

A decorative border of palm trees surrounds the text. The border consists of a top row of 20 palm trees, a bottom row of 20 palm trees, and two vertical columns of 20 palm trees each on the left and right sides.

# **The International Herpetological Symposium**

**Miami Beach, Florida USA  
June 17 - 20, 1993**

**Marco Polo Hotel  
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Friday June 18, 1993

8:00 am - 11:00

Registration Open

8:30 am - 9:00

Naturally Occurring Variants of Reptiles and Amphibians  
H. Bernard Bechtel, M.D.

(11) X

9:00 am - 9:30

Are There Any Nonpoisonous Snakes? An Update on Colubrid Envenoming  
Sherman Minton, M.D.

(12) X

9:30 am - 10:00

The World's Most Venomous Land Snake, *Oxyuranus microlepidotus*  
(Serpentes: *Elapidae*): Taxonomy and Natural History  
Jeanette Covacevich

(13) X

10:00 am - 10:30

Co-operative Management of the Striped Legless Lizard (*Delma impar*),  
an Endemic Vulnerable Victorian Reptile  
Chris Banks

(14) X

10:30 am - 11:00

Captive Management and Conservation of Amphibians and Reptiles:  
Past, Present and Future  
James B. Murphy, Ph.D.

(15) X

11:00 am - 11:30

An Overview of the Herpetofauna of the Everglades  
George Dalrymple, Ph.D.

12:00 pm

Buses Leave for Miami Metrozoo

12:30 pm - 3:00

Lunch at Miami Metrozoo

3:00 pm

Buses Leave for Everglades National Park

3:45 pm - 6:45

Everglades National Park

6:45 pm

Buses Return to Hotel



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# Saturday June 19, 1993

8:00 am - 12:00 pm

Registration Open

8:30 am - 9:00

An Introduction to the Care of the Other 46 Genera of North American Snakes  
John Rossi, M.A., D.V.M.

(16) X

9:00 am - 9:30

Pythons in Namibia: Their Distribution and Conservation Status  
William Branch, Ph.D.  
Mike Griffen

(17) X

9:30 am - 10:00

Comments on Varanid Management at Miami Metrozoo  
William Zeigler

(18) X

10:00 am - 10:30

The Role of Reptiles and Amphibians in the Secret Snake Societies of West Africa  
Charles Miller, III

(19) X

10:30 am - 11:00

A Review of the Rain Forest Reptiles of Australia's World Heritage Wet Tropics Area  
Jeanette Covacevich

(20) X

11:00 am - 11:30

An Aquarist's Approach to Poison-Dart Frog Husbandry  
B. Ian Hiler

37 min MS Half - GF last Half. - maybe all GF (21) X

11:30 am - 12:00

Natural Variation in Populations of Reptiles and Amphibians: How Can We Measure Decline?  
J. Whitfield Gibbons, Ph.D.

(22) X

12:00 pm - 1:00

Lunch

1:00 pm - 1:30

Epidemiology of Snakebite in Tropical America  
Santiago Ayerbe, M.D.

(23) X

1:30 pm - 2:00

The Role of Male Presence on the Female Reproductive Cycle in Boid Snakes  
Dale DeNardo, D.V.M.

(24) X

2:00 pm - 2:30

Captive Husbandry and Reproduction of Three Species of Malagasy Leaf-Tail Geckos, *Uroplatus*, at the Fort Worth Zoo  
Richard Hudson

(25) X

2:30 pm - 3:00

The Genus *Bungarus* (Serpentes): Their Ecology and Bite in Sri Lanka  
Ansem de Silva, M.D.

(26) X

3:00 pm - 3:30

Conservation Program for the Threatened Romer's Tree Frog (*Philatus romeri*)  
Chris Banks

(27) X

3:30 pm - 4:00

A Herp-Hopping Field Trip Across the Palearctic in Spring  
Ray Pawley

(28) X

4:00 pm - 5:00

Simple But Professional Techniques for Photographing Herps  
Jim Bridges

(29) X

Workshop

1:30 am - 7:00 pm

Banquet -- Auction to Follow Speaker

8:30 pm

Gems From The Forbidden Zone: The Herpetofauna of Richtersveld National Park and the Diamond Zone of Southern Namibia  
William Branch, Ph.D.

30 min started tele

MS

Sunday June 20, 1993

8:30 am - 9:30  
Workshop

Gecko Husbandry  
Tim Tyle, M.D.  
Jeffrey Nunan

9:30 am - 10:30  
Workshop

55 min

Varanid Husbandry  
Prof. Dr. Hans-Georg Horn  
Richard Hudson

MS + GF - all

10:30 am - 11:30  
Workshop

Ultrasound Evaluation of Female Snakes for Fertility and Pregnancy  
Dale DeNardo, D.V.M.

11:30 am - 12:30 pm  
Workshop

Legislative Preparedness II  
Jeffrey Nunan  
Curt Harbsmeier

12:30 pm

Closing Remarks  
Richard A. Ross, M.D., President, IHS, Inc.

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**International Herpetological Symposium  
Miami Beach, Florida  
List of Abstracts - Alphabetically by Author**

**Epidemiology of Venomous Snakebite in Tropical America**

Santiago Ayerbe, M.D.  
Professor Ad Hoc  
University of Cauca School of Medicine  
Popayan, Columbia

The great number and variety of venomous snakes in the tropics combined with a predominantly agrarian society makes snakebite an important cause of morbidity and mortality. This is true for laborers both in open country and rain forest.

Snakebite is more frequent in the lower limbs, during the rainy season, and during daylight hours. Bites by terrestrial vipers are more common than those by palm vipers. Envenomations are generally mild to moderate despite the highly toxic venoms that have been described for these species. Bites by elapids are rare, but carry the greatest risk of mortality.

Unfortunately, many factors serve to impact snakebite victims adversely. In many instances the use of so-called "first aid" measures has been shown to actually worsen outcome. The mountainous terrain encountered throughout Central America contributes greatly to delays in instituting treatment. Finally, many physicians fail to recognize the degree of envenomation or its etiology.

**A Conservation Program for the Threatened  
Romer's Tree Frog (*Philautus romeri*)**

Chris Banks  
Melbourne Zoo  
Victoria, Australia

Romer's Tree Frog (*Philautus romeri*) is a small rhacophorid restricted to four Hong Kong islands, one of which has now been lost due to the development of Hong Kong's new international airport. The environmental impact assessment for the airport recommended removal of all frogs from the island and an ecological study to determine suitable translocation sites. As a consequence, 30 frogs were transferred to Melbourne Zoo in April 1992. Breeding commenced soon after and 43 were raised to adults. Further breeding, involving both the original group and the F1s, occurred over late 1992 - early 1993. This resulted in over 500 metamorphlings and a current Zoo population of 580 frogs. Trial releases are underway in Hong Kong and it is anticipated that Melbourne specimens will be returned in 1994.

## **Co-operative Management of the Striped Legless Lizard (*Delma impar*), an Endemic Vulnerable Victorian Reptile**

Chris Banks  
Melbourne Zoo  
Victoria, Australia

The Striped Legless Lizard (*Delma impar*) is a small pygopodid, now restricted to small isolated patches of native grassland in far southeast Australia. It is listed as Vulnerable at both State and Federal levels, due mainly to loss of its grassland habitat. In December 1990, a Working Group was established to co-ordinate all management actions relating to this species in Victoria. The Group comprises representatives from Melbourne Zoo, Department of Conservation and Natural Resources, University of Melbourne, Museum of Victoria, Victorian National Parks Association and the Victorian Herp Group. Activities have focused on research, field surveys, public awareness and a captive colony. As a result, a full-color brochure and poster were produced, and a Friends support group established. The captive colony now comprises seventeen specimens, including two hatched at Melbourne Zoo and eleven more removed from one grassland site that was being converted into a highway extension. Specimens for translocation will also be drawn from the captive lizards.

### **Naturally Occurring Variants of Reptiles and Amphibians**

H. Bernard Bechtel, M.D.  
Valdosta, GA

Numerous examples of reptiles and amphibians with abnormal color, pattern, scutellation, or combination of these will be illustrated and discussed. The presentation will be limited to naturally occurring variations and will not include the many unnatural strains created by selective breeding on the part of herpetoculturists. Most of the reptiles and amphibians illustrated in this presentation are rare in nature, some known only by a single specimen, with the result that specific knowledge regarding most of them is scanty at best. The discussion of individual examples will include, when known, pertinent historical data, incidence of the anomaly, similarities, and genetics. Credible theories and speculations will be included.

## Pythons in Namibia: Their Distribution and Conservation Status

William Branch, Ph.D.<sup>1</sup> and Mike Griffen<sup>2</sup>

1. Port Elizabeth Museum, South Africa
2. Directorate of Wildlife, Conservation and Research, Namibia

The dwarf python (*Python anchietae*) and the African rock python (*Python sebae natalensis*) have broad, but mainly undocumented Namibian ranges. Broadley's (1990) recent monographic review of the snakes of the subcontinent gives only 16 and 4 localities (quarter-degree units) for the species, respectively.

Since 1986, these two species have been extensively studied in Namibia. In part, a color poster and questionnaires were used to gather data. Information was requested on the distribution, frequency encountered, seasonal activity, habitats and natural history aspects of the pythons. Return rates varied from around 60% from commercial farmers to less than 20% from wildlife conservation personnel.

All groups of respondents experienced some difficulty in distinguishing *Python anchietae* from small *Python sebae*, even though the poster was designed specifically for this purpose. However, on the basis of information documenting habitat size, distribution, etc., in the returns, we are confident that an accurate allocation to species can be made.

Following the survey, 129 quarter-degree localities for *Python anchietae* can be plotted, and 277 for *Python sebae*. The latter, in particular, is now shown to be much more widely distributed in Namibia than previously documented. It is characteristically found on Kalahari substrates, encroaching on to the Khomas Hochland and western escarpment and increasing in abundance with higher rainfall. *Python anchietae* is restricted to the escarpment and associated rocky situations which are primarily in low rainfall regions. Although both species are often reported from the same locality, they usually occur in different habitats. At least 75% of the estimated range of *Python anchietae* is now known to fall within Namibia. The common name Angolan dwarf python is thus inappropriate!

Both species are protected in Namibia, and since 1965 only six live *Python anchietae* have been legally exported, four to South Africa and two to Germany. However, demand for this species is high, particularly in the USA and Germany, and it is estimated that at least 2-4 specimens are illegally exported each year (with perhaps 15 or more specimens being smuggled, via Angola and Guinea Bissau, in 1992-93). Despite the high overseas demand and local willingness to deal in this illicit trade, the species is presently secure, due to its large range, secretive nature, and largely inaccessible habitat. Although *Python sebae* is regularly killed for skin, food, medicine, and as a threat to livestock, there is negligible illicit trade and its present conservation status is also secure.

Seven legitimate captive breeding programs for *Python anchietae* are now in operation, one in Namibia, one in South Africa, and five in the USA.



## The World's Most Venomous Snake, *Oxyuranus microlepidotus* (Serpentes: Elapidae): Taxonomy and Natural History

Jeanette Covacevich  
Senior Curator (Vertebrates)  
Queensland Museum  
Brisbane, Queensland, Australia

A large (1.75m) Western Taipan, *Oxyuranus microlepidotus*, can produce 110mg of venom at a forced milking. This is enough to kill 125,000 mice. *O. microlepidotus* has the lowest LD<sub>50</sub> reported for any land-dwelling snake, and one of the lowest known. Its murine LD<sub>50</sub> is 0.010mg/kg (sub-cutaneous injection, 0.1% bovine serum albumen in saline). Its venom is 50 times more toxic than that of the Indian Cobra (*Naja naja*), nine times more toxic than the venom of the Australian tiger snake (*Notechis scutatus*) and four times more toxic than that of its congener, the Australian Coastal Taipan (*O. scutellatus*).

*Oxyuranus microlepidotus* was described (as *Parademansia microlepidotus*) in 1879 from two specimens of unknown provenance. The species was lost to science for nearly 100 years until 1974, when one specimen was sent to the Queensland Museum for identification. Subsequent research entailed recognition of the close relationship between *O. microlepidotus* and *O. scutellatus*: analysis of the venom of the former for the first time; and documenting its life strategies.

*O. microlepidotus* lives in sparsely settled areas just to the east of central Australia. It is confined to open "ashy downs" plains, an extremely arid habitat subjected to extremes of heat and cold. Here its existence is tied inextricably to that of a native rat, the Plague Rat (*Rattus villosissimus*): the rats are the snakes' main, almost sole, source of food. Almost all the lives of snakes are spent underground in rat burrows from which they emerge to "sun" for 2-3 weeks a year, in Spring.

*O. microlepidotus* and *O. scutellatus* are unique amongst the Australian elapids in feeding exclusively on mammals, and in having an extremely rapid "snap-release" bite. The evolution of extremely potent venom in both species is believed to be related to their predation on mammals (e.g. rats, bandicoots, native cats) that can defend themselves by biting savagely. Potent venom is the best possible protection from such responses.

## A Review of the Rain Forest Reptiles of Australia's World Heritage Wet Tropics Area

Jeanette Covacevich  
Senior Curator (Vertebrates)  
Queensland Museum  
Brisbane, Queensland, Australia

The rain forests of the area known as Australia's Wet Tropics are a narrow, broken, coastal strip of vegetation between Cooktown and Townsville in northeastern Queensland. Amidst heated, sometimes violent, and always costly debate, they were nominated for inclusion on The World Heritage List in 1984. Following stringent review of the nomination in terms of "evolutionary biology", "superlative natural phenomena", and "habitats for threatened species", the Wet Tropics Area was added to the World Heritage List in 1988.

These rain forests cover some 900,000ha, including the wettest and the second highest part of Australia. Their gazettal as part of the World Heritage presents Australia with a special responsibility to set extremely high protection and management standards. The Wet Tropics rain forests are the only such forests to go gazetted in the developed world. (All others are in developing countries like Brazil, Indonesia and Zaire, where the need to improve day-to-day human living conditions takes precedence over the "luxury" of protecting native forests, and where financial resources are not only stretched, but impossibly so.) A major part of the task of protecting the "Wet Tropics", an intense research effort, is now well underway, along with the establishment of a Management Authority.

Thirty species of reptiles have been recorded from rain forests of the Wet Tropics World Heritage Area. Twenty-one of these species occur nowhere else. Extremely narrowly endemic, probably relict species (e.g. the skinks *Bartleia jigurru*, *Calyptotis thorntonensis* and *Glaphymorphus mjobergi*) are characteristic of the area. Several are known or believed to be rare. Review of the reptile species of the Wet Tropics reveals a complex mix of species of Gondwanan (e.g. *Carphodactylus laevis*, *Phyllurus cornutus*, *Saproscinus*, *Lampropholis* spp.); Asian (e.g. *Varanus* spp.); and New Guinean (e.g. *Gonocephalus boydii*, *Stegonotus cucullatus* and *Morelia amethestina*) influences or origins.

If the availability of information, specialist staff, money, state protective species legislation, and state, federal and international protected area legislation count for anything, then the future of this area as a wilderness seems to be assured. Prospects for reptiles of the area are thus also good.

## **Ecology of the American Alligator in the Shark Valley of Everglades National Park**

George H. Dalrymple, Ph.D.<sup>1</sup>  
Joseph A. Wasilewski<sup>2</sup>

1. Department of Biological Sciences  
Florida International University  
Miami, FL 33199
2. Natural Selections  
Miami, FL

Population size, structure, growth rates and movements of *Alligator mississippiensis* in the Shark Valley Tower Canal region of the Everglades National Park were studied between 1985 and 1991. In comparison to an earlier study, our counts revealed more alligators and a more predictable seasonal use of the canal area correlated to both water levels and water delivery schedules. Six hundred and fifty alligators were captured, measured and marked. Seventy nine were recaptured a total of 97 times. The average growth rate in total length of hatchlings was only 14 cm per year. Alligators grew at a higher rate for their first three years, and then showed reduced growth. There was no difference in growth rate between young males and females. Seasonal variation in growth in length and mass were very subtle. Most recaptures in the canal area had moved less than 0.16 kilometers, even after four years. There are differences between canal and natural marsh sub-populations that should be further investigated to properly plan management of this species.

### **The Role of Male Presence on the Female Reproductive Cycle in Boid Snakes**

Dale DeNardo, D.V.M.  
Department of Integrative Biology  
University of California at Berkeley

The necessity of males for successful reproduction in most animals is quite obvious, with the male's primary reproductive contribution being the transfer of sperm to the female. However the male may have an additional role of influencing the female's reproductive state. In order to test whether male snakes are necessary for normal follicular development in females, biweekly ultrasonography was conducted on virgin blood pythons (*Python curtis*) that were either kept in isolation or housed with a male. The ultrasonography allowed for close monitoring of follicular growth, vitellogenesis, ovulation, and egg development. The results presented in this paper are from preliminary studies which indicate that early follicular growth occurs independent of male influence, but vitellogenesis requires the presence of a male. The type of stimulation (e.g. visual,

chemical or tactile) and the critical exposure time are both still unknown and warrant further investigation.

### **The Genus *Bungarus* (Serpentes): Their Ecology and Bite in Sri Lanka**

Anslem de Silva, M.D.  
Faculty of Medicine  
University of Peradeniya  
Sri Lanka

The genus *Bungarus* is represented in Sri Lanka by *Bungarus caeruleus* (Common Krait) and *B. ceylonicus* (Sri Lankan Krait). *Bungarus caeruleus* inhabits the plains of the dry and intermediate climatic zones while the habitat of *B. ceylonicus* is from 20 to 1750 meters in the wet and intermediate climatic zones.

In habits, both are nocturnal, mainly ophiophagus, oviparous, docile and inoffensive during the day. A distinct nocturnal behavioral pattern was observed with bites sometimes occurring without provocation. Venom of both species is highly neurotoxic and accounts for nearly 20% of human deaths due to snakebite envenoming in Sri Lanka.

### **The Herpetofauna of Sri Lanka: The Impact of Habitat Destruction**

Anslem de Silva, M.D.  
Faculty of Medicine  
University of Peradeniya  
Sri Lanka

Sri Lanka is a tropical island, 65,584 km<sup>2</sup> in area. Its herpetofauna (213 taxa of which 108 (51%) are endemic) inhabit ecological niches in rain, montane, monsoon, and dry forests, grasslands and man-made habitats. As Sri Lanka's deforestation and habitat destruction rates are among the highest in South Asia, many herptiles are threatened and a few are vulnerable. Additional adverse effects on herpetofauna are from increased-use of fertilizer, pesticides, killing and predation.

Survey of existing herpetofauna, methods to protect habitats, identify threats, and conserve vulnerable taxa are proposed.

## **Venomoid Surgeries**

Richard S. Funk, M.A., D.V.M.  
Amazon Veterinary Services  
Brandon, FL

Under special circumstances, it may be advisable to have your reptile veterinarian perform venomoid surgery on venomous snakes to render them functionally harmless. Differing techniques exist for performing such surgeries. Pertinent aspects of husbandry, legal and ethical considerations will be discussed. Such surgeries should be performed only by experienced veterinarians.

## **Natural Variation in Populations of Reptiles and Amphibians: How Can We Measure Declines?**

J. Whitfield Gibbons, Ph.D.  
Professor of Zoology, University of Georgia  
Savannah River Ecology Laboratory

The assertion that we are losing biodiversity on a global scale as a consequence of habitat destruction goes uncontested among most biologists. Reptiles and amphibians are no exception. Numerous instances can be given where natural habitats have been destroyed as a consequence of human activities (construction, forest burning, flooding by dams), and entire populations have been eliminated. Establishing population trends of species in habitats on which the level of human impact is equivocal is more difficult. Long-term studies in protected research sites on the Savannah River Site in South Carolina have permitted us to assess annual population levels of several species of turtles, snakes, frogs, and salamanders. The results permit a view of natural fluctuations in populations that can occur in response to presumed normal extremes of environmental variation. The findings give cause for reconsideration of hasty conclusions based on short-term observations of population declines in such situations when human impacts are not apparent, or perhaps, have not been identified.

## **Private Registries for Reptiles: An Idea Whose Time Has Come**

Michael Hicks  
Senior Keeper  
Department of Herpetology  
Druid Hill Park  
Baltimore, MD 21217

As we all know, every day it becomes more difficult to bring wild specimens of many reptiles into captivity, mostly due to increasing legislation. Many species now

reasonably common in our collections are fast disappearing in the wild, as well. In order to preserve these species in private collections on a long term basis, it will take more than many individual breeding programs for these animals; it will take planned, cooperative breeding programs with specimens of known ancestry. Ultimately, indiscriminate inbreeding of our animals will result in their extinction in captivity as surely as would not breeding them at all. There is only one answer to this problem: the formation of private registries for various species of herps which can keep track of each animals pedigree. Private breeders of domestic animals as well as some exotic bird species already maintain successful registries for their animals. There is no reason herpetoculturists could not do the same.

## **An Aquarist's Approach to Poison-Dart Frog Husbandry**

B. Ian Hiler  
Senior Curator of Freshwater Exhibits  
Aquarium of the Americas  
New Orleans, LA

An uncomplicated, time and space efficient method of poison-dart frog husbandry, particularly for tribes of the genus *Dendrobates*, is described. This is achieved by blending tropical fish breeding techniques, methods developed in Germany for frog husbandry, and field observations of wild populations. Simple housing and care, as well as the nutritional breakdown of commonly used foods is discussed. Also, a new method for rearing egg-eating tadpoles will be introduced.

## **Keeping Monitors in Captivity: A Biological, Technical and Legislative Problem**

Prof. Dr. Hans-Georg Horn  
Herpetolog, Forschungsinstitut  
Sprockhövel, Germany

Monitors are distributed widely throughout the old world, inhabiting a great variety of biotypes, e.g., deserts, savannahs, dry sclerophyl forests, rain forests, and rivers and lakes. Problems arising from uncertainties of their distribution areas, poorly understood taxonomy, ecology and ethology, all combine to make captive husbandry and breeding difficult at best. Technical problems may occur because industry did not develop special light sources (UV, IR), heating filaments and measuring instruments for terraria as is the case for aquaria. An even more difficult problem is legislation prohibiting trade, and in many case, simple possession of monitors. Finally, this paper will describe the author's experience in the practical husbandry and captive breeding of monitors.

## **Captive Husbandry and Reproduction of Three Species of Malagasy Leaf-Tail Geckos, *Uroplatus*, at the Fort Worth Zoo**

Rick Hudson  
Assistant Curator of Herpetology  
Fort Worth Zoological Gardens  
Fort Worth, TX

A brief overview of the natural history and distribution of three species of Malagasy leaf-tail geckos, *Uroplatus fimbriatus*, *U. henkeli*, and *U. sikorae* is provided. Husbandry requirements including enclosure design, lighting, watering techniques, thermal regimen, and feeding/nutrition are described. Observations on reproduction including sexing, maturity, copulation, induction of breeding, oviposition, egg incubation and hatching and various other breeding data are presented. Finally the health and husbandry problems that have hampered this genus in captivity are reviewed and discussed.

## **The Role of Reptiles and Amphibians in the Secret Snake Societies of West Africa**

Charles Miller III  
Aspects of Africa  
St. James, NY

Personal observations of the roles of reptiles and amphibians in West Africa in the Bakona and Bafrehn secret snake societies of the Dan People of Liberia. Illustrated by slides and videotapes of tribal rituals, and highlighted by an exhibition of herpetologically oriented African artifacts. This paper emphasizes the importance, both past and present, of many of the familiar species of West African herpetofauna. Some historical perspectives of the origins of the herp export trade are also discussed. Personal observations of field experiences and the ethnology and natural history of herpetofauna are also presented.

## **Are There Any Nonpoisonous Snakes? An Update on Colubrid Envenoming**

Sherman Minton, M.D.  
Research Associate in Herpetology  
American Museum of Natural History  
Indianapolis, IN

About 60 species of colubrid snakes in 36 genera have been identified as causing human envenoming. They belong to eight colubrine lineages. Geographically, Afro-Asian, Neotropical, and African genera predominate, while in terms of habitat, arboreal

snakes predominate. These snakes have enlarged posterior maxillary teeth which may or may not be grooved. Most colubrid venoms show procoagulant, proteolytic and hemorrhagic activity; neurotoxic activity has been reported. Lethality for mice is comparatively high. Human envenoming nearly always follows deliberate interaction with *Boiga irregularis* in Guam where numerous unprovoked bites have been reported. Most colubrid envenomings show only local manifestations, but severe coagulopathy occurs with bites of some species. Fatalities have occurred. Neuroparalytic symptoms are rare. Treatment for most colubrid bites is symptomatic.

### **A Herp-Hopping Field Trip Across the Palearctic in Spring**

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Curator of Herpetology  
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In 1990 I was invited by the Moscow Zoopark to tour selected field sites. In April/May, 1991, with three American colleagues, a six week visit took us to six diverse habitats: the Karakum desert, the Kopet Dag Mountains (near the Iranian border), the Caucasus Mountains, the Steppes, wetland arboreal forest near Moscow, and the coastal and foothill regions of the Sikhote-Alin Amur Tiger reserve (Soviet Far East). Various reptile and amphibian species were observed, photographed, and selected specimens collected. Of particular interest was the apparent abundance of various Anuran species in seeming contradiction to the global amphibian decline. Our hosts were Sergei Kudrjavitsev and Sergei Mamet, Curator and Assistant Curator of the Moscow Zoopark "Terrarium."

### **Husbandry and Some Behavior Observations on the Goliath Frog, *Conrana goliath*, at the Brookfield Zoo**

Ray Pawley  
Curator of Herpetology  
Brookfield Zoo  
Brookfield, IL

Current husbandry practices will be reviewed, plus comments on combat behavior of the Goliath Frog at the Brookfield Zoo. Three distinct calls (out of known total of four) have been recorded and will be played during the presentation. This popular exhibit species should be a suitable candidate for future captive breeding programs.



## **Sea Turtle Management: What We Know and What We Don't**

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Although several of the eight species of marine turtles (families *Cheloniidae* and *Dermochelyidae*) have areas of localized abundance, all are considered endangered or threatened for a variety of reasons. These include absolute low population numbers (Kemp's Ridley), international commerce for the shell (hawksbill), beach development and drowning in trawls (loggerhead), heavy egg collection (especially the green turtle, olive ridley, and leatherback), and slaughter for food (mainly the green). The flatback turtle, restricted to tropical Australia, may be relatively safe, being protected by law and little sought for food, but it is subject to a certain level of incidental catch.

Techniques for "saving" turtles are varied. They include protection of nesting turtles and their eggs; restriction or elimination of the legal take of turtles at sea; restriction of international trade in sea turtle products; operation of hatcheries; deployment of "TEDs" on shrimp boats and other trawling vessels; "head-starting" of hatchling turtles in captivity; restriction of beachfront development; control of beach lighting; and others. All are worthy, common sense techniques. Yet we remain ignorant of even the most basic parameters of sea turtle population dynamics, and it is rarely possible to demonstrate that a given conservation technique has yielded quantifiable or predictable benefits.

### **An Introduction to the Care of the Other 46 Genera of North American Snakes**

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The majority of North American snakes have been poorly studied with regard to their captive requirements. The main reason for this is their perceived difficulty of maintenance or perceived lack of economic value. In truth, neither argument is valid for most species. The basics of herpetoculture which have been successfully applied in the captive maintenance of other reptiles, are appropriate for these species, although major modifications may be necessary for some. The majority of the species however appear to tolerate the simple captive environments we have created for members of the genera *Elaphe*, *Lampropeltis*, and *Lichanura* while for others we must consider heretofore rarely considered environmental parameters such as substrate humidity gradients and pH. With the expansion of herpetoculture over the last ten years making reptiles and amphibians the fastest growing group of captive animals in the country, there is tremendous opportunity for market expansion with many of these neglected snakes. The Western

Hognose, *Heterodon nasicus*, is only the first of such snakes. As the awareness of the public and herpetocultural communities increase, many more species will join the king snakes and rat snakes in the ranks of "domestic" snakes. This is a necessary and positive undertaking which should not be legislated against by those who do not understand or appreciate these animals. Furthermore, in light of the tremendous habitat destruction presently occurring, these animals need to have their captive maintenance and breeding requirements studied intensively, as only the private sector can do.

### **Experimental Manipulations of Clutch Size and Egg Size: Implications for Captive Management and Conservation Programs**

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Several hormonal and surgical manipulations of clutch and egg size will be described. These techniques may be useful in captive propagation of threatened or endangered species or in the re-introduction of such species in wild populations. Increasing clutch size accelerates the short-term reproductive rate of female lizards. Conversely, decreasing clutch size increases offspring size and this appears to enhance survival of female offspring in the wild. The relative merits of these complementary techniques depending on housing limitations of a captive rearing program or the ecological circumstances involved with re-introduction schemes will then be discussed.

### **Halting Biodiversity Decline: The Herpetological Response**

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The science of herpetology, as with biology in general, is increasingly taking on a minimalist complexion. In this sense, it is joining the great hegira toward molecular biology. Whereas molecular biology has provided great insights into the nature of life, it has overshadowed pursuit of other areas of biological science, most notably, natural history. In addition, molecular biology has become increasingly wedded to technology (science in the service of business), emerging as biotechnology. Biotechnological research has become infected with the same ethical malignancy as is business in general - the profit motive.

Imperatives of gigantic proportions, but of a different sort, however, exist for biologists, including herpetologists, in today's world. Of greatest significance are

environmental imperatives. Environmentalists refer to the 90's as the Decade of Decision. As such, they mean that the policy decisions that will have to be made concerning the intertwined problems of overpopulation, resource depletion, pollution, global warfare, and environmental degradation must be forthcoming before the close of this millennium.

Herpetologists traditionally have not been much involved in addressing these imperatives. Small efforts have been made recently relative to declining amphibian and reptilian populations. Nonetheless, the major work is just beginning, and the response rate must be stepped up. The major environmental arena in which herpetologists should play a much larger role is in research concerning the causes, consequences, and effective responses to the problem of biodiversity decline. Biodiversity decline represents a problem the questions about which no one on the planet is prepared to provide answers. Such questions include: How many organisms currently inhabit the planet? What is the rate at which taxa are being driven to extinction? What environmental roles are played by the species in decline? What are the long-term environmental consequences of their decline and disappearance? Of what conceivable value are such species to the improvement of the lot in life of humanity? The central question, of course, is: Which of these species in decline will signal, upon its extinction, the passage of the point of no return, beyond which no action humans can take will be able to repair the disintegrating life support systems of our planet?

Given the urgency of the need to provide definitive answers to currently unanswerable questions about biodiversity decline, herpetologists, if they are to be more than a hindrance, must redirect their research interests into the more traditional, but now increasingly neglected arenas of systematics, ecology, and natural history. Nobility, if not Nobel prizes, lies in this direction.

### **Comments on Varanid Management at Miami Metrozoo**

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Over the last 15 years, the Miami Metrozoo has had the opportunity to maintain over 20 species of varanids, many of which have been successfully bred. Over the last seven years there seems to have been an increase in the interest of keeping monitors. This paper deals with the experiences of the author in managing various species and through that experience the development of some husbandry parameters that may benefit other institutions and/or private herpetologist. Caging, space, set up, social groupings and conditioning will be discussed that will show alternative ways of establishing breeding animals as opposed to past methods and beliefs.