned. We went to another pond still full of water and searched the surrounding vegetation. We captured 2 Nile monitors in their burrows. They had not been marked. These two had apparently not yet abandoned their shrinking pond. We went to the village of Soussoum, where we had previously marked some monitors, to continue our search. The burrows were also abandoned. We investigated a tree that was about 20 m (65 ft) from housing. We found a marked monitor; it was the one previously captured in a hut.

Savannah monitor preferred hide spot during rainy season is a tree hollow.

← Nile monitors rest in burrows and also tree hollows; their hide spots are often found near human habitation.

← Local customs prohibit killing of monitors.

← A Nile monitor caught in a home stealing chicken eggs was tied up and flogged. It has never returned to the house, even though its hide spot is in a nearby tree.

→ Savannah monitors become seasonally inactive regardless of environmental conditions.

Nile monitors remain active year round when water is present

→ Savannah monitors remain inactive for 6 months

In the height of the dry season (April) we returned to the same locations to look for marked animals. The Diongol pond was completely dry. All burrows were empty. On the other hand, in some nearby trees we found 2 monitors which had been marked during the wet season. Two other unmarked monitors were also found in tree hollows. At this point in time, there was hardly any water in the vicinity and prey had become quite scarce. These monitors had nothing in their stomachs.

We felt that these Nile monitors, confronted with a scarcity of food, were forced into a state of dormancy. The inhabitants of the nearby village, Oular, unanimously confirmed that during this season, these animals were never found in their homes searching for chicken eggs, but remained in the tree hollows. We began to wonder if the same was also true for the monitors living near permanent bodies of water. The same day we visited the Sangane river near Thiès. Water and vegetation were relatively abundant. Upon arrival, we spotted fresh monitor tracks. We followed them and surprised a monitor in a small water hole, probably looking for frogs and fish.

Also in April, someone brought us a water monitor he had caught in Séfa, in the Casamance region. Two other monitors were brought to us from Richard-Toll. Each had a freshly swallowed mouse in the stomach.

These latter observations led us to the conclusion that Nile monitors living near permanent bodies of water remain active throughout the year and continue to feed throughout the dry season.

Thus, this species appears to undergo a period of seasonal inactivity based on environmental conditions: individuals living near permanent bodies of water do not estivate, whereas those living where no water is available during the dry season remain inactive until favorable conditions return. The "tough" times are spent in tree hollows, which provide enough humidity and coolness to maintain the minimum conditions necessary for the animal to survive. We have even found water in the tree hollow of a baobab, however, we do not believe this to always be the case. Actually, we found many *Varanus niloticus* in tree hollows containing no water. The presence of water in these trees during the dry season is the exception. It is also likely that during the dry season the water monitor also fasts once water has disappeared. How does the other species (that is, the savannah monitor) deal with these conditions? We begin discussion in the following paragraph.

#### b) Savannah monitor

Towards the end of December, this monitor stops all activity. It retires to its summer hide

spot. This is in spite of the fact that water is still present and invertebrates have not as yet completely disappeared. We wondered if the availability of prey had fallen below the minimum necessary for the savannah monitor to remain active.

This still remains to be answered. We do know that the savannah monitor is not active during the dry season even in areas where water is still available. We saw no active savannah monitors during a search we carried out in April in the lower and middle Casamance.

All individuals we found during the dry season were in their nests, which varied according to the terrain. In wooded areas, the savannah monitor prefers the hollows of large trees, without preference for any plant species. We found them in *Acacia albida*, in *Celtis integrifolia*, in *Erythrophloeum guineense*, in *Ficus gnaphalocarpa*, etc. For the most part, these hollows had two openings: one facing the sky, the other facing downward. In general, the monitor was curled up inside. If the tree did not offer a hollow large enough for the monitor, it would remain pressed against a branch out in the open. We saw one individual on an *Acacia* branch and another on the small boughs of a thicket.

In areas with few trees, the monitor spends the unfavorable season sheltered on the ground, either in an old ground squirrel burrow, in an abandoned termite mound, or under a bush.

The savannah monitor remains inactive in its nest for about 6 months without food or water. It fasts throughout the dry season regardless of the environmental conditions. It is completely inactive. However, this inactivity is not a continuous sleep. During the day, the animal may wake up, but does not move unless it is disturbed. If one tries to remove it from its hide spot, it digs in with its claws and puffs up.

We wondered if the dry season fast was a response to environmental conditions or if the monitor would respond to stimuli normally encountered during its active period.

In April, we offered water to both a *V. niloticus* and a *V. exanthematicus* which had been taken from their respective hide spots. Only the Nile monitor drank. It would appear that the Nile monitor reacts to water year round while the savannah monitor can simply do without when estivating. As well, the West African savannah monitor undergoes a complete estivation. It fasts during the dry season, regardless of the amount of available water. This differentiates it from the Nile monitor, for which seasonal inactivity appears to be determined primarily by the lack of water within its home range.

Without a doubt, it would be interesting to give a physiological analysis of this behavior and we have already begun investigating it. However,

we chose not to include this information here, this collection of notes intended as an overview on the subject of these monitors.

Nevertheless, we would like to remark on the existence of sizable fatty reserves these two species have in both the abdomen and the tail. During the fast, these reserves are absorbed in the blood to satisfy the metabolic needs of these animals. This physiological mechanism is not the only adaptive behavior during the dry season. Remaining curled up, the humidity and relative coolness of the nest help minimize the expenditure of energy and unnecessary activity. But, we will not go into any more detail here. We will reserve the discussion for a future publication dealing with physiological problems as they relate to seasonal variations. Now, we conclude our remarks on diapause in monitors.

Based on our observations, seasonal inactivity varies between the two monitors being discussed. The savannah monitor (*Varanus exanthematicus*) annual cycle takes two distinct phases: an active phase during the rainy season and an inactive phase during the dry season. The inactive period begins with the onset of several factors occurring at the end of December and has a decisive influence on certain physiological processes. All of these conditions still need to be studied and better understood. However, it does appear that the presence of water is not an important factor. The savannah monitor begins its inactive period well before water totally disappears from its habitat.

This is not the case with the Nile monitor, where estivation is optional. When water is available year round, this monitor remains active and continues to feed. However, in areas where water disappears during the dry season, the Nile monitor adapts by going into a period of inactivity similar to the savannah monitor.

This adaptive behavior is similar to that of the African lungfish, *Protopterus annectens*, a fish inhabiting the marshes and ponds of West Africa.

In the wet/dry climate of Senegal, this animal will live a life of activity or relative inactivity depending on the amount of water available in its habitat. The most active period coincides with the abundance of water and it breathes via gills. When water retreats, the fish digs itself a burrow and wraps itself in a cocoon and respiration is via lungs. During long droughts, the fish remains encased year round, awaiting the return of water and favorable conditions.

With regards to diapause, the Nile monitor is more like this fish than its "first cousin", the savannah monitor. The lack of water is the primary factor for both the Nile monitor and the lungfish entering into an inactive state whereas the savannah monitor appears to do so regardless of the availability of water.

#### Editor:

The areas reported in the article appear to be in western Senegal from Richard-Toll in the north to Casamance in the south. During the dry season, temperatures are higher inland than on the coast, but fall lower at night.

Rainfall increases from north to south. In the north, rainfall is 12-14 inches falling in a 20-30 day period between June and September. In the south, 40-60 inches of rain falls in a 60-90 day period extending into October. Dakar, the capital, is located in the center with rainfall amounts between the two extremes.

#### Temperatures and rainfall in the Dakar region

(unless otherwise noted, rainfall is under 2 inches per month)

|     | Temp. °C (°F) |         | Rainfall<br>(inches) | Relative humidity |      |
|-----|---------------|---------|----------------------|-------------------|------|
|     | high          | low     |                      | 6 AM              | 1 PM |
| Jan | 24 (75)       | 18 (64) |                      | 71                | 45   |
| Feb | 23 (73)       | 17 (63) |                      | 80                | 45   |
| Mar | 24 (75)       | 17 (63) |                      | 87                | 51   |
| Apr | 25 (77)       | 19 (66) |                      | 86                | 55   |
| May | 26 (79)       | 20 (68) |                      | 86                | 59   |
| Jun | 29 (84)       | 23 (73) |                      | 85                | 62   |
| Jul | 30 (86)       | 25 (77) | 4-8                  | 84                | 66   |
| Aug | 30 (86)       | 25 (77) | 8-12                 | 87                | 74   |
| Sep | 30 (86)       | 24 (75) | 4-8                  | 88                | 72   |
| Oct | 30 (86)       | 25 (77) | 2-4                  | 86                | 65   |
| Nov | 29 (84)       | 23 (73) |                      | 80                | 50   |
| Dec | 27 (81)       | 20 (68) |                      | 70                | 46   |

#### Reference

Michelin travel guide map to North & West Africa. No. 953. 1990.

Both monitors survive the dry season fast by absorbing fatty reserves built up in the abdomen and tail during the active season.

### Nile monitor anti-defamation league (in spirit)

naclerio

Ask about keeping Nile monitors and more often than not, responses will include "get a savannah or water monitor". However, over the past few years a number of people have told me they have Nile monitors that can be handled without any fuss or fight.

For the *disbelievers*, I would like to assemble and publish in Varanews a collection of "testimonials" from varanophiles who keep, or have kept, Nile monitors that are "sociable"<sup>1</sup> around humans. This would include your personal experiences, notes on methods/

techniques that led to the monitor becoming comfortable in your presence, how long it took, frequency of handling, enclosure size, age/size when monitor first acquired, etc.

The purpose of this is not to imply keeping Nile monitors is for everyone (there are a lot of people I do not believe are "qualified" to have children, but...). Perhaps we can collectively "uncover" some basic guidelines that increase the odds of a captive *V. niloticus* becoming sociable.

The most common recommendation for taming is frequent handling, but my experience leads me to conclude there are other important factors.

My personal belief is that key elements in arriving at a good relationship are providing the proper physical and psychological environment and patience. Based on my experience, I offer the following perspective.

I've been keeping Nile monitors since I brought the first one home in 1985, an 18 in TL male *Varanus niloticus ornatus*. Today he is 67 in TL (28 in SVL), weighs 25-28 lbs and is quite sociable.

Early on he lived up to the Nile monitor stereotype of "mean and nasty"... he wouldn't hesitate to lunge at me if I got too close. He also never ate in my presence. There was minimal handling during the first 16 months in my care, limited to weighing and measuring every few months. In fact, a few months after bringing him home, I spent the better part of a year abroad and relied on herpetologically-inclined friends to care for him. He was pretty much left to himself, dashing into the water when someone approached or lunging at the door if he suspected food.

January 1987: I returned home and began what turned out to be about a 10 month period of "acceptance" conditioning after which I could enter his enclosure or pick him up without provoking a negative reaction (such as getting bitten). During this period, I interacted with him in various ways, randomly alternating sitting outside his enclosure (a 61 x 12w x 6H ft. wood and plexiglass structure) letting him observe me in a "non-threatening" situation, standing at the open door watching him watch me, cleaning the enclosure, feeding, and capture/handling

#### Enclosure size and sense of security

Naturally, Nile monitors eventually need large enclosures because of their size. I suggest that a large enclosure also helps the monitor attain a sense of security, which is the first step toward sociability.

Initially, when I was anywhere within sight, the monitor in question remained in, or above, his hide spot at the opposite end of the enclosure 12 ft away, alert and watchful. As time went on, he gradually became more comfortable at closer distances as I stood in the open door or cleaned the water tank. His tongue-flicking investigations brought him progressively closer with each visit. During water tank cleaning, he gradually established closer "observation posts" where he would settle down and keep an eye on me.

Probably the biggest hurdle was the day he approached and slid into the water tank (a rectangular 48 x 24 x 30 in [122 x 61 x 76 cm] polypropylene tank) while I was cleaning it. I don't recall how far into the 10 month period this happened. He was quite content to sit in the tank under the running water as I refilled it. From then on, he continued to grow more comfortable around me.

I think it's important to note that I never made a move toward him nor attempted capture during tank cleaning. In the wild, water is a preferred retreat when threatened and I didn't want to send any confusing signals.<sup>2</sup> I did no more than keep an eye on him in case he made an uncharacteristic aggressive move toward me, which he never did. He set the pace at which he grew accustomed to my immediate presence.

Once he was comfortable in this routine arrangement, the next step was to "hang out" inside his enclosure. My spot was a flat rock about 8 ft from his hide spot (the farthest I could get without sitting in the water tank). I would sit and read or write (or simply warm up in the "tropics" after a long motorcycle ride on a cold day). He was initially cautious and remained in or near the hide spot. Again, I acted indifferent toward him, keeping an eye on him for safety sake but never making a move toward him.

Growing accustomed to my unthreatening presence, he became braver as time went on. His curiosity about this occasional "furnishing" (me) got to the point he would approach, alert and tongue-flicking, but never appeared to feel threatened.

Eventually, I had to give up doing anything while sitting in his enclosure; he would begin climbing over me so I couldn't pay attention to what I was doing. He measured 43 in TL when the program began in January 1987; in October of the same year, about the time I could move around and pick him up without any nervous display on his part, he measured 53 in TL.

My hypothesis is that in a small cage where the monitor cannot attain an initial comfortable "social distance" from the creatures (we humans) towering above and moving around it, it may never develop a sense of security that it loses its nervousness and begins to feel less threatened.

With smaller enclosures, placing them so the monitor can observe people approaching from a distance at least avoids startling the monitor. However, the large enclosure also allows the monitor to become accustomed to the keeper at its own pace and on its own turf rather than at the keeper's discretion/convenience, always in "unfamiliar" surroundings (outside the enclosure), and accompanied by "dreaded" capture.

I have also observed some Nile monitors appear to be more nervous when people are hovering above them. With a couple other *V. n. ornatus*, I noticed a definite reduction in nervousness when moving them from a "ground level" habitat to one whose floor was about 4 foot above ground level. Rather than retreat to the hide spot when someone passed by, though cautious and on alert, they would remain in the open.

Summary of author's 10-month interaction and "acceptance" conditioning with Nile monitor.



Monitor measured 43 in TL at start of "program" and 53 in TL at end.

Benefits of large enclosure when interacting with monitor.

### Positive association

I try to make capture a positive experience by associating it with something rewarding for the monitor: going outdoors and holding it so it can bask in the sun; feeding after release into the cage (doing this before will probably get you the "lunge at food" greeting).

The "big day" he entered the water tank during cleaning was also a positive association; my presence was tied to something he enjoyed, sitting under running water.

### Patience

This informal program spanned about 10 months and I did get bitten several times. (Each time it was because I was not paying attention.) I never really had the expectation he would become as sociable as he did, so I really had nothing to get impatient about. All I knew at the time was what people were telling me... they are "mean and nasty; get a savannah or water monitor".

What we have no control over is each monitor's "predisposition" toward sociability. And there is

never a guarantee a monitor will ever become a "joy" to handle.

### Summary

Again, these hypotheses are based on personal experience with a small number of Nile monitors.

Regardless of the degree of sociability, care and attention are always in order. When spring and summer (= warm weather) roll around, the monitors are more active and alert, reacting with interest to any movement as if considering everything a potential meal.

A point to consider: Is it necessary we are driven to "tame" monitors, especially when setting up a breeding colony? This discussion is for another time.

<sup>1</sup> sociable - Though this may be an abuse of the term, I prefer it to the word "tame" (which I consider even more of an abuse, Webster equating this to "domesticated" or "subdued"). I use "sociable" to refer to a monitor not threatened by humans who can be handled without evoking a defensive reaction, such as biting, tail lashing, etc.

<sup>2</sup> I apply the same logic to the monitor's hide spot. Since this is supposed to be its secure retreat, prying it out for handling is not going to reinforce the monitor's sense of security in its captive home.

## Captive Monitor Breeding Programs: The Need is There

It's time for varanophiles to seriously think about how they can contribute to the establishment of a global population of captive-bred monitors. There are forces working against your right/privilege to keep monitors, including habitat destruction, growing import/export restrictions, and activist groups fighting against the captive care of any animal. There is also increasing pressure to buy only captive-bred reptiles. From a snakekeeper's perspective, this is an alternative thanks to the efforts of many people over many years who have built captive-bred populations.

Undeniably, captive-bred offers many advantages, but without sources it's not much of an alternative. And regardless of whether or not CB monitors are available, the negative forces continue to head toward one end: no more imports.

Do you know of a **verifiable** source of captive-bred monitors? Do you know of, or are you involved in, a captive breeding program? Let's begin hearing your ideas and plans on the subject. If you aren't concerned and don't get involved, no one else is going to stand up on behalf of varanophiles. Most likely, what is decided for the more common reptiles will, at best, be applied to monitors.

One member is working on a cooperative plan with a local zoo and is seeking assistance.

### Nile monitor captive breeding program

I recently applied for and was issued a class 4 propagators license (required in Massachusetts) for 10 Nile monitors in order to establish a captive breeding colony.

I have contacted the curator of my local zoo in an attempt to start a cooperative effort with this program and am currently preparing a proposal outlining the project.

I am interested in communicating with other people having experience with Nile monitors, who may also be working towards captive propagation, and who would be willing to share their findings.

Andrew Borasky, 27 High Road, West Roxbury, MA, 02132, ph. (617) 327-1818 (evenings are best).

## Australasian TAG's "Varanid Info Request"

As members of the Australasian Reptile Taxon Advisory Group (TAG), we are currently seeking information on Australian Varanids.

The aim of the Reptile TAG is to co-ordinate effective and ongoing co-operative management of captive reptiles in Australasian zoos. The Reptile TAG is a zoo initiative. However, participation from private herpetologists, and those in private zoos, is very important to its success.

It is our particular responsibility to collate information on the captive husbandry and breeding requirements of monitors. Once enough information is collected it will then be possible to produce a summary of the status and husbandry and breeding requirements for species that require regional management.

Varanids were included as a priority group due to the fact that Australia has more than 50% of the world's species. Currently 26 species of monitor are recognised in Australia but of these only 15 are being held by 14 TAG participating institutions, only half of these are currently being bred. At this stage few species are being bred in private collections. It is therefore difficult for TAG co-ordinators to obtain enough information to produce a complete and accurate management account for more than a few species.

If you or your associates have information or personal experience related to these species, we would be extremely grateful if you could contact us. All information is relevant and welcomed.

We look forward to your assistance in managing this important group.

Yours sincerely,

Matt Vincent

Grant Husband

Steve & Terri Irwin

Sub-Taxon Co-ordinators, Australian Varanids.

Replies may be sent to: Matt Vincent  
Royal Melbourne Zoo  
P.O. Box 74, Parkville, 3052  
Victoria, AUSTRALIA  
phone: +61 (03) 285-9300  
fax: (03) 285 9330

(Thanks also to Phillip Averbuck, who took the time to forward the same post from Compuserve's Reptile Forum (GO PETS).)

## Projects, Programs and Publications

### Species Resource Panel

The following individuals have volunteered to field specie-specific questions. If communicating by phone, you are asked to pay for the call. Please consider sending in even a short summary of what you have learned for inclusion in this newsletter. Without a doubt, others are asking the same questions now or will be asking them one day.

- **exanthematicus** (savannah), **albigularis** (white-throated)  
Mark Bayless, 1406 Holly St., Berkeley, CA 94703
- **dumerilii** (Dumeril's)  
Mike Fost, Zoo Atlanta, Reptile Dept, 800 Cherokee Ave. SE  
Atlanta, GA 30315-1440 (404) 624-5618 (daytime EST)
- **salvator** (water)  
Mike Blanchard, 1080 23rd Ave. #307, Oakland, CA 94606  
John Adragna, 16 Milton Ave., Staten Island, NY 10306
- **indicus** (mangrove); **tupinambis** (tegu)  
Joel Shaner, 110 Long Pine Dr., Madison Hts., VA 24572

- **prasinus** (green/emerald tree)  
Johnathan Emberton, 1709 Shattuck Ave. #225,  
Berkeley, CA 94705
- **timorensis** (Timor)  
Scott Stahl, DVM, 4001 Legato Rd., Fairfax, VA 22033  
(703) 591-3304
- **niloticus** (Nile)  
Greg Naclerio, <Varanix address>
- **flavescens** (yellow)  
Ennis Berker, 9603 Woodlawn Dr., Portage MI 49002

### Metric/English Conversions

The following conversion information is provided to assist the reader. For simplicity, some conversions are approximations.

**To convert:** Multiply to get: Example:

|                       |                 |                        |
|-----------------------|-----------------|------------------------|
| inches to centimeters | in x 2.54 = cm  | 15 in x 2.54 = 38.1 cm |
| inches to millimeters | in x 25.4 = mm  | 15 in x 25.4 = 381 mm  |
| centimeters to inches | cm x .394 = in  | 61 cm x .394 = 24.0 in |
| millimeters to inches | mm x .0394 = in | 61 mm x .0394 = 2.4 in |
| ounces to grams       | oz x 28.35 = g  | 6 oz x 28.35 = 170.1 g |
| grams to ounces       | g x .035 = oz   | 6 g x .035 = .21 oz    |

**To convert:**

Celsius to Fahrenheit

multiply °C by 1.8 then add 32  
(°C x 1.8) + 32 = °F

example: convert 100 °C to °F  
(100 x 1.8) + 32 = 180 + 32 = 212 °F

Fahrenheit to Celsius

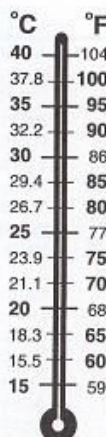
subtract 32 from °F then divide by 1.8  
(°F - 32) / 1.8 = °C

example: convert 212 °F to °C  
(212 - 32) / 1.8 = 180 / 1.8 = 100 °C

For a reasonably accurate conversion without division:

subtract 32 from °F then multiply by .556  
(°F - 32) x .556 = °C

example: (212 - 32) x .556 = 180 x .556 = 100 °C



### Monitor Rescue Program

This volunteer-sponsored program was established to place unwanted monitors in the permanent homes of experienced varanophiles. For a copy of the 2-page program description, send a legal-size SASE to Varanix, attn: Monitor Rescue Program.

All other questions should be directed to the MRP Administrator:

Wanda Olson  
4099 Timberline Dr.  
San Jose CA 95121  
(408) 274 9020  
(408) 274 2555

### Supplemental Publications

The following documents are available. To receive a copy, send a legal-sized self-addressed stamped envelope along with a note indicating which ones. As others become available, they will be added to the list.

The following two documents are combined:

- **Vet Visit Sheet** - used to prepare for a visit to the vet and record results and treatment during and after visit
- **Varanid Captive Husbandry Log** - simple log sheet for recording notes and observations

## Ads / Notices

Short line ads are free and must relate to the audience of this newsletter. They will be included as space allows. Varanix is not responsible for the quality of merchandise advertised and reserves the right to refuse any ad deemed inappropriate. You are encouraged to inform Varanix of your satisfaction/dissatisfaction with a product or service. Your comments will remain confidential.

### § ANACONDA TO ZOOXANTHELLA §

#### Varanid Bibliography is Underway

Work is in progress on a multi-volume, comprehensive bibliography of the family Varanidae. We are soliciting literature (papers, book chapters, newsletter articles, etc.) from anyone who has published on varanids. Our goal is to publish the first volume in 1995, with subsequent volumes to follow.

When sending literature (photocopies are fine), it is extremely important that each citation be as complete as possible (e.g., title, date, volume/issue, page numbers/book chapters, publisher, total pgs). Thank you in advance for your help.

Peter D. Strimple

Mark K. Bayless (see address above under Species Resource Panel)

I'm working on a study of the African monitors *V. exanthematicus* & *V. albigularis* to improve

husbandry techniques. Please contact me if you would like to participate. Mark Bayless

I am interested in information on *dumerilii* and *rudicollis*. Mike Fost, Zoo Atlanta Reptile House, 800 Cherokee Ave., SE, Atlanta GA 30315-1440. (404) 987-3933

### § PUBLICATIONS §

**The Guide to Keeping Monitors.** \$5.99. The Reptile News Press, 17603 E. Tennessee Dr., Aurora, CO 80017. (303) 751-6923.

**Herpetological Booksellers**, P.O. Box 1906, Palm City, FL 34990-1906.

**Herpetology Books** - Paul Gritis, 1731 W. Market #12, Bethlehem, PA 18018 USA (215) 867-9723

**Serpent's Tale**, Natural History Books & Supplies. Eric Thiss, 464 Second St. Excelsior, MN 55331. (612) 470-5008

### Mertensiella #2: Advances in Monitor Research

This collection of papers (in English) by monitor research experts was presented at the First World Conference on Monitors in 1989. Price: \$25 (includes surface mail); add \$10 for air mail. Contact: Wolfgang Bischoff, Museum Alex. Koenig, Adenaueralle 150-164, 5300 Bonn 1, Germany.

**Original copies** (3) of Senckenbergiana from 1958 (Indo-australian monitors) and 1959 (Australian monitors) by Mertens from the Senckenberg Museum. They are now officially out of print. \$100 per volume. Make checks payable to Robert Sprackland, 1406 Holly St., Berkeley, CA 94703.

### § WANTED §

Photos and data on *V. salvator*. Immediate reply. Neil Miner, 8125 Early Morning Way, Sacramento, CA 95842.



## Husbandry Tips & Tricks

How are you dealing with the necessities of captive care for your varanid? This is where you can share helpful hints on topics such as feeding, heating, water systems, habitat design, maintenance, ....

**Always carefully consider what you read and weigh it against your own experiences before acting. When in doubt, keep asking questions.**

**What works in one case may not be suitable in another!**

### A Suggestion for Controlling Biting

Omar Attum

I would like to suggest an idea to anyone who is trying to control charging or biting in a monitor or tegu. In my case, I bought a juvenile Black and White tegu, who at the time seemed docile. After he started growing and becoming accustomed to his surroundings, he would attack and charge my hand whenever I changed his water or cleaned his tank. And he certainly didn't like being handled. After still being attacked relentlessly even when wearing a glove, I started to spray the glove with Bitter Apple® (Valhar Chem. Corp.), a chew deterrent for dogs.

After biting the Bitter Apple glove several times, the tegu immediately released it each time with an obvious dislike. He stopped charging and resorted to opening his mouth and hissing, sometimes retreating to his hide spot.

I eventually felt confident enough to remove the glove and spray my bare hand. After some cautious tongue flicks, he retreated without attacking my hand. I then started doing maintenance with my bare hand and no spray. Even though there was no Bitter Apple on my hand, he was still cautious and made no attempt to bite. As time has passed, he has become less cautious, but rarely charges or attempts to bite. This process of controlling biting did not take place overnight. It took at least one month to arrive at this stage. I have also had moderate success with this method with an iguana.

This experience seems to indicate that scent cues are important, at least for this tegu, since he was less apprehensive when he couldn't smell the Bitter Apple. This also indicates past experience affected future behavior. He did not attack my non-scented hand because of the previous negative experience when it had been sprayed with Bitter Apple.

### Gusto ko ng isang dozenang balut please.

naclerio

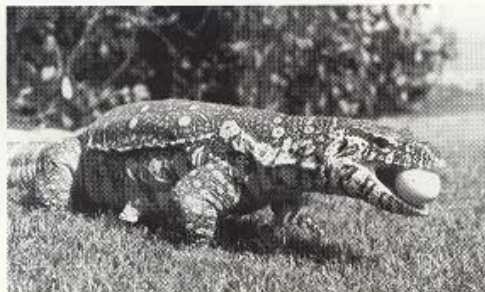
I have just begun feeding *balut* (ba-loot) to several Nile monitors, which they readily go for. Found at your local Filipino store, *balut* are fertilized duck eggs.

I serve *balut* once every week or two. The eggs are put in already boiling water (with the heat turned off) for 2-3 minutes. After cooling down, they are rolled in front of the monitors. Eating can be messy and unless fed with something else, defecation even messier. Rodents "complement" *balut* well, the hair especially providing some fecal solidity.

[I have yet to tell the storekeeper who these are for. He drew the conclusion I had lived in the Philippines and took a liking to this delicacy, believed to enhance one's virility. Though, I think buying a dozen at a time does seem a bit odd to him.]

Recommended preparation for human consumption: Boil for 15-20 minutes, let them cool down but eat while still warm.]

*Gusto ko ng isang dozenang balut please* is Tagalog (Philippines) for "I would like one dozen balut please".



Nile monitor about to eat fertilized duck egg. photo by naclerio

### Mysterious Deaths of 2 Mangrove Monitors

The following anonymous letter was received relating the unexplained loss of two mangrove monitors.

Over the past year I have had two adult male mangrove monitors die. No necropsy was ever done, so no definite cause of death is certain. Both appeared healthy in that they had good weight, were active, and had normal stools. Both had been de-wormed with Panacur® and one with Ivermectin®. Both were kept separate in 90 gallon aquariums and died one month apart. Both died within 24 hours after a routine cleansing of their enclosure. I usually placed them in their water bowl at cleaning time. These two times the water in the dish was really cold. After returning to their cages in the morning, they were each dead in their water dish.

I wonder if the cold water chilled the monitors and caused them to die. I have also heard stories like this related to caimans. I now know that it is common sense not to place reptiles in extreme cold or hot water because they are ectothermic. I think it would also be important to hear from anyone else who has had sad experiences like this.

This is a tough one to respond to based on the information in the letter. Some of the questions that come to mind are: How cold was the water?; What was used to clean the cage?; What was the temperature range in the cage?; How long were the monitors in the author's care? If the author would care to send in more details, I'm certain a lot of people reading this would be interested in helping.

Individually, most people (hopefully) learn from their own bad experiences. By sharing a negative experience, who knows how many other beginning varanophiles (and more importantly, monitors!) will benefit from not going through the same learning curve. Anonymity will always be respected.

### Caution with rodents raised on cedar shavings

Bob Hole, Jr. recalls reading "rodents raised or kept on cedar shavings carry the cedar oil to their predators and many snakes (and probably lizards, too) find cedar oil deadly". Bob is checking with an on-line herp vet, but wanted to pass this along for feedback from readers.

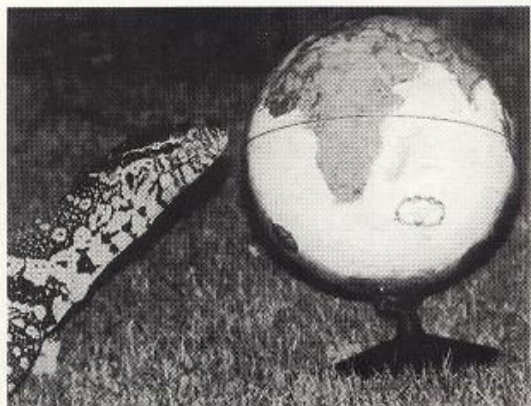
### Shedding monitors: Should I help?

Oscar de Los Reyes asks:

When my savannah began shedding, a friend told me I should help him by peeling the skin off. I'm new at this, but that doesn't seem like such a good thing to do. What's the deal?

## Photo & Illustration Page

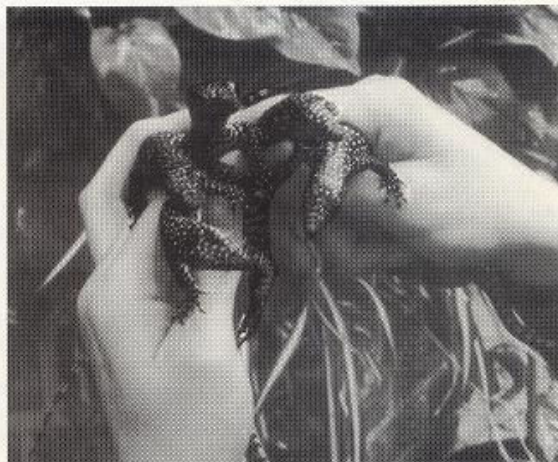
See inside front cover for submission details



Nile monitor, *V. n. ornatus*, looking for his roots.  
photo by naclerio



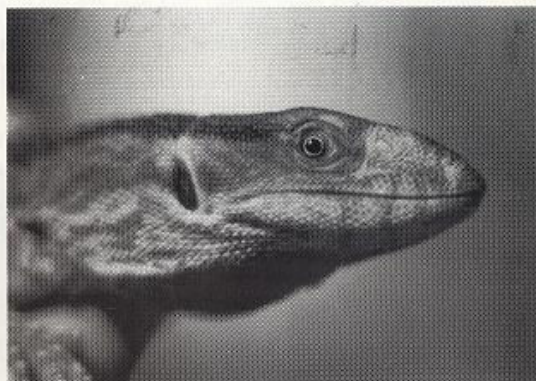
White-throated monitor (veld leguaan), *V. albigularis*, in  
southern Africa. Mark Bayless.



↑ In Varanews 3(6), there was a brief note on the successful breeding of *Varanus indicus* by a member of the Dutch Varanid Association. The member of Nederlandse Doelgroep Varanen who experienced this success, René Kok, wrote in to clarify the details of the event:

1. Copulation was not seen immediately after putting the male and female together but 4 months later.
2. Not 6, but 7 eggs were laid (1 was infertile).
3. Not 4, but 6 monitors were born and this was over a period of 3 days.
4. The young ranged from 27 to 32 cm (10.6 - 12.6 in) total length (TL).
5. The throat was not pink-reddish but orange.
6. An incubator malfunction, caused the temperature to rise to 43 C (109.4 F) for 3 days.

René was also kind enough to send in a photo of his handful of hatchlings.



↑ Andrea Smith sent in these two photos. The photo above is a young white-throated monitor, *Varanus albigularis*.

↪ To the left is a baby Komodo dragon, *Varanus komodoensis*, taken at Zoo Atlanta.