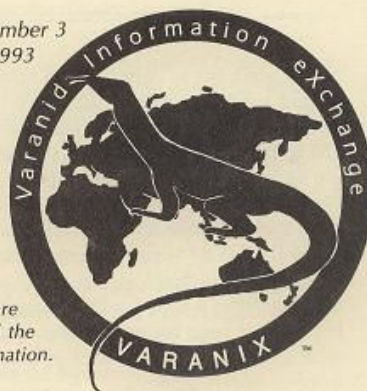


VaraNews

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26 May 1993



— Varanews is the newsletter of Varanix™, the Varanid Information eXchange.
— Varanix was founded to help promote responsible captive care
— of monitor lizards through education and the
— open exchange of information.

■ General Info ■

You may have noticed that Varanews experienced a 50% weight gain (.75 to 1.125 oz./21 to 32 g) since the last issue. This was due to an enriched diet of letters, photos and editorial submissions from readers. Hopefully, this dietary regime will continue to sustain the weight increase. (It is not yet known whether or not the longer spring days and warmer temperatures had an impact on this increase in activity.)

Controversy

A few readers have expressed dismay that their comments have not appeared in Varanews. In this case, we're referring to letters or calls whose focus is raising issue with husbandry practices the individual has become aware of, either in print or having seen. The struggle with the "controversial" topics has been how to present them in a manner that would have a positive effect.

One instance involved a caller's anger about the appalling captive conditions of a group of monitors, especially incensed that they were CITES Appendix I animals. There was no denying that the individual reporting the poor housing conditions was genuinely upset by what he saw. He also said at least one well-known expert on monitors was aware of the situation and either wasn't interested or didn't have the time to get involved. Without more details, it wasn't clear how we could present the caller's case in a manner that could aid in the monitors' plight.

In another instance, a strongly-worded letter took exception to the use of some captive husbandry techniques the author had read about in another publication. Most of the topics in the letter were those prone to personal opinion and interpretation (in one case, disputing the publication's definition of saying a monitor "does well in captivity"). The most troublesome part of printing the letter was the tone. The best that would have come out of printing it would have been more confusion on the part of varanophiles looking for solutions and ideas.

What's important is the author was concerned enough to take the time to write down and send in

his thoughts. (He later acknowledged that, although he still felt the same way, perhaps the letter had been a bit harsh.)

When deciding what will appear in these pages, there are several considerations taken into account. A primary one is how the information benefits the reader and, in turn, the reader's monitor(s). Another is "real estate"; there is only so much space in these pages and one thing included means another is not. After some discussion about how to deal with topics of this nature, the following approach has been adopted:

- If you take exception to an individual's or organization's position, author your point of view. There will be no editorial corrections; this means your letter must be precise and to the point. Be aware that a lot of people with their own experiences and opinions will read what you have to say, and some will respond.
- A copy of your letter will be forwarded to the party in question for their response/comment.
- You will receive a copy of the response to review.
- Both opinions will then be published, unedited, together.

Please feel free to comment on this policy. *Editor*

■ Sightings ■

A Report of *Varanus* on New Caledonia

Mark Bayless and Greg Naclerio

The island of New Caledonia and its dependencies lie in the region of the South Pacific known as Melanesia. This island, 19,103 km² in size, is situated at 20 degrees latitude, 1,500 km east of Australia, 1,700 km north of New Zealand, and 7000 km SE of Japan (Thompson). First sighted by Captain James Cook (1728-1779) on 4 September 1774, he named it New Caledonia (Barrow).

New Caledonia is extremely remote, having no known native mammals (except rats), a few bats, a variety of birds and lizards (skinks and geckos) [Bauer; Osborn]. It has been hypothesized that the island's natives, the Kanaky, migrated from Wallis Island during the Christian Era.

New Caledonia is very hot and humid and has a terrain similar to Australian shrub lands in addition to mountains covered by araucarian pines reaching 150 ft, fig trees and tree ferns (Bauer; Osborn). There are 68 species of living amphibians and reptiles on New Caledonia. It is hypothesized that *Varanus* may have been a native form of New Caledonia that was exterminated by human encroachment. However, it is also possible that *Varanus* may have been introduced as a food source (Bauer). Fossil *Varanus* bones have been found in caves on New Caledonia, which does support the idea of extinction via human intervention (Gaffney).

This report ends with word of a recent observation of a living varanid on New Caledonia. This is not the first such report; there have been numerous sightings in recent years of unidentified varanids in New Caledonia. Though several incidents have been reported in local newspapers, none have produced tangible evidence (Bauer, pers. comm.).

Although not yet verified, this recent sighting of a varanid, which was missing most of its tail, may belong to the *V. indicus* group, known throughout the islands of Micronesia.

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■ Publications

Rediscovery of a Solomon Islands Monitor Lizard (*Varanus indicus spinulosus*) Mertens, 1941.

Robert Sprackland. *The Vivarium* 4(5):25-27. 1992

The author summarizes his efforts thus far in a study he has undertaken on the *indicus* group (which also includes the peachthroat monitor, *V. karlschmidti*), focusing discussion on *V. indicus spinulosus*. Included are 3 color photos and 2 maps. Sprackland begins by drawing attention to the fact some of the largest species of monitors have remained unknown until as recently as the 1980's. He also adds that a monitor from New Guinea may soon be described. Beginning by resurrecting old data, the author eventually tracked down and examined several recently imported specimens of *V. i. spinulosus*. Of the five imported, only 3 remain alive at the Baltimore Zoo.

The author offers an outline of the natural history of the subject, including the similarities to the mangrove and green & black tree monitors. He also notes some of the behavioral differences compared to *V. i. indicus*, which were recorded by Andrew Wisnieski of the Baltimore Zoo: *V. i. spinulosus* seems to prefer only fish, while *V. i. indicus* consumed fish, rodents, insects and meat. Male *V. i. indicus* showed no interest in female *V. i. spinulosus*, while wasting no time with female *V. i. indicus*.

Based on his findings, Sprackland argues to raise this monitor to specific rank, *Varanus spinulosus*, and suggests the common name Solomons keeled monitor.

The American Federation of Herpetoculturists is to be commended for regularly featuring monitors in *The Vivarium*. More importantly, the AFH is stepping up efforts to "build a vital and influential legislative presence". The Mar/Apr 1993 issue outlines what's being done to fight for the herpetoculturist's rights.

A group of Legislative Representatives has been appointed to assist herpetoculturists in legislative matters. Though the service is offered free, you are requested to purchase and become familiar with the AFH Legislative Packet (\$16 + sh.).

As surprising as it may seem (not?), monitors are a minority in the captive reptile community and need to be visibly represented in a positive manner. Anti-herp laws list restrictions on a species level. For example, in San Diego the law states it is illegal to keep "any monitor lizard species (Family Varanidae)" that grow longer than 3 ft (91 cm) TL or weigh more than 10 lb (4.5 kg). [Varanews 1(5):2-3].

When contacting the AFH (and any other herp or conservation groups), let them know you are specifically interested in the protecting your privilege to keep monitors.

If you don't really understand how serious the global legislative situation is, the discussions and letters in this issue of *The Vivarium* should shed some light. If you can't go to court to fight the legal battle, you are encouraged to support the people who are willing to do it for you.

AFH, P.O. Box 1131, Lakeside, CA 90240-0905

Australian Reptiles & Frogs, Raymond Hoser, 1989, Pierson & Co., Sydney Australia.

This 238 page hard cover book has 10 pages of color photos and brief descriptions of Australian varanids. It also includes 26 pages of photos, description, and locality information of native reptile habitats across Australia with indigenous species listed.

Other useful information on captive housing and care is provided. Author's recommended minimum cage size: for small monitors (avg. 30 cm TL),

1 x 1 x .5 m [40 x 40 x 20 in]; for large monitors (over 1.1 m), 4 x 3 x 2 m [13 x 10 x 6.5 ft].

Reptile & Amphibian Magazine 1993-94 Directory

Included in the 120-page directory is a list of veterinarians (by state) having a special interest in reptiles & amphibians, wildlife regulatory agencies, zoos, herp societies, products & supplies, universities and private breeders.

Cost: \$15 + 10% s&h. Reptile & Amphibian Magazine, RD #3 Box 3709-A, Pottsville, PA 17901.

Goanna: The Biology of Varanid Lizards, Brian Green & Dennis King, 1993, New South Wales Univ. Press

Part of the Australian Natural History Series, this 100-page illustrated, soft cover work begins with the acknowledgment that most of the literature on monitors is not readily accessible to the general public, much of it appearing in scientific journals as well as in a number of different languages. The goal set by the publisher was to "draw together and condense the more interesting aspects of varanid biology and [try] to present this information in an easily readable form".

This book falls into the same category as *Mertensiella: Advances in monitor research* (see ads/ notices section). It's an inexpensive (the investment is about \$16) yet worthy addition to your captive husbandry library. Though much of the information presented in the book is derived from studies on Australian varanids, in particular *V. rosenbergi*, most applies to monitors in general.

The table of contents lists the following sections: Taxonomy and Phylogeny, Feeding, Breeding, General Behaviour, Thermal Biology, Respiration, Water Use, Energy and Food and Conservation and Management (covering all monitor native habitats).

Scientific terms are accompanied with a brief explanation. Illustrations and charts throughout the book complement the clearly written text. There are numerous diagrams of the varanid anatomy and of various postures. Eight pages of color photos include *V. salvator cumingi*, *V. gouldi*, *V. mertensi*, *V. glauerti*, young *V. komodoensis*, *V. giganteus*, *V. pellewensis*, and *V. rosenbergi*.

If you're looking for more literature on monitors, there are 8 pages of suggested readings, broken down by chapter, at the end of the book.

If you can't learn anything from this book, then you should be writing one for the rest of us.

Events

2nd Annual Int'l. Reptile Breeder's Convention

Taking place on October 2 & 3, 1993 in San Diego, CA, this event will feature a panel discussion on varanids and the husbandry of large lizards. Two of

the panelists should be familiar names to readers of Varanews: Robert Sprackland and Mark Bayless. They are accompanied by Dr. Rick Abrahams of the Del Norte Veterinary Clinic. Admission is \$6.50 (under \$10 yrs., \$3.50). IRBA, P.O. Box 85152-279, San Diego, CA 92186.

Ecology of Varanids Symposium, 2nd World Congress of Herpetology, Australia

Taking place at year's end, papers on a range of topics will be presented [see Varanews 3(2):1 for a preliminary list of topics].

Northern CA Varanid Symposium in 1994

Several members are laying the groundwork for a varanid symposium to be held in Pacific Grove. The tentative plan is a 4-day event in July or August with speakers, workshops, display and dealer tables, and a tour of Monterey Aquarium. The organizers are interested in getting an idea of how many people are likely to attend. Please send a brief note indicating your interest and the events that you would most like to see to Varanix, attn: Varanid Symposium 94.

Reproduction

Dallas Zoo Reports Significant Monitor Hatchings, AAZPA Communiqué, April 1993

Eight Gould's monitors (*V. gouldii*) hatched at the Dallas Zoo between 9-21 September 1992 after an incubation period of 223-227 days. Copulation was observed on 5 December 1991, and egg deposition occurred 117 days later. The sire was donated as an adult from the Melbourne Zoo on 29 March 1990. The female was hatched at the zoo in 1987. This is the second successful breeding of this species in the U.S., both of which occurred at the Dallas Zoo. One additional egg, from a second female, hatched bearing twin neonates on 23 January after an incubation period of 220 days. Copulation was observed on 13 February 1992, and egg deposition occurred 92 days later. The staff of the department of herpetology at the zoo are currently investigating prey odor discrimination, chemical detection of predators, and chemosensory prey tracking with these neonates.

One Gray's monitor (*Varanus olivaceus*) hatched on 13 January after an incubation of 219 days. Copulation was observed on 7 March and again on 27 March 1992, and egg deposition occurred 73 days later. Seven additional eggs were laid, but these began to desiccate after 11 days. Three were found to be fertile. The parents were collected as adults in the Philippines in 1982 and have been maintained on exhibit since that time. The neonate appeared healthy upon hatching but died several hours later. This is the first recorded captive breeding of this species. Copulation was observed again in late December, and the female appears to be gravid. (W.Card)

Reproductive Output in Captive and Wild Mangrove Monitors (*Varanus indicus*)

Michael James McCoid¹

Division of Aquatic and Wildlife Resources,
P. O. Box 2950, Agaña, Guam 96910, USA

Varanus indicus has a fairly large range encompassing extreme northern Australia and many island groups in the western Pacific, including New Guinea, and the Solomon, Palau, Caroline, Marshall, and Mariana Islands. *V. indicus* populations in the Palau, Marshall, and Caroline Islands appear to be the result of historical human-aided introductions.

In the southern Mariana Islands (Guam and Rota), monitors occur island-wide but, at least on Guam, are becoming increasingly restricted in distribution (McCoid, et al. MS). Information on natural history of this species includes publications on reproductive ecology (Losos and Greene, 1988; Wikramanayake and Dryden, 1988), behavior (McCoid and Hensley, 1991), and feeding (Dryden, 1965; McCoid and Witterman, 1993).

Despite a thorough discussion of the reproductive ecology of this species by Wikramanayake and Dryden, no mention was made of potential reproductive output in terms of either enlarged yolkeg follicles or oviductal eggs. The reproductive phases of egg-laying reptiles can generally be divided into three stages: primary follicles (unfolkeg eggs), secondary follicles (folkeg or folkeg eggs), and oviductal eggs (shelled or shelling eggs). Shelling of eggs occurs in the oviducts while other phases occur in the ovaries. There have apparently been a number of people who have observed oviposition (egg-laying) in captive *V. indicus* (Bayless, pers. com.) and they have reported that two to five eggs (including 'slugs' = undersized shelled eggs or unshelled folkeg eggs) have been deposited with a one week period. At least one major U.S. zoo (pers. com.) has successfully bred *V. indicus* in captivity and reports that normal clutch size is two. Data from captive *V. indicus* on Guam [estimated snout-vent lengths (SVL) of females were between 30 and 40 cm] indicated that one to four eggs (including slugs) were laid within a one-week period. These data indicate that reproductive output in captive *V. indicus* is low but within the known range for other species of monitors (Horn, 1989).

Conditions that the Guam females were held under consisted of large outdoor, open-air enclosures and the monitors were liberally fed live mice, occasional live snakes, and small lizards. Known males were also housed with these females. Eggs obtained from captive females on Guam have not been successfully incubated. There have been no published observations of oviposition sites or clutches found of wild *V. indicus*.

In contrast to captive data, information obtained from road-killed monitors on Guam and Rota allows a different interpretation of reproductive output. Between September 1988 and February 1991, monitors were salvaged from both these islands and necropsied for reproductive condition. While many monitors were immature or had recently oviposited, reproductive condition indicated that actual reproductive output in wild females is higher than that reported for captive *V. indicus*. It is unknown what the relationship is between macroscopically (with the naked eye) visible (at least 1 mm diameter) primary follicles and eggs actually laid in *V. indicus*, but necropsied adult females contained between 19 and 34 total primary follicles. It is known that other species of larger reptiles (certain snakes) show a positive correlation with the number of macroscopically visible primary follicles, the female's snout-vent length, and number of eggs oviposited. This means that older (and generally larger) females ovulate more eggs, and then yolk and shell more eggs than smaller (and younger) females. A 379 mm (14.9 in) SVL road-killed *V. indicus* contained 22 primary follicles and 10 [40.5 to 46.7 mm (1.6-1.9 in) length] shelled eggs (five in each oviduct) placing known clutch size at 10. Minimum clutch size of wild females is unknown, but a 300 mm (10.8 in) SVL road-killed specimen still contained two [30 and 34 mm (1.2-1.3 in) length] shelled (but undersized and probably slugs) eggs and both her oviducts were thickened indicating recent oviposition. This suggests that at a minimum, two eggs (one from each oviduct) had been deposited. Reproductive maturity can be reached at 275 mm (10.8 in) SVL in *V. indicus* (Wikramanayake and Dryden, 1988). Female *V. indicus* reach almost 450 mm (17.7 in) SVL (Wikramanayake and Dryden, 1988) and it is likely that these larger mangrove monitors lay more than 10 eggs.

It is apparent that captive female *V. indicus* may not be realizing their reproductive potential even when being held under seemingly natural conditions either on Guam or under artificial conditions by knowledgeable herpetologists.

I thank Rebecca Hensley for reviewing a draft of this paper, Robert Cruz for helping with necropsied monitors, and Mark Bayless for encouraging submission of this manuscript. Portions of this study were supported by the Endangered Species Conservation Program, Project E-4.

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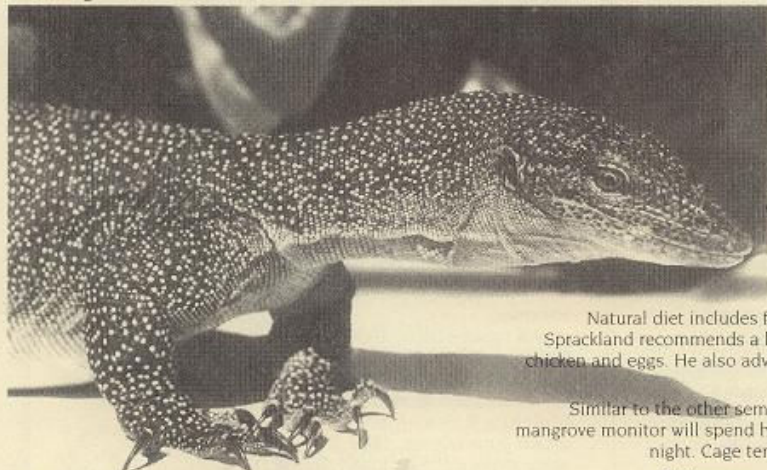
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*Present Address: 10 Stratford Road, Edenton, North Carolina 27932

Mangrove Monitor, *Varanus indicus* (DAUDIN), 1802



The mangrove monitor's natural range includes the Indonesian islands of Celebes and Timor, New Guinea, Papua New Guinea, the Solomon Islands, the Carolines, the Marshall Islands and parts of Northern Australia. *V. indicus* is the only monitor species inhabiting the Marianas, occurring on all but the 3 northernmost islands. Length is up to 1.5 m (4.9 ft) TL.

On page 95 of *Giant Lizards*: "Found in moist environments near permanent bodies of water, [the mangrove monitor] is an excellent climber and swimmer. These monitors may sunbathe on large branches then drop suddenly into the water below in order to escape detection or chase after prey. In the water they are in their second element."

Natural diet includes fish, crabs, shrimp, crayfish, mollusks, frogs and turtles. Sprackland recommends a high-protein captive diet, including mice, strips of steak, chicken and eggs. He also advises the use of vitamin and mineral supplements along with broad-spectrum lighting.

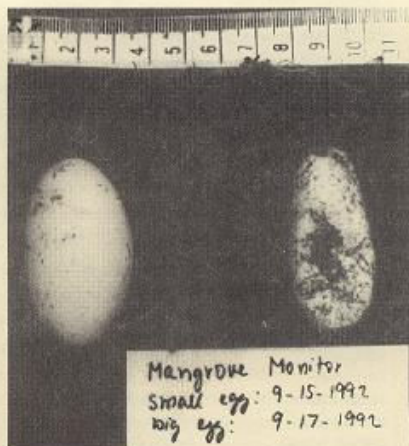
Similar to the other semi-aquatic monitors, such as *V. niloticus* and *V. salvator*, the mangrove monitor will spend hours in the water, often remaining there throughout the night. Cage temperature should fall into the 86 - 92 F (32 - 33 C) range.

References

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McCoid, Michael & R. Hensley. 1991. Mating and combat in *Varanus indicus*. Society for Study of Amph. & Reptiles. Herp Review 22(1):16-17.

Captive *V. indicus* Egg Deposition

Zuzana Kukol reports one of her *V. indicus* having deposited eggs on several occasions. Ten eggs were deposited in Sep/Oct 1992. Four more were found on November 1st. Nine days later, Zuzana witnessed one of the females deposit an egg in the soaking pan which had just been refilled with clean water. Upon entering the water, the *V. indicus* raised its tail and laid an egg. Two more clutches were found, numbering nine and five eggs, through mid-January 1993. None of the eggs to this point appear to have been fertile.



Zuzana Kukol took the three photos on this page. The two photos of the monitor are of the same gravid *V. indicus*. At the time the photos were taken, the female had just recently deposited 2 eggs. Four more eggs were subsequently laid.

The other photo is of the eggs laid by the female in September 1992. [tape measure in centimeters: 2.54 cm = 1 in.]

The Status of Varanid Names Changed Since 1980

Robert George Sprackland

Monitor lizards are increasing in popularity with zoos and private herpetoculturists. However, complicating the matching of specimens and literature is a frequent revision of the taxonomy within the family Varanidae. While many people believe this juggling of nomenclature is a random act of malice aimed at frustrating the non-taxonomist, in reality these changes reflect a better understanding of the relationships within the groups under study. In some cases, older, almost forgotten names are resurrected because of the rule of priority that gives the first describer of an animal credit for that description. Sometimes a scientist will accidentally describe an animal as new to science, only to be corrected later. In this case, the newer name becomes a junior synonym, and the older name is brought back into use. In other cases, the first name is inappropriate, already having been assigned to another animal, for which reason a newer name must be coined.

The first column of the list below provides the names that are probably most familiar to herpetologists for particular monitors, the scientific name used until the 1980s, followed by the currently accepted name. The authors of the change are listed next, followed by a number. The key to numbers is as follows:

- (1) resurrection of older name with priority
- (2) elevation to full species status
- (3) renamed because of error in type description
- (4) name eliminated (moved to junior synonymy)

In addition, an asterisk (*) indicates that the taxonomy of the species is questionable or under review at this time.

Was known as:	Is currently called:	Authority
<i>panoptes</i>	<i>gouldii</i> (1)	Böhme, 1991a
<i>panoptes rubidus</i>	<i>gouldii rubidus</i> (1)	"
<i>panoptes horni</i>	<i>gouldii horni</i> (1)	"
<i>gouldii flavivultus</i>	<i>flavivultus</i> (1)	"
<i>storni ochreatus</i>	<i>storni ochreatus</i> (*)	"
<i>irrawadicus</i>	<i>bengalensis</i> (3)	"
<i>karischmidtii</i>	<i>jobiensis</i> (1)	Böhme, 1991b
<i>indicus jobiensis</i>	<i>jobiensis</i> (2)	"
<i>prasinus</i>	<i>prasinus</i> (2)	Sprackland, 1991
<i>prasinus beccarii</i>	<i>beccarii</i> (2)	"
<i>prasinus bogerti</i>	<i>bogerti</i> (2)	"
<i>prasinus kordensis</i> (4)		"
<i>exanthematicus albigularis</i>	<i>albigularis</i> (1)	Branch, 1982
<i>exanthematicus microstictus</i>	<i>albigularis microstictus</i> (1,*)	
<i>exanthematicus ionidesi</i>	<i>albigularis ionidesi</i> (*)	

Additionally, the monitors assigned to *Varanus tristis*, *V. timorensis* and *V. indicus* are in desperate need of study, as relationships are unclear, and the unnamed taxa need formal recognition. Sprackland (1993 and in press) has elevated the rare Solomon Islands *Varanus indicus spinulosus* to specific status as *V. spinulosus*. Other

revisions and new descriptions are inevitable. Sprackland (in prep) has just finished a review of *V. dumerilii*, revising the subspecific arrangement for that taxon.

The name *panoptes* is rendered a junior synonym of *gouldii* because Gray's original specimen for using the latter name was of the color pattern of Storr's (1980) *panoptes*, ergo a prior claim existed for that animal. *Varanus irrawadicus* was described by Yang (1987), and the description conforms to that of *V. bengalensis* (Ermi Zhao, pers. comm.). Unfortunately, the description suffers from use of old texts as sources of comparison, and includes use of the invalid name *Varanus monitor* (see Sprackland, 1982).

Additionally, the last thirteen years have seen many newly described and named varanid taxa:

Varanus:

gouldii rubidus Storr, 1980
kingorum Storr, 1980
pilbarensis Storr, 1980
storni ochreatus Storr, 1980
baritji King & Horner, 1987
gouldii horni Böhme, 1988
yemenensis Böhme, Joger, Schatti, 1989
telenestes Sprackland, 1991
teriae Sprackland, 1991

There is also a lizard from northeastern Australia that has appeared in print and is known to many herpetologists as *Varanus pellewensis*. A member of the *tristis* group, it has not yet been formally described (Green & King, 1993), though at least three Australian herpetologists are preparing the formal description (Wombley & Cogger, pers. comm.).

Herpetoculturists should remember that taxonomic changes are not capricious attempts to befuddle names. Rather, they hopefully make clearer the relationships between and among taxa, and are essential in finding appropriate animals for potential captive breeding programs as well as other forms of research.

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Monitoring Medicine

This section is intended to help the varanophile understand the medical aspects of captive husbandry. What you learn here will hopefully help you work more actively with a qualified veterinarian/experienced herpetoculturist when dealing with medical problems. You are invited to send in your questions and to respond to questions posted in this section.

This information is not a substitute for training and years of experience. Always work with someone qualified in the medical treatment of monitors.

Bizarre Subcutaneous Abscesses and Possible Causes in the Savannah Monitor Lizard, *Varanus exanthematicus*

Michael J. Balsai and Mark K. Bayless

The authors have been keeping monitor lizards for a number of years. In their experiences with the savannah monitor lizard (*Varanus exanthematicus* Bosc, 1792), they have sometimes encountered a peculiar problem. This anomaly is marked by the appearance of a subcutaneous abscess that appears most often on the legs and, especially, the feet. Other herpetoculturists keeping this species have reported similar observations of this syndrome (Clark, pers. comm.; Rivera, pers. comm.; Dull, DVM, pers. comm.; all to MKB; Stahl, DVM to MJB). Yet, despite numerous discussions between the authors, no complete consensus has been reached as to the cause of this pathology.

This anomaly appears to occur more frequently in regions where dramatic, abrupt seasonal changes in climate occur, such as Southern and Southeastern USA. It is suspected that pronounced seasonal humidity changes may cause acclimatization stress for captive reptiles originating from xeric (very dry) climates. Any animal that is subject to stress is more susceptible to attack by opportunistic organisms such as bacteria, viruses, various types of parasitic worms, etc. It is also known that stress can induce all sorts of physiological malfunctions (Cowan, 1980; DeNardo, 1990; Frye, 1991; Patton, 1991).

In this case, seasonally induced, dramatic humidity changes may initiate a stress reaction for savannah monitors which manifests as a subcutaneous abscess in the feet. This can be accompanied by associated temperature changes (i.e., cooling), as well, though it need not be. This problem will normally appear in the animal at about the same time every year, usually late Fall (November or December) or the early Spring (January or February). Experience has shown that if the abscess occurs in the Fall, then with uncanny regularity it re-appears on one or more of the lizard's feet (usually at least the previously afflicted foot) at this time every year. The hind feet, either one or both, are the more likely sites for this problem. The front feet are less likely to be affected, though this has happened on rare occasions. When more than one foot is afflicted, this can be a major disaster.

A veterinarian reported to one of the authors (Bodri, VMD to MJB, pers. comm.) that he treats a similar problem in another xeric species of lizard, the desert iguana, *Dipsosaurus dorsalis*. The problem also manifests itself with a similar annual regularity.

Again, a reptile from a dry climate is forced to acclimate to a region which experiences rapid, dramatic changes in humidity. Other captive *Varanus* species kept by the first author (MJB) which naturally occur in semi-aquatic and/or rain forest conditions, have never showed signs of this problem. It should also be noted that neither author has received reports of this condition occurring in other "xeric" *Varanus* species, such as: *V. griseus*, *V. gouldii*, *V. flaviviratus*, *V. flavescens*, *V. bengalensis*, *V. nebulosus*, *V. giganteus*, *V. acanthurus* or even for *V. albigularis*.

These subcutaneous abscesses usually start in the feet, beginning with swelling in one or more feet. Sometimes the swelling will progress so quickly that the foot will resemble a little football with toes! The animal will continue to walk about with the affected foot/feet, though its locomotion may appear somewhat peculiar. If the affected areas are not immediately and properly treated by a qualified veterinarian, the swollen regions may "burst" and a hole will appear on the surface of the abscess. Purulent material is often seen protruding from the wound after it breaks. These

abscesses can cause circulatory deterioration in the affected appendage, which can lead to even more severe complications (including death). **Immediate**

aggressive proper treatment is always called for with this affliction. It cannot be ignored and will not clear up if left untreated.

Several years ago, the senior author (MJB) was taught how to treat this problem by a veterinarian from the University of Pennsylvania and has (unfortunately, due to the affliction's annual periodicity) had much experience treating it. The following description on how this affliction is treated is provided to assist others when they take their monitor to a vet for treatment. **The reader is cautioned that this is a difficult and complicated procedure and should only be undertaken with the assistance and/or supervision of a veterinarian. The description of this procedure is not meant to be a "quick and dirty, do it yourself" manual!**

First, the abscess is opened as aseptically as possible. The animal may need to be restrained during this procedure. General or local anesthesia may be used if the severity of the affliction requires it or if the monitor shows signs of great discomfort. It has been the senior author's experience that the patient will



not usually display signs of discomfort if great care is used. The animal may, however, become somewhat agitated when the abscess is first pierced and sometimes during the subsequent draining procedure. The yellow-white pus must be removed as thoroughly as possible. The pus is not normally very fluid, but is usually caseous or "cheesy" in appearance. Dilute Nolvasan® can be used to irrigate the wound. I prefer this to dilute Betadine® (povidone-iodine), because Nolvasan seems to be less irritating to the lizard. After the wound is well drained, an anti-necrotic drug called Kymar® is liberally applied to the surface of the wound. This is followed by an application of one or more topical antibiotics, such as triple antibiotic ointment (polymyxin-b-bacitracin-neomycin).

The wound is then wrapped with a gauze pad that has been "dipped" into Furacin® (to prevent the pad from adhering too tightly to the wound). The pad is then secured with a few turns of gauze bandaging material, which may be taped in place. The gauze bandage is then completely covered with a layer of Elasticon® tape, ensuring that some part of the Elasticon firmly adheres to the leg of the lizard. The final bandage is left loose enough to allow some mobility to the foot, but tight enough to prevent the animal from prematurely "shedding" the protective dressing.

The dressing is changed frequently, typically every other day. If any pus is observed when removing the old bandage, it is cleaned out as thoroughly as possible. Several applications of Kymar® may be needed to remove all necrotic (dead, decaying) tissue before the wound starts to take on a healthy appearance. These wounds are fairly slow to heal, so the lizard may require bandaging for several months if the abscess is severe! A radiograph should probably be taken to determine the possibility of osteomyelitis. If the bone(s) of the foot or leg prove to be severely afflicted, amputation may be called for. Apparently, foci for future reoccurrence may lie somewhat dormant in these infected bones supplying sites for future reinfection of other parts of the limb during times of stress (Stahl, DVM to MJB, pers. comm.). It also appears to be nearly impossible to knock these foci completely out of the bones once established.

The species of facultative pathogens infecting these wounds seems to vary. The senior author (MJB) has normally found the offending bacteria to be a member of certain genera of **gram-negative** bacteria, usually some species of *Pseudomonas* (most commonly), *Aeromonas*, *Serratia*, or sometimes, *Citrobacter* (Dr. Stahl's experience has been similar, pers. comm. to MJB). Treatment for the type of bacteria varies and the best way to discover the culprit is to have a bacterial culture performed on material obtained via a Culturette II®. A sensitivity

test can then be performed to determine the proper antibiotic with the greatest efficacy against the particular invader. These tests are routinely performed by veterinarians when such cases are seen, so be sure to enlist the aid of one on which you can rely. The vet will then give you a schedule of how and when to administer the drug(s) needed. Keep in mind, that many of these gram-negative bacteria may normally be part of the lizard's mouth or gut flora, only becoming sources of trouble when they lodge in an "abnormal" site in the animal's body. When the monitor's immune system is compromised due to stress, these bacteria can rapidly multiply. They are almost certain to be introduced from recently deposited fecal material in the lizard's environment, or may even be present there naturally (Ross, 1984; Jacobson, 1984; Shotts, 1984; Hoff, 1984). Dr. Richard Ross reported growing many of these bacteria from cultures scraped from captive reptile water bowls (Ross, 1984). *Pseudomonas aeruginosa* is one culprit commonly encountered and is often resistant to many antibiotics. **Again, always consult a vet before embarking upon antibiotic treatment.**

The junior author received a report of a savannah monitor that was kept by an owner living in Virginia. (Virginia, like Pennsylvania, has dramatic humidity changes as part of its seasonal variation.) The owner reported observing the rapid swelling of one of the lizard's legs, just 3 or 4 days after purchase. He applied Gentomycin® to the swelling with no effect. The swelling had grown to a significant size in a very short time. At first, the reptile showed no impairment of normal locomotion or general activity but soon became listless. Originally, the owner had been informed the animal had a tumor, but he eventually discovered that it was actually filled with pus. By this time, the infection had spread to the belly. The infected areas were soaked 3 times a day in a Betadine solution and treated with topical applications of Gentomycin¹ and Polysporin®. The lizard is now recovered.

Another skin affliction that may infest some reptiles is a syndrome known as "blister disease" (Marcus, 1981; Feldmann, 1991; Frye, 1991) or "scale rot". This problem arises on reptiles kept in conditions that are too damp for them. It starts as one or more fluid-filled blister-like pustules on the surface of the animal. If allowed to remain untreated, it can rapidly spread over the entire surface of the reptile! The organism initiating the condition seems to be a strain **gram-positive** spherical aerobic bacteria called *Staphylococcus aureus* (Marcus, 1981). Eventually, the lesions can become secondarily infected by gram-negative bacteria (such as the above mentioned species involved in abscesses) and/or fungi. The lesions will then become filled

with caseous pus and can also ulcerate (Frye, 1991) and this, in turn, can lead to general septicemia. If discovered early enough, this disease can be treated with topical applications of dilute Betadine or Nolvasan. More severe infections will require sensitivity testing and antibiotic therapy (Marcus, 1981; Frye, 1991). It is important not to confuse this disease with the subcutaneous abscess condition described earlier.

Conclusions

The savannah monitor is a lizard that is normally found in fairly dry to very xeric habitats. In some parts of its range, this lizard will retreat to its burrow during certain periods of the year. In a captive situation, these lizards may find themselves exposed to climatic regimes for which they are not naturally adapted. This, in turn, leads to stress and possibly maladaptation. During this stress, the monitor's immune response is suppressed and it becomes a ripe target for invasion by organisms to which it is normally not sensitive. In certain parts of North America, the climate exhibits dramatic and rapid humidity changes (from wet to dry and back again). It may be that this abnormal (for the lizard) climatic regime, coupled with the normal stresses of captivity, may initiate the onset of bizarre subcutaneous abscesses in some individuals. This seems to occur, at least in some individuals, despite adequate sanitary conditions and proper temperatures. The occurrence of this problem in some other xeric adapted lizards lends additional support to this hypothesis. The authors would appreciate hearing from other herpetoculturists that have encountered this syndrome in their captive savannah monitors, as well as with any other species of lizard that comes from a dry climate.

¹ It should be noted that topical applications of Gentomycin usually have little efficacy under these conditions, having difficulty penetrating the purulent material to get to the "offending" organisms.

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Appendix to Subcutaneous Abscesses and Possible Causes in the Savannah Monitor

In July of 1990, the second author (MKB) received a report of an infection or growth in the left foot and lower leg of a young savannah monitor (Dull, DVM, pers. comm. to MKB). Medication was administered and the animal survived with no apparent ill effects. Dr. Dull reported that treatment with the antibiotic Gentomycin seemed to have no effect. He later switched to Chloramphenicol[®] with the lizard responding favorably¹. This drug does not kill bacteria but prevents their cell division. It essentially allows the normal immune response of the monitor to fight off the infection, assuming the monitor is healthy enough to do so. Chloramphenicol may also be used in conjunction with another antibiotic (selected as a result of a sensitivity test) which kills the offending microbes. Dr. Dull also prepared the abscess to allow the purulent material to drain from the afflicted leg. In this case, the major infecting organism apparently was *Clostridium sordellei*. This is the only case reported to either author where *Clostridium sordellei* was reported as the infectious agent. It may be considered unique for the present.

A few interesting facts to note about *Clostridium sordellei*. This species is a rod shaped **anaerobic gram-positive** bacterium that bears a flagellum (a whip-like feathery structure used by certain microbes for locomotion). It prefers an optimum temperature of 37 C (98.6 F) The savannah monitor enjoys temperatures that range in the mid to upper 30's Centigrade [35 C/98 F is preferred body temperature (PBT) of *V. exanthematicus*] so these lizards are (in this respect, anyway) "compatible" hosts for *C. sordellei* (Sterne and Batty, 1975; Gleeson and Mitchell, 1980). *Clostridium* species can form endospores² when they meet with adverse conditions. These endospores are resistant to desiccation (drying out) and can tolerate a wide range of temperatures and disinfectants. They can live as endospores for many years (Tortora, et al, 1982). These bacteria can revert to an active stage when conditions again become favorable. *Clostridium sordellei* finds enriched culture media a very favorable place, under the proper conditions, in which to grow, though they are anaerobes. Under stressful conditions, a savannah monitor might become such a culture medium!

C. sordellei can produce potent, sometimes lethal, toxins which are capable of producing extensive

necrosis. These toxins also produce much swelling (Sterne and Batty, 1975). As the affected area accumulates fluid, further tissue damage can result. Eventually, the affected site becomes inflamed. In the case of the infected savannah monitors, the inflammation occurs in the extremities.

One might ask how *C. sordellei* infects the lizard. The bacterium may be ingested from the environment or, possibly, spores may be present within the digestive system of the monitor, it is really difficult to say at this time. As it defecates during the normal course of its day, it may somehow step into the stool. If it has any sort of wound, the bacterium may invade the opening and compromise the tissues at the site. **Despite all this it should be emphasized here, again, that this case is very unusual and that in all other cases where a culture was performed (at least for either MJB or for Dr. Stahl), the culprit was reported to be a gram-negative bacterium of one of the genera reported in the main article above!**

¹ MJB has also had frequent success with this drug used in conjunction with some other drug (e.g., Gentomycin) determined by sensitivity testing.

² The organisms become encapsulated in a protective shell.

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Méli-mélo

The various and sundry...

Captive Care Toolkit: metric conversion and thermometers

I (nac) found a few useful "tools" in the 1993 Radio Shack catalogue: Solar power metric conversion calculator, \$14.95. converts temp, length, weight, volume, etc.; Combination thermometer and hygrometer, \$29.95; Combination indoor/outdoor thermometer with probe: switchable display, \$14.95. dual display, \$21.95. The probe units are handy for measuring spot temperatures, such as when setting up basking spots, in relation to cage temperature. If you catch these on sale, they're usually \$5-10 cheaper.

Nile tongue color revisited

A couple of readers responded to a previous note on the observed color difference in the tongues of

several Nile monitors, *V. niloticus* [Varanews 3(1):6]. Linda McIntosh wrote: "One of the *V. n. ornatus* has a pink tongue, the other has a black tongue. The *V. n. niloticus* also has a black tongue."

Kevin Baker wrote: "Yes, I have seen the tongue difference - *V. n. ornatus* being pink, almost white." He goes on to add that he's also observed a difference in *V. exanthematicus*, having most often seen blue/black and pink/tan and two cases of "blueberry" purple.

Varanid Sense of Hearing

Chris Nelling writes: "I've been told recently, by more than one person, that monitors can't hear airborne sounds, but I have had at least two experiences that suggest the contrary. The first occurred when I was handling Amentet and someone accidentally turned a stereo up real fast, startling him and causing him to squeeze into my arm. The second happened during feeding time; a mouse squealed when I caught it and Amentet perked up upon hearing the sound. One might say that he smelled the mouse, but he did not start flicking his tongue until I brought it within his line of sight."

I (nac) have observed several instances to support Chris' observations. In one case, the neighbor was watering his yard and the water hit a sheet of fibreglas producing a sharp, spattering sound. About 20 feet away, the only Nile monitor out basking immediately struck an alert posture, the head angled up and a fixed "broadside" glare in the direction of the sound.

Reptiles: A New Magazine

Reptiles is a new bi-monthly color magazine that begins delivery at the end of August. One year subscription is \$17.97, two years is \$29. Reptiles, Subscription Division, P.O. Box 6040, Mission Viejo, CA 92690-9953.

If you subscribe, accompany your payment with a note stating your interest in seeing articles about monitors. If you don't ask, no one will hear. (Besides, you have the best chance of getting someone's attention when giving them money!)

Another magazine from the same publisher is worth looking over if you keep aquatic and semi-aquatic monitors, such as the Nile, water and mangrove. *Aquarium Fish* has one monthly section in particular, "Ponds and Pond Fish", which offers advice on setting up and maintaining "large" bodies of water. The July issue Q & A section describes construction of an inexpensive pre-filter used to avoid daily clogging of a koi pond pump. The \$35 worth of materials includes a 32-gallon trash pail, 2 clothes hampers with "grilled" midsections and nylon mesh screen.

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- Network: user ID: Greg Naclerio

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Species Resource Panel

These individuals have volunteered to field specie-specific questions. In the case of a panel member returning a phone call, you are asked to pay for the call.

- Savannah (*exanthematicus*), White-throated (*albigularis*)
Mark Bayless, 1406 Holly St., Berkeley, CA 94703
- Dumeril (*dumerilii*)
Mike Fost, Zoo Atlanta, Reptile Dept, 800 Cherokee Ave. SE
Atlanta, GA 30315-1440 (404) 624-5618 (daytime EST)
- Nile (*niloticus*)
Greg Naclerio, <Varanix address to left>
- Yellow (*flavescens*)
Ennis Berker, 9603 Woodlawn Dr., Portage MI 49002
- Mangrove (*indicus*)
Joel Shaner, 110 Long Pine Dr., Madison Hts., VA 24572
- Timor (*timorensis*)
Scott Stahl, DVM, 4001 Legato Rd., Fairfax, VA 22033 (703) 591-3304

Monitor Rescue Program (MRP)

This volunteer-sponsored program was established to place unwanted monitors in the permanent homes of experienced varanophiles. For a copy of the 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 (408) 274 9020, (408) 274 2555
4099 Timberline Dr.
San Jose CA 95121

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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 the majority of available 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.

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A primary function of the Varanid Information eXchange is to build a collective knowledge base that will serve to

further our understanding of Varanidae. The goal of these efforts is to improve their chances of survival, both in captivity and in the wild.



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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.

Coffee Mugs: One side is original Varanix logo in black & green. The other has the species text piece shown below. \$5.95 per cup. S&H: Add \$3.50 for the first cup; \$1.50 for each additional cup (US & Canada only). Allow 3 weeks for delivery.

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rudicollis indicus glauertii salvadori kordensis mitchelli
acanthurus primordius dumerilii flavescens rosenbergi
timorensis breviceauda giganteus glebopalmaspenceri
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karlschmidtiocellatusnebulosustorribengalensis punctatus

\$ PUBLICATIONS \$

Write or call for a free booklet from the following vendors unless otherwise noted.

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

"This is a nice booklet for those new to the hobby and should reduce early mortality of captive monitors." [Mark Miller, Varanews 2(2)]

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

Mertensiella #2: Advances in Monitor Research This collection of papers (in English) by monitor research experts was presented at the First Multidisciplinary World Conference on Monitors in 1989. Price: \$25 (includes surface mail); add \$10 for air mail. Wolfgang Bischoff, Museum Alex. Koenig, Adenauerallee 150-164, 5300 Bonn 1, Germany.

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

\$ ANACONDA TO ZOOXANTHELLA \$

I'm working on a study of the African monitors *V. exanthematicus* & *V. albigularis* to improve husbandry techniques. Mark Bayless (address, page 7)

I would like to communicate with anyone who has experience with spiny-tail monitors, *V. acanthurus*. Neal Egge, P.O. Box 653, Kenai, AK 99611.

I'm studying varanid reproduction and would like info on breeding projects, esp. pre-courtship environmental conditions, courtship rituals, clutch size & egg incubation. Chris Nelling, 10 Criswell Ave., Mercersburg, PA 17236

HerpNet is an electronic forum for anyone with an interest in reptiles/amphibians. Participants include professional & amateur herpetologists, veterinarians, etc. HerpNet can be accessed at any modern speed. (215) 464-3562. Settings: N-8-1-F

Blue Ridge Herp Soc., P.O. Box 727, Brookneal VA 24528.

\$ FOR SALE \$

2.1 captive-bred freckled monitors (*V. tritis orientalis*). \$4500 for the group. Will consider trades for varanids listed in my wanted ad below. Jim. (602) 649-1399

\$ WANTED \$

Information on *V. dumerilii* or *V. rudicollis*. Mike Fost, Zoo Atlanta Reptile House, 800 Cherokee Ave., SE, Atlanta GA 30315-1440. (404) 987-3933

Captive hatched and/or raised varanids, preferably hatchling to sub-adult. Wish list includes: *griseus*, *flavescens*, *bengalensis*, *albigularis* and most Australian varanids. Jim O'Dell. (602) 649-1399.

One each, *V. salvator* and *V. rudicollis*. Very young or captive raised only. Wayne Palmer, P.O. Box 2781, Eugene, OR 97402. (503) 683-6019

Young *V. salvator*, captive-raised preferred. Thomas Covington, 2601 John B Dennis Hwy #110, Kingsport, TN 37660. (615) 288-4549.

Preserved specimens of *V. indicus*, *V. jobiensis* & similar Australasian taxa for detailed systematic study. Locality data desired, but not essential. Put your freezer zoo to good use! Varanid Research, Young Forest Company, 1201 Geraldine Way #1, Belmont, CA 94002.

Adult female Burundi or ornate Nile (*V. n. ornatus*). Dan (407) 631-9004.

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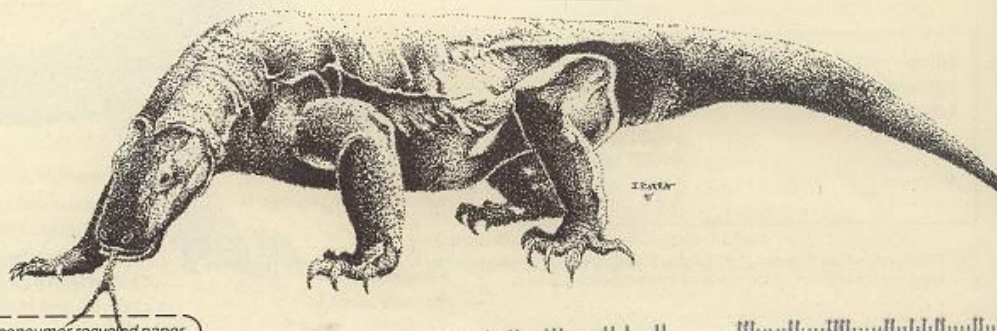


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