

International Herpetological Symposium

32nd Annual Meeting



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Nashville, Tennessee USA

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June 18 - 21, 2008

Program and Abstracts

Welcome to the
32nd Meeting of the
International Herpetological Symposium



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**INTERNATIONAL HERPETOLOGICAL SYMPOSIUM
32nd ANNUAL MEETING**

PROGRAM

Wednesday, June 18th

7:00 - 9:00 p.m. Registration – Millennium Maxwell House Hotel - Nashville
7:00 p.m. - ? Ice Breaker – Hospitality Suite

Thursday, June 19th

8:30 a.m. - 3:30 p.m. Open Registration – Millennium Maxwell House Hotel - Nashville

8:30 - 8:45 a.m. Opening Remarks and Introductions
Nashville Zoo Director of Animal Management: Connie Philipp
Vince Scheidt – IHS GRANTS

8:45 - 9:30 a.m. **Adam Marfisi**
“The Natural History and Captive Propagation of the Caucasus
Viper, *Vipera kaznakovi*”

9:30 - 10:45 a.m. **Wade Sherbrooke**
KEYNOTE ADDRESS
“Horned Lizard Adaptations: Life as Predator, and Life as Prey”

10:45 - 11:00 a.m. *Morning Break*

11:00 - 11:45 p.m. **Jeff Ettling**
“From the Ozarks to Mt. Ararat: The Saint Louis Zoo's Conservation
Efforts for Herps in the Backyard as well as Overseas”

11:45 - 12:15 p.m. **Steve Conners**
“Status and Future Outlook for the Booby Cay Iguana *Cyclura carinata*
“*bartschi*””

12:15 - 1:30 p.m. *Lunch Break*

1:30 - 2:15 p.m. **Johnny Arnette**
“Expedition Komodo: Dragons in the Wild and Captivity”

2:15 - 3:00 p.m. **Jason Wagner**
“Abronia: Notes on Captive Husbandry and Conservation”

3:00 - 3:15 p.m. *Afternoon Break*

3:15 - 4:00 p.m. **Dean Ripa**
“The Bushmaster: Silent Fate of the American Tropics”

4:00 - 4:30 p.m. **John Tashjian**
“Rattlesnake Variations”

Friday, June 20th

8:30 a.m. - 3:30 p.m. Open Registration— Millennium Maxwell House Hotel - Nashville

8:30 - 9:30 a.m. **Rom Whitaker**
“The King Cobra and Other Amazing Reptiles of India's Western Ghats”

9:30 - 10:00 a.m. **Kristen Monsen**
“Molecular Evidence of Cryptic Speciation in the Rare Frog *Rana cascadae*”

10:00 - 10:15 a.m. *Morning Break*

10:15 - 11:05 a.m. **David Warrell**
“Scientific and Therapeutic Potential of Venom Toxins”

11:05 - 11:50 a.m. **Ray E. Ashton, Jr.**
“How Behavior and Environmental Studies Should be the Basis for Good Captive Husbandry”

11:50 a.m. - 1:00 p.m. *Lunch Break*

1:00 - 2:00 p.m. **Kevin Zippell**
KEYNOTE ADDRESS
“Amphibian Ark and the 2008 Year of the Frog Campaign”

2:00 - 2:45 p.m. **Lisa Powers**
“The Salamanders of Tennessee”

2:45 - 3:00 p.m. *Afternoon Break*

3:00 - 3:45 p.m. **Robert Hill**
“Disappearing Diversity: Preserving Panama's Endangered Amphibians”

4:30 p.m. Shuttle Buses leave for **Field Trip to the Nashville Zoo and Hosted Picnic at the Nashville Zoo**

5:00 - 9:00 p.m. **The Nashville Zoo Reptile Department Open House**

9:15 p.m. Shuttle Buses Return to Millennium Maxwell House Hotel

Saturday, June 21st

- 8:30 a.m. - 12:00 p.m. Open Registration – Millennium Maxwell House Hotel
- 8:30 - 9:15 a.m. **Donald Schultz**
“Swaziland: Kingdom of Herps”
- 9:15 - 10:15 a.m. **David Warrell**
KEYNOTE ADDRESS
“Challenging Snake Bite Cases in Five Continents”
- 10:15 - 10:30 a.m. *Morning Break*
- 10:30 - 11:15 p.m. **Ernie Jillson**
“Miami-Dade Fire Rescue Antivenom Bank: Ten Years in the Making”
- 11:15 - 11:45 a.m. **Omar Attum**
“Egyptian Tortoise Conservation: a Community-Based, Field Research Program Developed from a Study on a Captive Population”
- 11:45 a.m. - 1:00 p.m. *Lunch Break*
- 1:00 - 1:45 p.m. **Ryan Potts**
“West Indian Boas of the Genus *Epicrates* - Captive Care and Conservation”
- 1:45 - 2:30 p.m. **Peggy Rismiller**
“Breeding Phenology in Rosenberg's Goanna *Varanus rosenbergi*”
- 2:30 - 2:45 p.m. *Afternoon Break*
- 2:45 - 3:30 p.m. **Kristen Wiley**
“Husbandry of Saw-Scaled Vipers *Echis carinatus* and Related Species”
- 3:30 - 4:00 p.m. **David Lazcano**
IHS 2009
- 4:00 - 5:00 p.m. **John Tashjian**
HERP QUIZ 2008
- 6:30 p.m - ????? **IHS BANQUET**
Announcement of the Photo Contest Winners
- Banquet Speaker – ROM WHITAKER**
“The Song of the Gharial: Saving an Ancient and Unique Crocodylian from Extinction”
- Auction - Proceeds benefit next year's IHS! (Credit Cards Accepted)
- Presentation of the **Joseph Laszlo Memorial Award** & Closing Remarks

Abstracts

ROM WHITAKER

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The Song of the Gharial: Saving an Ancient and Unique Crocodylian from Extinction

The gharial (*Gavialis gangeticus*) is not only a strange looking crocodylian it is truly one of the most bizarre looking animals on the planet, prompting a nickname 'the croc from Mars'. Found only on the Indian subcontinent it has a body form and long snout which characterized a number of different ancient, now extinct crocodylians once found in most parts of the world. Today there are a number of odds stacked up against this fish-eating river specialist, mostly because of intense human pressure for river water and fish resources.

The Gharial Conservation Alliance, WWF India and the Crocodile Specialist Group of the IUCN are three of several organizations which are committed to the gharial's survival. The catastrophic die off of gharial in it's main stronghold, the National Chambal Sanctuary in North India has prompted a major push for research on the species including a telemetry project to study gharial movement in the river.

If the gharial is to survive (it is now Critically Endangered with under two hundred breeding adults left in the wild) the Gharial Conservation Alliance needs to galvanize fund-raising and other activities to support work in the field all the way from research to education to helping river people find alternative livelihoods. Here's our challenge to keep a magnificent crocodylian, which grows to 20 feet and its riverine habitat from going extinct.

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The King Cobra and Other Amazing Reptiles of India's Western Ghats

The king cobra (*Ophiophagus hannah*) is the world's largest venomous snake, the only species which makes an elaborate nest and a snake much feared and revered throughout its huge range from India to the Philippines. Unfortunately, besides being killed out of fear or for food, the king cobra's primary habitat, Asian rainforests, are being destroyed to accommodate the dams, agriculture and living space for an annual addition of hundreds of millions of humans. We know very little about this charismatic snake and the Agumbe Rainforest Research Station is now the world center for the study of this icon of the rainforest.

For the past 30 years we have been gathering sporadic data on the king cobra but since the establishment of our station at Agumbe in 2005 there has been an all out effort to unravel the secrets of this snake in order to contribute to its better conservation and management. We have monitored seven nests, rescued and relocated over 80 adult snakes and recently started the first telemetry project, with snake radio-tracking expert Matt Goode, to study their movement and habits.

Even though the telemetry study is only a few months old we have already made some startling observations which will be shared with the IHS audience in June at Nashville.

JOHNNY ARNETTE
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Expedition Komodo: Dragons in the Wild and Captivity
(Abstract not available)

**OMAR ATTUM*, MINDY BAHA EL DINA, SHERIF BAHA EL DINA, BASSIM RABEIA ‡, AND
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**Egyptian Tortoise Conservation: a Community-Based, Field Research Program Developed from a Study on
a Captive Population**

Local community participation and ex-situ conservation has the potential to assist the recovery of the endangered Egyptian tortoise, *Testudo kleinmanni*. We initiated an in-situ community-based conservation and research program from a captive population of *T. kleinmanni*. We used a captive population of the Egyptian tortoise to train a member of the local community as a research technician and used his indigenous tracking skills and knowledge of the area to collect activity and dietary data on 28 captive tortoises. We overcame problems with illiteracy by creating a data sheet based on symbols and numbers. This data sheet allowed us to utilize the indigenous knowledge of various people from the community, and employ them in the future. Our local community approach to data collection, in conjunction with a craft program, made the conservation of the Egyptian tortoise more rewarding to the local community by providing a more sustainable form of income than collecting animals for the pet trade. Our multi-dimensional approach (local community participation as research technicians, craft program, and trust building) for gaining local support eventually led to the rediscovery of wild Egyptian tortoises in North Sinai, which was significant, as this species was presumed extinct in Egypt. We have now shifted our focus to in-situ conservation, using the research and local capacity building template developed from this captive population study. Our template can be used by zoos and conservation organizations with small budgets and collections of native species in natural habitats to create similar captive research programs that can be applied to in-situ conservation.

RAY E. ASHTON, JR.

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How Behavior and Environmental Studies Should be the Basis for Good Captive Husbandry

Over the several hundred years that herpetologists have been observing and collecting their animals in the field, very few species have had exhaustive studies done on their behavior, habitats, the food they eat, or the ways in which they have adapted to their environments. There were a few herpetologists that did exhaustive field studies such as the Wrights and their studies of the herps of the Okefenokee Swamp. They documented carefully that a frog lived in a pond and began to look at the food they ate and their behaviors through the seasons. Of course the field naturalists and Native Americans or their counter parts around the world were aware of many special things

that reptiles and amphibians did as special adaptations to their environments. In the 1970's it was realized that "nonacademic herpers were learning many things from their captives that field biologists had yet to learn. Folks like Joe Laszlo were discovering the need to create microhabitats for breeding success. Today, there are fewer people out there collecting herptiles and even fewer naturalists out there observing through long term exhaustive studies the secret lives of reptiles and amphibians. This is true of both zoo and private herpetoculturists. Few grow up today having experienced "rock turning" and road cruising with dedicated "crazed" individuals that live and "eat and sleep" field collecting. Now it is hard to find a herpetology course at any university and when you do, it may not include field studies. Most herpers roam the halls of Herp Expos and *kingsnake.com* and their animals come not from under a rock but in a deli cup. Meanwhile, our wild herps are declining and some of those declines have been blamed on highly infectious diseases. The fear of these diseases entering into captive populations has caused extreme preventive measures, some causing more deaths than the disease itself. The purpose of this paper is to encourage herpetoculturists, curators and zoo veterinarians to learn more about the natural history of their captives and to use this knowledge to create management plans that reduce stressors thus reducing diseases of all types and to possibly increase the success of creating assurance colonies of herps that can be used when the need arises to do reintroductions, and augmentations. We will discuss examples of both amphibians and reptiles and look at all the various aspects of "Nature to Nurture". What do we need to know about a species before we should try to keep it? Do you need to breed everything? What is the goal of having it? How do we balance the confines of captivity with the diversity of a species' wild habitat and what nature provided in diversity of food, shelter, microclimate, and lack of stressors? How can we reduce highly intrusive preventative measures that may cause more harm than good? Bottom line, what is the conservation value of what we do? Ultimately, we look at what a detailed study and understanding of the natural habitat and habits of a species can teach us about ways of effectively caring for these animals in long term captive situations.

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Status and Future Outlook for the Booby Cay Iguana *Cyclura carinata* "bartschi"

The Turks and Caicos iguana, *Cyclura carinata*, is widespread in its namesake archipelago but limited in range to one small island in the easternmost Bahamas. The two km² island of Booby Cay, located only 200m east of the main island of Mayaguana, has an estimated population of 500 iguanas. Researchers have monitored this population for over 10 years and in spite of extreme weather events and some introduced non-native mammals, this population has remained stable. Currently Mayaguana, with a human population of only 3-400, is undergoing a large scale development boom. A private firm is investing heavily in new infrastructure which will vastly increase the population and tourist capacity of the island. It is recommended that Booby Cay be afforded greater government protection, such as national park status, to counter any threats development on Mayaguana may pose to its unique wildlife and iguanas in particular.

JEFF ETTLING

Curator of Herpetology & Aquatics

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From the Ozarks to Mt. Ararat: The Saint Louis Zoo's Conservation Efforts for Herps in the Backyard as well as Overseas

The Saint Louis Zoo has been actively involved in a wide variety of wildlife conservation programs for many decades, but in 2004 it refined and focused its efforts with 12 dedicated Conservation Centers working under the umbrella of the Zoo's new Conservation Initiative known as the WildCare Institute. Although several of the Conservation Centers are habitat based and include programs for reptiles and amphibians, two of the

Centers specifically target a herp species or species complex that is in need of conservation. The Ron Goellner Center for Hellbender Conservation is one such Center and it focuses its efforts on the eastern hellbender, *Cryptobranchus alleganiensis alleganiensis* and the Ozark hellbender, *C. a. bishopi*, which are both listed as endangered in Missouri. In collaboration with the Missouri Department of Conservation, USFWS and several universities the Center is assisting with population surveys, disease screening, water quality assessments and the development of captive reproduction protocols. Half way across the globe the Center for the Conservation of Near East Mountain Vipers is focusing its efforts on the conservation of eight species of mountain vipers that have restricted, isolated distributions in the rugged mountains of Lebanon, Turkey, Armenia and Iran. The Center's first project is focusing on the development of a conservation management strategy for the Armenian viper, *Montivipera raddei*, a species which has experienced an 88% drop in population numbers over the past 20 years as a result of habitat loss and illegal collection for the pet trade. In order to develop an effective conservation plan for the Armenian viper data are needed on population structure, home range size, seasonal activity patterns and habitat usage. Radiotelemetry and GIS technology along with microsatellite DNA analyses are being used to help answers the questions regarding the species ecology and the genetic structure of the fragmented populations. Whether focusing on species in our own "backyard" or those overseas, the efforts of all of the WildCare Institute Centers are focused on habitat protection, community development and capacity building. In the end, conservation only works if you can get the people living in the areas where you are working directly involved in the programs. The core values of the WildCare Institute, the human element and how they relate to hellbender and mountain viper conservation will be discussed.

ROBERT HILL

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Disappearing Diversity: Preserving Panama's Endangered Amphibians

The talk will focus on the amphibian conservation programs that have taken place in Panama over the last decade. It will cover the beginning of amphibian conservation in Panama starting with Project Golden Frog in 1999 up to the present day with the El Valle Amphibian Conservation Center which is the first center of its kind in Central America.

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Miami-Dade Fire Rescue Antivenom Bank: Ten Years in the Making

The Venom Response Team began in 1998 with 26 calls and one responder. In 2008 the team has grown to 6 Response Officers and handles over 1500 calls a year. Calls range in scope from simply identifying a snake in the yard, to complex and extended assistance in exotic snake envenomation cases. The VRT is also at the front line of the defense of South Florida against Africanized Honey Bees, running numerous calls on bee swarms and colonies, mitigating the situation to protect public safety when possible, or turning the case over to private bee removal specialists. VRT team members are trained in Large Animal Emergency Rescue and work in conjunction with Technical Rescue in large animal rescue events. VRT officers serve as the animal's advocate, to help ensure safety for both the animals and the rescuers.

Miami Dade's Venom Response Team maintains the most comprehensive Antivenom bank in the country. With 40+ different antivenoms in stock, and in-date, (many "banks" are zoo holdings and are out of date medications),

there are few species that would not be covered by their reserves. In almost 10 years of service many lives have been saved by the availability of these medications. Even when life is not threatened by the bite of a venomous snake, antivenom therapy is a tissue and function saving measure that can mean the difference in regaining full use of an extremity versus crippling or amputation of the limb.

“Envenomation Management” is the Venom Response Team’s program for First Responders and Hospital staff. The VRT regularly offers this training, free of charge, to Hospitals, Fire Rescue departments, police departments, code inspectors, public works and any other entity that may reasonably come in contact with venomous creatures. Here in tropical South Florida, the “season” for encountering native venomous animals is year round, plus this area is home to many keepers of exotic, and potentially deadly, wildlife species. It is of the utmost importance for everyone to recognize species of concern, know what to do in the event of a negative encounter with the animal, and have some understanding of how to effectively manage the situation. This valuable training is also being offered by the VRT throughout the entire State of Florida.

The Venom Response Team is well-known within the community for their presentations and displays at school career day events, safety fairs and festivals. “Dangerous Critters in Your Backyard” is presented hundreds of times a year to children and adults alike. This program teaches respect and appreciation of all wildlife, particularly snakes, and it highlights safety and wellbeing for both observer and the observed. The audience is also given the opportunity to touch a live “pet” snake so that fear can be replaced by wonder and admiration.

Miami Dade Fire Rescue’s Venom Response Team has grown and developed during its 10 years of service to the community. Their myriad collection of antivenom, and their knowledge of envenomation management offered as resources for treating physicians, have saved many lives, and prevented loss of function in many envenomation cases. With a firm belief that “an ounce of prevention is worth a pound of cure”, the VRT is also dedicated to providing education to audiences of all ages and professions.

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Natural The History and Captive Propagation of the Caucasus Viper *Vipera kaznakovi*

The Caucasus viper (*Vipera kaznakovi*) is a member of what are commonly known as the shield-headed vipers. They inhabit low altitude, subalpine and alpine regions of the Caucasus Mountains. *V. kaznakovi* is found in the western, moist regions of the range down to the eastern portion of the Black Sea. (Nilson et al., 1995) this species are extremely attractive snakes. *V. kaznakovi* is most often recognized by the black dorsum and the bright orange-red, yellow or cream longitudinal stripe or zig-zag formation. Due to its brilliant coloration and morphological similarity to *Vipera berus* this viper’s first known appearance in Turkey led it to be considered a subspecific *Vipera berus ornata* (Basoglu, 1947). This was corrected by Mertens in 1952 and remains *V. kaznakovi*. Melanistic specimens are not common in the lower elevations but become more numerous in the higher, northern part of its range where it reaches the coniferous belt (Höggren et al. 1993). This presentation is the result of six years work with *V. kaznakovi* in my private collection. The emphasis will be on acclimating the adults and reproduction, as well as raising the offspring with details on the pitfalls and successes working with these tedious but rewarding vipers.

KIRSTEN MONSEN* and VANESSA ESPINOSA

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**Phylogenetic Analysis of Internal Transcribed Spacer Sequences among the Rare Frog *Rana cascadae*;
Implications for Cryptic Speciation and Conservation**

Rana cascadae is a member of a species complex of frogs endemic to the Pacific Northwest of the United States. Over the last 25 years *R. cascadae* has experienced population declines throughout its range. We have recently shown this species is composed of three unique genetic groups whose mitochondrial DNA is as divergent as well-described species suggesting they may represent unique cryptic species. In order to assess nuclear DNA divergence among these *R. cascadae* groups relative to other well-described species we designed PCR primers to amplify the Internal Transcribed Spacer 2 from individuals in each *R. cascadae* genetic group as well as five closely related ranid frog species from the same species complex (*Rana aurora aurora*, *R. auroradraytoni*, *R. pretiosa*, *R. luteiventris*, *R. muscosa*) and one out group species (*R. catesbeiana*). Sequence analysis of ITS 2 from these species shows California *R. cascadae* are as genetically divergent as well-described species and potentially warrant separate conservation status as a cryptic species.

RYAN POTTS

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West Indian Boas of the Genus *Epicrates* - Captive Care and Conservation

The West Indies contain a rich diversity of reptiles and amphibians, including nine species of boas within the genus *Epicrates*. These boas range in size from the fourteen foot Cuban boa, *Epicrates angulifer*, to the diminutive Vine boa of Hispaniola, *Epicrates gracilis*, which measures little more than a pencil width in girth. West Indian *Epicrates* are infrequently maintained in captivity within either the zoological or private sectors. However, when relatively simple needs are met, these boas prove to be interesting specimens, adapting well to captivity and breeding readily. Certain *Epicrates*, including the Jamaican boa, Bimini Island boa and Virgin Island boa, have become endangered in their native habitat. Increased efforts to preserve critical habitat and the implementation of captive breeding programs should be encouraged further as conservation management tools. My presentation will highlight the diversity of West Indian *Epicrates*, introduce basic husbandry requirements, and discuss conservation issues for these snakes, which I hope will stimulate more interest in this fascinating group of boas.

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The Salamanders of Tennessee

Tennessee is home to over 10 percent of the worlds' population of salamanders. What makes this beautiful state such a hotspot for these amphibians? Explore some of the answers about these engaging creatures as we take a PowerPoint tour of the state from the Mississippi Alluvial Floodplain in west Tennessee to the scenic mountains of east Tennessee.

DEAN RIPA

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The Bushmaster: Silent Fate of the American Tropics

The largest viper in the world, reaching a length of 12 ft (3.6 m), the bushmaster has long inspired excitement and dread in the thoughts of travelers to the jungles of the New Tropics. Indeed, it is one of the few snakes known to chase people, and its bite is almost always fatal. In one Costa Rican study, 80 percent of victims died even with antivenom treatment. Although the bushmaster has earned a nearly legendary status in popular writings, it remains an almost unknown character in herpetology. Rarely seen even by dedicated field scientists, bushmasters are so secretive, so few in number, and live so deeply in the most remote forests, that many biologists spending years studying the Neotropical fauna have never actually encountered one for themselves. Their rarity, their obvious danger, and the difficulty of keeping these delicate creatures alive when taken from the wild, has made them extremely difficult to study in captivity. As such, no scientific book has yet been published on the bushmaster's real life habits. As one of the few survivors of bushmaster bite, and the first person in the world to reproduce two species of bushmaster in captivity, I will review sections of my monograph on the bushmaster's natural history. Revealed are the truly unique characteristics of bushmasters, refuting popular myths and longstanding scientific beliefs. The scientific information amassed was a labor spanning more than 25 years.

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Breeding Phenology in Rosenberg's Goanna *Varanus rosenbergi*

Over the past 15 years we have observed and recorded the life cycles of individual free ranging Rosenberg's goannas. These lizards are solitary living except during their annual summer breeding cycle. Through seasonal field studies we have documented activities and behaviours from precourtship through to pairing up, copulation, vitellogenesis, selecting and excavating an incubation chamber, egg laying and finally guarding the egg mound before returning to a solitary life style. Whereas the sequence of breeding activities tends to follow a set pattern, timing and duration of certain physical and physiological events vary from season to season.

DONALD SCHULTZ* and DEVON MASSYN

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Swaziland: Kingdom of Herps

The Kingdom of Swaziland: a small Southern African country about 1/40th the size of Texas! An amazing country which has an extremely rich natural reptile biodiversity with almost the same number of reptile species as the entire United States of America! A new revolution in herpetology has started to take place in Swaziland. The many herpetologically uneducated people of Swaziland have taken up a new respect for the snakes of Swaziland. One of the new initiatives is to educate the people on identifying and in some circumstances even handling venomous snakes! Some individuals have been trained around the country to perform reptile call outs for extra efficiency in residential reptile removals. Snakes are now not killed as often as they were in the near past. Locals are even collecting dead snakes found on the roads and bringing them in for their scientific value. Many locals are growing a keen interest in snakes and helping out with research and learning at an astounding rate.

WADE C. SHERBROOKE

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Horned Lizard Adaptations: Life as Predator, and as Being Others' Prey

One genus of lizards (13-17 species) does not represent all of life, nor all of reptilian life. Nevertheless, it is difficult to grasp the complexities of life for animals in general unless we focus on specific lives, even narrowly on parts of their lives. So, I will discuss some aspect of the ways horned lizard's adaptations, to feeding and to avoiding becoming another organism's meal, have shaped their lives. The pattern I hope to share is that no matter where one looks in nature, if issues are examined in detail, the realized complexities of designs for survival of the animals in question can be generators of wonder and awe for human minds. This may lead to respect and value, on our part, of the natural world.

Even within the genus (*Phrynosoma*) there is variation in feeding between species, but the unique body plan and ecology of all horned lizard species suggests a uniformity of evolutionary purpose. In terms of feeding, the focus is on ants as prey. And of particular interest are the seed-harvester ants (*Pogonomyrmex* spp.), whose chitinous jaws are well developed for seed husking (and biting) and whose female ovipositors are modified as stingers to carry the most toxic venom known in invertebrates. Feeding on this abundant food resource in arid areas requires behavioral, visual, morphological, physiological, and life-style adaptations, some of which will be reviewed, with a focus on my research experiences. Harvesting these small and nutrient-poor insects exposes horned lizards to the eyes of numerous predators of varying prey-capture and pre-subjugation skills. Some ingest prey whole, others dismember prey into small pieces before swallowing. How do horned lizards successfully (or unsuccessfully) deal with threats from predators as diverse in their prey capture skills as roadrunners, rattlesnakes, coachwhips, leopard lizards, grasshopper mice, foxes and coyotes? Often with adaptations of body armor, behaviors and chemicals that enhance survival of individual events, as will be illustrated.

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Rattlesnake Variations

(Abstract not available)

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***Abronia*: Notes on Captive Husbandry and Conservation**

I've been keeping *Abronia* collectively for about 6 years, but have only been successful with breeding them for four years, from 2003-2007. My goal in documenting these notes on keeping *Abronia* is primarily out of concern for the animals. I want to share my observations so that others who may have the opportunity to keep these lizards will at least have a reliable reference point from which they can work to gain their own experiences. *Abronia* have adapted to a unique environment in the niche habitats they occupy in the wild, and as a result their captive care and maintenance does take some special attention to detail, if one is to become successful working with them. I try to maintain a level of humility with the entire subject of captive husbandry, because in effect, all we are really attempting here is to mimic in as many ways as possible, what they would have in the wild (obviously without the dangers of predators and preferably without parasites). Try as we might, there is no way to duplicate their native environment exactly, but we can get close enough to be effective in producing them on a sustainable basis.

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Challenging Snake Bite Cases in Five Continents

The snake that probably possesses the deadliest venom, judged by combined mouse lethality and maximum yield, is the inland taipan *Oxyuranus microlepidota*. However, this reclusive inhabitant of arid central Australia has rarely if ever bitten anyone. In the real world of snakes biting people, the most challenging cases with which I have been involved in five continents, judged by the severity of the life-threatening medical problems they created in individual patients, were envenomings by the European adder *Vipera berus* (UK), black mamba *Dendroaspis polylepis* (Zimbabwe), king cobra *Ophiophagus hannah* (Burma), fer-de-lance *Bothrops lanceolatus* (Martinique) and coral snake *Micrurus lemniscatus helleri* (Ecuador). The species whose bites caused the greatest human morbidity and mortality in areas where I have worked are saw-scaled vipers *Echis ocellatus* in Nigeria, common lanceheads *Bothrops atrox* in Brazil, Ecuador and Peru, common kraits *Bungarus caeruleus* in Sri Lanka and taipans *Oxyuranus scutellatus canni* in Papua New Guinea. However, the greatest challenge in both categories (individual severity and numbers of human victims) is posed by Russell's vipers *Daboia siamensis* and *D. russelii* in Burma and Sri Lanka. The risk of bites in Burma will have been greatly increased by flooding caused by Cyclone Nargis.

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Scientific and Therapeutic Potential of Venom Toxins

Animal toxins have proved valuable research tools in the discovery of physiological mechanisms (e.g. snake venom procoagulant enzymes and the blood clotting cascade; snake venom neurotoxins and neuromuscular transmission). Venoms are rich in chemical compounds of enormous scientific interest (e.g. enzymes, polypeptide toxins and non-toxic proteins such as nerve growth factor and cobra venom factor). Some toxins have provided chemical structures of established or potential use as drugs. Angiotensin converting enzyme (ACE) inhibitors and bradykinin-potentiating peptides were discovered in *Bothrops jararaca* venom. Synthetic versions are now the most widely used blood-pressure-lowering/heart-protecting drugs, "ACE-inhibitors" (e.g. "Vasotec", "Accupril", "Capoten"). A new pain-killing drug "Ziconotide" has been modelled on ω -conotoxin M VII A from the venom of the marine snail *Conus magus*. "Byetta" is a synthetic version of exendin-4, a glucagon-like peptide-1 analogue from Gila monster (*Heloderma suspectum*) saliva, now licensed by the United States FDA for treatment of type-2 (adult onset, non-insulin dependent) diabetes. Many snake venom toxins are used in hospital blood coagulation laboratories (e.g. procoagulant enzymes from Russell's viper *Daboia russelii* venom used to investigate patients with bleeding/clotting disorders; *D. russelii*, *Oxyuranus scutellatus*, *Pseudonaja textilis* and *Echis* venom toxins to measure lupus anticoagulants in patients with systemic lupus erythematosus; *D. russelii* and "Protac" from *Agkistrodon c. contortrix* venom to measure protein C; "Botrocetin" from *Bothrops jararaca* venom to measure von Willebrand factor).

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Husbandry of Saw-Scaled Vipers *Echis carinatus* and Related Species

Saw-scaled vipers are small, cryptic snakes with a wide distribution across Northern Africa, Arabia, and Southern Asia. These vipers are responsible for a large number of snakebite deaths annually, and also have venom with interesting research potential. For these reasons Kentucky Reptile Zoo has endeavored to keep a colony of captive *Echis* in order to provide venom from these snakes. Due to their small size as neonates, most snakes available on the market have historically been wild caught adults, and juveniles have proven problematic to raise. This paper discusses proper de-worming and acclimatization of wild caught adults, as well as several feeding techniques for juveniles. A brief discussion of venom composition and safety is included.

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Amphibian Ark and the 2008 Year of the Frog Campaign

Amphibians are an important component of ecosystems, indicators of environmental health, and contributors to human health. They watched the dinosaurs come and go, but today between one third and one half of the world's ~6,300 amphibian species are threatened with extinction. This is the greatest extinction crisis in their 360-million-year history, and it is the greatest species conservation challenge in the history of mankind. The global conservation community has formulated a response to this crisis in the Amphibian Conservation Action Plan, and an integral part of that response is the Amphibian Ark, in which select species that would otherwise go extinct will be maintained in captivity until they can be secured in the wild. Amphibian Ark provides core services such as leading husbandry workshops, providing guidelines for species and population management, and facilitating communications and public relations. To help raise awareness and funds, we are also leading the ex situ community in a globally coordinated public awareness campaign "2008: The Year of the Frog"