

THE VIVARIUM

American Federation of Herpetoculturists Vol. 6 No. 4

\$5.95

San Esteban Chuckwallas (*Sauromalus varius*)

Taxonomy: The Making of Scientific Names

Australian Pythons (genus *Antaresia*)

Herp Photography

Casque Headed Frogs (genus *Hemiphractus*)



California Kingsnakes (*Lampropeltis getula californiae*)

HERPTIVITE™

Premium Quality Multivitamins for Healthy Exotics.



Photo by Dante Fenolio

ATTENTION DEALERS...

Fax or Mail your business card for free shelf talkers and product support!



Rep-Cal®

Quality Nutrition for Reptiles

Rep-Cal Research Labs

P.O. Box 727

Los Gatos, CA 95031

Phone: 408-356-4289

Fax: 408-356-3687

All-Natural source ingredients...

Nothing artificial.



No Vitamin A toxicity...

The FIRST Reptile Supplement that exclusively uses Beta Carotene, a unique anti-oxidant that is *naturally converted* into Vitamin A by reptiles, thus preventing the threat of toxicity inherent with other supplements.



Nutritional Sea Vegetation Base...

Provides a rich, natural source of essential trace elements and minerals (unlike other reptile vitamins which utilize non-nutrient bases and fillers).



Natural Color Enhancement...

Beta Carotene maximizes the color potential in your reptiles.



Unique...

No other reptile vitamin available today compares to the *quality, comprehensive capabilities and overall nutritional value* of Herptivite.

STAFF

Founder and President
Philippe de Vosjoli

Publisher
American Federation of Herpetoculturists

Managing Editor
Sean McKeown

Assistant Editor
Robert G. Sprackland

Publication Manager
Bridget M. Pilcher

Photo Editor
Philippe de Vosjoli

Graphic Design and Production Assistant
Andrew J. Mansker

Advertising
Peggy Lee Dillon
Andrew J. Mansker

CONTRIBUTING WRITERS

Allison Alberts, Ph.D.
Kevin Wright, D.V.M.
Dave and Tracy Barker
Winston Card
Ellin Beltz
Danté Fenolio
Randall L. Gray
Doug Mader, D.V.M.
David Perlowin
Roy Pinney
William B. Love
Thurgess Cranston

COPY EDITORS

Bob Davignon
Randall L. Gray
Wendy McKeown

AFH ADMINISTRATIVE STAFF

Nancy Alemo
Peggy Lee Dillon

OFFICERS

Legislative Action Coordinator
Gaylon Holmes

Legislative Representatives

Louis B. de Armas
Ken Foose
Glen 'Jake' Jacobsen
Julie Layton
Richard Strieber

BOARD OF DIRECTORS

Philippe de Vosjoli, President
Jeff Nunan, Vice President
Bridget M. Pilcher, Treasurer
David Perlowin, Secretary
Dan McCarron, Education Coordinator
Tracy Barker, Member at Large

Manufactured and Printed
in the United States of America.

THE VIVARIUM, (ISSN 10472665) is published six times a year January/February, March/April, May/June, July/August, September/October and November/December issues. Subscription price is \$26 for U.S. and \$32 for all foreign countries per year. Published by American Federation of Herpetoculturists, 360 N. Midway, Ste. 203, Escondido, CA 92027 Tel# (619) 747-4948. Second-Class Postage Paid at Escondido, CA and additional mailing offices. POSTMASTER: Send address changes to THE VIVARIUM, P.O. Box 300067, Escondido, CA 92030-0067.

Copyright 1995 by the AFH, P.O. Box 300067, Escondido, CA 92030. All rights reserved. No parts of this publication may be reprinted without the written permission of the AFH.

Prospective authors should write to the editorial board at the above address for guidelines. No responsibility is assumed for unsolicited contributions. Manuscripts, queries, photos, etc., are not returned unless accompanied by an addressed return envelope with proper postage. The Publisher reserves the right to edit or reject any advertisement.

The AFH assumes no responsibility for the quality of the products or the animals advertised herein.

On The Cover: Hemiphractus johnsoni. Photo by Danté Fenolio using a Minolta 9xi body, 100mm macro lens, and 3500xi flash unit with Minolta off camera and cable release chords.

FEATURES

Herpetoculture in a Changing World (Part II) 10
by Philippe de Vosjoli

Taxonomy: The Making of Scientific Names 14
by Robert G. Sprackland

California Kingsnakes (*Lampropeltis getula californiae*) 26
by Patrick Briggs and Sean McKeown



28

COLUMNS

HERPETOLOGICAL MEDICINE: Let There Be Light 12
by Kevin M. Wright, D.V.M.

THROUGH THE EYE OF THE AMPHIBIAN: Casque Headed Frogs of the Genus Hemiphractus 18
by Danté Fenolio

Q & A COLUMN: ASK THE EXPERTS 24
by Winston Card

PYTHONS & BOAS: The Southern Stars of Australia: Australia's Small Pythons 30
by Dave and Tracy Barker

HERP HORIZONS: Herp Photography 38
by William B. Love

AFH PROFILE: San Esteban Chuckwallas (*Sauromalus varius*) 52
An Arizona-Sonora Desert Museum Delight
by Randall L. Gray

DEPARTMENTS

HERP NEWS FROM AROUND THE WORLD — by Ellin Beltz 8

PRODUCT REVIEW — by David Perlowin 36

AFH BUSINESS 46

COMING EVENTS 47

CLASSIFIEDS 48

ADVERTISERS INDEX 49



19

Postal regulations require that The Vivarium publish the following: The American Federation of Herpetoculturists is a nonprofit organization with no bondholders, mortgages or other security holders owning 1% or more of the total amount of bonds, mortgages or other securities. Our purpose, function and nonprofit status of this organization and the exempt status for Federal Income Tax purposes has not changed during the preceding 12 months.

Extent and Nature of Circulation	Average No. Copies Each Issue Published Nearest to Filing Date	Actual No. Copies of Single Issue
Total No. Copies (Net Press Run)	10,000	10,000
a) Paid and/or Requested Circulation		
Sales Through Dealers and Carriers		
Street Vendors and Counter Sales	3311	3187
By Paid or Requested Mail Subscriptions (Include Advertisers')		
Proof Copies/Exchange Copies	5117	4223

c) Total Paid and/or Requested Circulation (Sum of a and b above)	8428	7410
d) Free Distribution by Mail	110	105
e) Free Distribution Outside the Mail	35	30
f) Total Free Distribution (Sum of d and e)	145	135
g) Total Distribution (sum of c and f)	8573	7545
h) Copies Not Distributed	687	2455
i) Return from News Agents	740	0
j) Total (Sum of g, h and i)	10,000	10,000
k) Percentage Paid and/or Requested Circulation (c / j x 100)	98%	98%

I certify that the statements made by me alone are correct and complete: Nancy Alemo:

N. Alemo



We Take The Work Out Of Reptile Care...

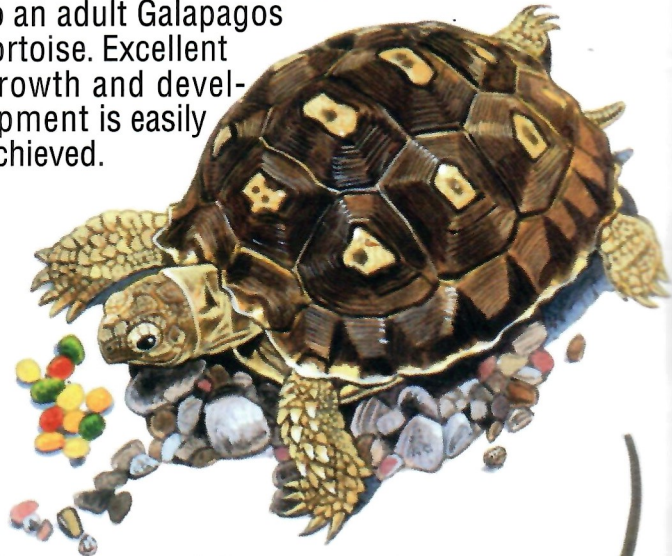
Pretty Pets has developed an easy to use food morsel that can be fed either dry or moistened. Pretty Pets products feature nutritionally balanced formulas that offer the proper calcium to phosphorus ratio for reptiles.

Multi-colored, fruit-flavored shapes in several morsel sizes make converting your pets to a prepared diet very easy. Conversion can take as little as three hours.

Teach your pets to eat a dry diet and add to your free time. You can feed a two or three day supply at a time without worrying about the spoilage associated with messy fruits and vegetables.

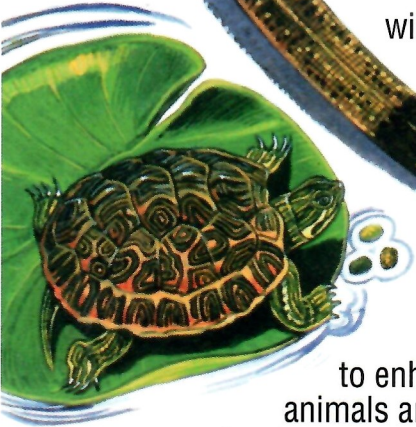
Our Juvenile Iguana formula will produce the proper growth and development for healthy internal organs. Adult Iguana is designed

With three sizes of food morsels available in Tortoise Food, you can feed everything from a baby desert tortoise to an adult Galapagos tortoise. Excellent growth and development is easily achieved.



We also carry a full line of bird food products including daily diets, breeder diets, specialty foods, and handrearing formulas.

For Your Nearest Distributor
1-800-356-5020



to enhance the life span of your animals and promotes good color development and increased activity levels.

Our Aquatic Turtle Diet is designed specifically for an aquatic situation and features a long float time, excellent acceptability, and balanced nutrition for optimum growth.

Pretty Pets®

Pretty Bird International, Inc.
Volume 6 Issue 4 THE VIVARIUM

On The Legislative Front: NIGHTMARE IN TEXAS

by

Gaylon LeCoy Holmes

Snake collection and observation took an ugly turn this summer in the area around Big Bend National Park. Every year colubrid enthusiasts travel to West Texas in search of the elusive nocturnal gray-banded kingsnake (*Lampropeltis alterna*). Oftentimes enthusiasts spend many late hours driving slowly along isolated rural roads in hopes of spotting a specimen. The success ratio is rather low due to the reclusive nature of this snake. Some herpetologists have been coming to the area regularly for many years as a form of recreation.

Recently, the National Park Service implemented a sting operation, code named "Operation Rockcut," in order to stop a purported "multimillion dollar snake poaching ring," operating in and around Big Bend National Park and national parks in Arizona. A federal undercover agent worked in conjunction with Texas Parks and Wildlife officers to catch the alleged illegal snake hunters. Texas state law prohibits "hunting" from an automobile on public roadways. Hunting is defined to include "taking." Texas Parks and Wildlife Department officers have initiated a program of issuing citations for illegal hunting to individuals observed "snake collecting" by federal undercover agents on roadways outside Big Bend National Park. Previously, the Texas Parks and Wildlife Department had generally permitted "road collecting" of snakes in Texas outside of protected areas. *Time* magazine covered "Operation Rockcut" in their August 22, 1994 issue as part of an article entitled "The Killing Fields." The National Park Service issued a news release claiming that the officers involved should be looked upon as heroes due to their efforts in what they claimed to be a highly dangerous mission.

According to the author of the article, the "kingpin" of the alleged poaching ring "gave up without a fight" and surrendered his firearm. The article further claimed that according to a "scientific study" a purported rat plague around Big Bend National Park was a result of the snake

populations being depleted due to the poaching ring's activities.

Once "Operation Rockcut" became public, the American Federation of Herpetoculturists (AFH) began receiving numerous telephone calls from members nationwide. An investigation was initiated by AFH Legislative Representatives and it became apparent early on that the story, as published by *Time* magazine, was less than accurate. It should be noted that the article was based on the news release from the National Park Service.

Information obtained by the AFH indicates the alleged "kingpin" of the purported "multimillion dollar poaching ring" is in reality a young man who works as a restaurant laborer and occasional snake hunter. He has no previous criminal record. Charged with several state misdemeanor counts, the suspect spent some time in jail which has upset at least one local justice of the peace since the state charges are not considered jailable offenses. Federal charges are pending at this time but to my knowledge have not been formally filed.

The AFH Legislative Action Coordinator has been unable to verify the existence of a scientific study relevant to the rat population in the Big Bend region of Texas. Any members with knowledge of this study are encouraged to contact the AFH. It should be noted that the species most sought by herpetologists and herpetoculturists, the gray-banded kingsnake (*L. alterna*) and the Trans-Pecos rat snake (*Bogertophis subocularis*), do not predominantly predate upon rats. The National Park Service, in response to AFH inquiries, has refused to comment upon their own press release.

A well-known herpetologist and biologist who annually travels to the Big Bend area to photograph the unique flora and fauna was stopped this summer inside Big Bend National Park by federal officers. He has informed the AFH that a cursory search was made of his vehicle and the officers found no evidence of snake hunting implements or of any other illegal activity. Several cameras were the only items in his

possession. The herpetologist was allowed to continue his photography. A few months after he returned to his home outside Texas, he received a citation in the mail issued by a Texas Parks and Wildlife officer alleging that he had violated Texas State Law by illegally using an automobile to collect snakes. The individual was then contacted and questioned by a federal agent who stated that they "knew he was a snake hunter." The state citation was inaccurate in several areas including the color of the vehicle and the license plate number, as well as listing the time of his alleged hunting violation as approximately 3:00 P.M., an unusual time of day to be searching for the gray-banded kingsnake (*L. alterna*). The herpetologist has secured legal counsel and will be returning to Texas to defend himself against the charges.

National Park Service undercover agents have been active in other parts of the country as well. National Park Service agents were apparently present at the National Reptile Breeders' Expo in Orlando, Florida and reportedly had a table at the San Diego, California, International Reptile Breeders' Convention. Offered for sale at these booths were reptiles originating from protected areas. If an unsuspecting person purchased one of these reptiles, even in total ignorance, they could then be charged with a violation of the Federal Lacey Act. The Lacey Act prohibits the interstate transport of wildlife obtained in contravention of state and/or federal law. At least one herpetologist has already fallen prey to this maneuver. He is now left to defend himself in a very expensive court case.

Investigations by the AFH indicate that little apparent justification for "Operation Rockcut" exists. Richard Strieber, a San Antonio-based attorney and an AFH Legislative Representative, points out, "There are self-sustaining captive populations of the native Texas snake species in question. This fact, together with the availability of legally obtained wild-caught specimens, makes the premise of a multimillion dollar snake poaching ring highly suspect."

Illegal collecting of reptiles and amphibians must be stopped. However, the extraordinary misinformation issued by the National Park Service should be challenged and any improper activities by its agents should be questioned. The publicity garnered by "Operation Rockcut" could have a devastating effect on responsible law-abiding herpetoculturists and herpetologists. Interested AFH members are encouraged to write the Texas Parks and

Continued on page 6

reviewed by Robert G. Sprackland

Reptiles and Amphibians

Edited by Harold G. Cogger and Richard G. Zweifel. 1992. Smithmark Publishers, 240 pages, illustrated. ISBN 0-8317-2786-1. \$25.

This book provides an overview of the biology of reptiles and amphibians. In this regard, it joins the ranks of Halliday and Adler's (1986) *Encyclopedia of Reptiles and Amphibians*, and Zug's 1993 *Herpetology* university text. *Reptiles & Amphibians* approaches the subject matter by providing a collection of contributions by eighteen of the foremost university and museum herpetologists. The editors, Cogger and Zweifel, have helped provide a consistency of style and presentation which is highly desirable, but unusual, for a multi-authored volume. However, under their expert supervision, *Reptiles & Amphibians* comes across as well-balanced and authoritative.

In format, *Reptiles & Amphibians* is most similar to the Halliday and Adler encyclopedia. This is a large book in which color dominates the top-quality illustrations. Chapters on the different taxa are prefaced by a vertical box of important statistics. Three main sections include pertinent chapters that cover a specific topic, including the world of reptiles and am-

phibians (six chapters), kinds of amphibians (three chapters), and types of reptiles (six chapters). Each chapter is written by one or more experts with long and distinguished track records as researchers. Consequently, Carl Gans (who else?) writes on tropical legless amphibians (amphisbaenians), William Duellman and Charles Carpenter cover, respectively, amphibian and reptile behavior, and Olivier Riessel writes about the origins and evolution of herpetiles.

Nitpickers will find a few errors. For example, in Bauer's chapter on lizards, he identifies the California legless lizard as *Anniella nigra*. In recent years, the familiar *Anniella pulchra* had been taxonomically changed to *nigra*, but subsequently the longer used and more familiar name *pulchra* was retained, the decision even endorsed by the herpetologist who had published the revision to *nigra*. Such footnotes in taxonomy will only serve to historically date the text, while having no real bearing—or importance—on the high overall quality of each chapter and of the text as a whole.

My only serious complaint is the brevity of the bibliography. The selection presented is far too short (22 entries) and contains a number of books of dubious value to a general reader of *Reptiles & Amphibians*, e.g., two books about dinosaurs, the IUCN *Red Data Book*, and the magazines "Airone" and "Australian Geographic." Additionally, other important bibliographic entries, including virtually

all covering herpetoculture, are conspicuously absent.

Nevertheless, the pluses of this book far outweigh its minor glitches. The photography is superb, with many uncommon and rarely seen species represented. The original illustrations are very good, and combined with the text, the reader is provided with a broad range of herpetological subjects, not merely the "same old species seen everywhere else" approach.

The text is generally to the point and written for a broad audience. All herpetological terms are defined as they are presented (though the species concept remains as unclear here as in most other recent books). Numerous sidebars amplify important themes ranging from disastrous introductions of some non-native species to the rediscovery of the second species of tuatara in 1989. The emphasis in each chapter is on ecology and natural history, thus providing an essential source book for serious herpetoculturists.

While there may be little new in this text for veteran reptile and amphibian keepers, it does condense a lot of otherwise widely dispersed information between two covers. You can't beat the price for such a well-illustrated book written by so many top herpetologists, making *Reptiles & Amphibians* a highly recommended addition to the herpetoculturist's library.



Continued from page 5

Wildlife Department, National Park Service, and their U.S. Senators and Representatives.

There are many aspects of this situation that are pending as this goes to press. Members can expect some interesting updates in the next issue.

AUTHOR'S NOTE: The ramifications of this case are such that every herpetoculturist in the U.S.A. could be affected by the outcome. The AFH fully supports all law enforcement agencies in their honest endeavor to catch and stop poachers of any kind. However, as a result of my investigations, it would appear that "Operation Rockcut" itself was not justified and was handled in a manner inconsistent with good law enforcement. Furthermore, it is my personal opinion that the majority, if not all, of the alleged violators will be found not guilty of alleged criminal activity. This opinion is based on research involving many hours of telephone interviews of people across the nation. I have yet to find

a record of a single illegal snake in this case that did not originate from a government agent. These actions by federal law enforcement agencies scare me. It must be stopped. Your voice is vital in this task. Without your visibility, our efforts may be in vain. It is time for us to lobby together as a cohesive group. Please take a few minutes to compose a well-thought-out, rational letter commenting on this case and send it to the officials listed below. Any additional questions or insights relative to this case may be directed to my attention and posted to the AFH office. Also, you can utilize the Legislative Hotline, (619) 747-6289, for additional input.

1. Honorable Phil Gramm, U.S. Senator
2323 Bryan Street, #1500
Dallas, TX 75201
2. Acting Regional Director
United States Dept. of the Interior
National Park Service
Southwest Region
P.O. Box 728
Santa Fe, NM 87504-0728

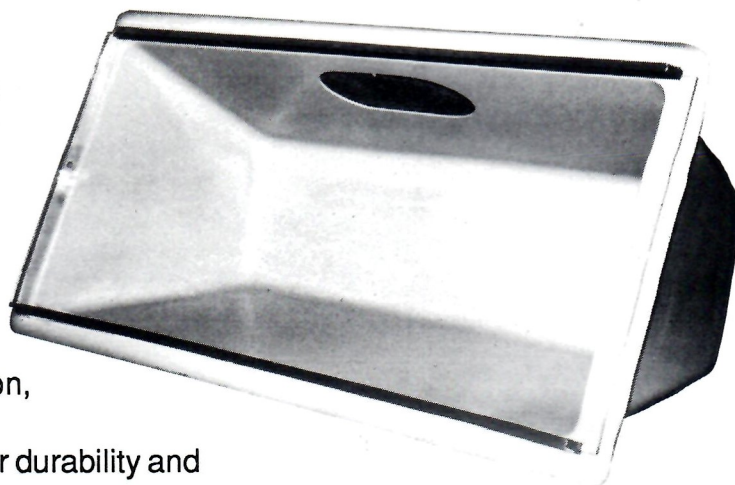
3. Harold D. Oates
Assistant Commander
Law Enforcement Division
Texas Parks and Wildlife Dept.
4200 Smith School Road
Austin, TX 78744

The AFH is looking for additional Legislative Representatives in various areas of the nation to assist in our efforts to support responsible laws and enforcement and to prevent and respond to unjust legislation and inappropriate or unethical enforcement. If you have had any experience working with regulatory agencies, your skills would be of value to us. If you are interested in finding out more about these positions, please contact me through either of the methods noted above.

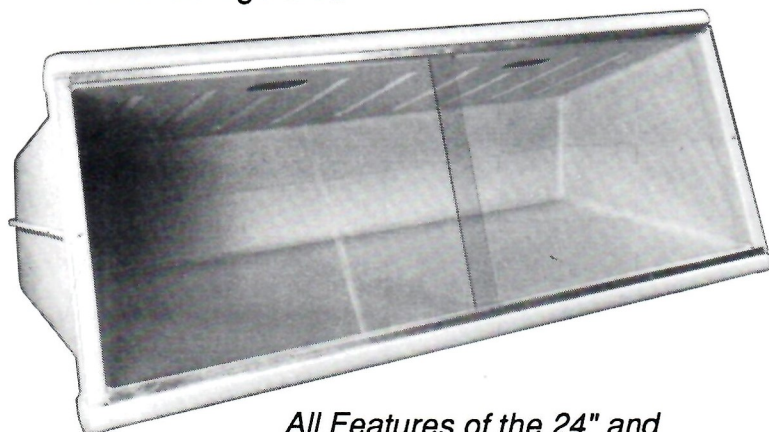
G. L. Holmes,
Legislative Action Coordinator



Reptile Cages



- Durable ivory ABS plastic construction, unbreakable under normal usage.
- 3/16" thick clear plastic sliding door for durability and unobstructed viewing.
- Sloping front for easy observation.
- No seams; all corners are rounded to facilitate ease in cleaning and provide freedom from mites.
- Odorless and stain resistant.
- Door and cage drilled on each end for padlock or pin for security. Doors and cages are template drilled for interchangeability between cages. Door holes match cage holes no matter how door is inserted.
- Top venting can be used for lighting or temperature control. Cage easily heated by resting on heating pad or using stick on type aquarium heaters.
- Flat back allows standing cage upright for reptile privacy if desired.
- Tapered form allows stacking one inside another to reduce storage area.



*All Features of the 24" and
36" Cages PLUS . . .*

- 1/4" Tempered glass by-pass doors with holes drilled for pins or locking
- Aluminum glass track for rigidity and safety for larger reptiles

As an option we offer dams (litter guards) which are installed at bottom front of cage just behind doors to keep litter from falling in door track when door is opened.

24" Reptile Cage

24" Wide, 12-1/4" High,
12-1/2" Deep
250 sq. in. Floor Area,
Single Vent

36" Reptile Cage

36" Wide, 18" High,
19" Deep
580 sq. in. Floor Area,
Double Vent

48" Reptile Cage

48" Wide, 22" High,
21" Deep
920 sq. in. Floor Area,
Double Vent

72" Reptile Cage

74" Wide, 28" High,
33" Deep
2,200 sq. in. Floor Area,
4 Vents

NEODESHA PLASTICS, INC.

TWIN RIVERS IND. PARK (316) 325-3096

P.O. BOX 371

NEODESHA, KANSAS 66757-0371

VISA/MC Accepted

HERP NEWS FROM AROUND THE WORLD

by
Ellin Beltz

REVENGE OF THE FROGS

• A 42-year-old Fresno, California man died after falling into the San Joaquin River. A stringer of bullfrogs was attached to his belt when he was found, and a companion said he had been hunting anurans. [Sacramento Bee, September 1994 from Robert Hansen]

• Researchers are studying how wood frogs survive freezing in an effort to better understand how to store human organs for transport and reuse. What they have found are a series of proteins in the frogs which function much like antifreeze does in a car radiator; ice crystals never have a chance to form. [Discover magazine, August 1994 from David A. Webb]

• Japanese customers are snapping up a new CD titled "The Frog Chorus." Solos and choruses of that island nation's 36 species of frogs are featured and the CD comes with a book of color photos. It was released by Yamato Keikokusha music publishing company in early June. [The San Francisco Chronicle, June 17, 1994 from Matthew and Laurie Aikawa.] If anybody finds out how to order this, would they please let me know?

• The disappearance or decline of certain species of frogs worldwide is keeping some researchers awake. Famous disappearances include the Costa Rican golden toad, the Australian gastric-brooding frog, northern populations of the American cricket frog, among others. Worldwide it appears as though populations of other frogs and toads are in severe decline including the Yosemite toad and the Wyoming toad. Even the formerly abundant American toad has become reduced in numbers in some areas. On the other hand, last year's midwestern U.S. flooding has provided new habitat for several species as farmers abandon flood plain agricultural areas. [The Provo, UT Daily Herald, July 19, 1994 from David A. Webb]

• Officials with the Arizona Department of Game and Fish are not pleased with the state's newest tourist attraction: licking Colorado River toads. The toads secrete bufotenine, which is listed as a psychoactive drug under state law as well as a compound called dimethyltryptamine. Undercover agents with the department have busted several people, including one man who was caught with 62 toads. [The Potomac News, August 19, 1994 from Daniel Riley]

MAN'S BEST FRIEND...

• A 47-year-old Tucson, Arizona man credits Goliath, his pet green iguana, for saving his life. The man suffers from sleep apnea and other chronic respiratory disorders. Recently, he was awakened by the lizard scratching his face and beating him around the head with its tail. He feels the reptile roused him just in time because he found he had barely enough energy left to reach his medication. [Tucson Citizen, June 1, 1994 from Mike Smith] A related story in the Salt Lake Tribune [August 19, 1994 from David A. Webb] reports that the same man and Goliath were banned from shopping at Wal-Mart even though the man claims the green iguana should be allowed under the category of "trained assistance animals" which are permitted in the stores of the retail giant. The man claims Goliath

warns him of being weak or sick even before he is aware of it himself. Unimpressed Wal-Mart workers banned the lizard anyway. Wal-Mart executives claim that assistance animals can only be dogs.

• Three Wyoming Tribune-Eagle stories sent by Bryan McCarty deal with green iguanas. First, it was the stolen green iguana [May 25 and 28, 1994] for which three juveniles were busted after leaving the lizard, taken from the local high school, alongside a road. According to witnesses, shortly afterwards, a man in a pickup truck stopped, picked up the green iguana and drove off with it. He read about the burglary, the lizard was returned, and the story ended happily. On June 11, the paper picked up an AP report which stated that four Denver, Colorado children had caught salmonella from pet green iguanas during the last three months. Headlined "pet iguanas spreading salmonella," the report advised families with young children, older family members, or persons with decreased immunity or chronic illness, not to buy green iguanas. Expect legislation in the near future.

NOT MONITORED CLOSELY ENOUGH

Mongo, the 3-ft (1 m) long monitor lizard is still on the loose in Kingston, Ontario Canada. Its 18-year-old owner was away at the time. When the family returned from vacation, they found Mongo's cage door open, and the lizard was (surprise, surprise) nowhere to be found. Cat owners in the neighborhood were warned to keep their pets inside. [The Kingston Whig Standard, July 22 and the Ottawa Globe and Mail, July 25, 1994 from Captain Wes von Papineau]

COSTLY PRANK REVEALED

Two workers admitted they placed a dead desert tortoise along the access road to the Tuachan Arts Complex being constructed in St. George, UT. After the dead tortoise was found, the foundation director suspended all vehicular traffic to the site; in effect shutting down his own project. An agreement was negotiated in which the foundation agreed to pay \$20,000 in fines for the tortoises accidentally killed last spring along the same access road. A tortoise-proof fence has been built along the road and observers regularly walk the 1.3 mile (2.1 km) section to look for tortoises. The dead tortoise placed as a "joke" was found inside the fenced perimeter. The workers were fired and an investigation is underway. All told, desert tortoises have cost the project about \$200,000 in fines, legal fees, and tortoise-protection measures. [The Salt Lake City, UT Deseret News, August 25-26, 1994 from David A. Webb]

MYSTERY TURTLE IDENTIFIED

BY READER

Dan Leavitt of Washington State wrote to identify the turtle species being protected by the Thai government which appeared in an earlier column. Dan writes: "By your description, the turtle would most likely be the large batagurine turtle, *Callagur borneoensis*. Adult males develop a prominent bright red mark on top of the head and snout bordered by light cream and dark colors during the breeding period. *Callagur* ranges from Thailand southeast through parts of Malaysia. Its eggs and flesh have been used extensively by the people of this region causing depletion in many regions. These turtles are purely vegetarian. As you stated, there is a slight

resemblance in markings and foot webbing to the American diamondback terrapin (*Malaclemys terrapin*)."

DITCH THE ALLIGATOR

Writer Bob Morris recently suggested changing the state reptile of Florida from the alligator to the green anole. He wrote: "This lizard is a noble animal. Unlike its larger cousin, it has never posed for a tacky postcard, been humiliated by pseudo-wrestlers at roadside tourist attractions or lunched on a wayward poodle." [The Lakeland, FL Ledger, July 30, 1994 from Melody Smith]

SHORT CROC-TALES

• A 4-ft (1.2 m) alligator caught by a fisherman in the Iowa River, Iowa was airlifted and released into the Savanna River in Georgia. Officials believe that the animal was released into the Iowa River by a person or persons unknown. [USA Today, September 2, 1994 from David A. Webb]

• Kansas City, Kansas, which has a dangerous animal ordinance, gave a local woman two days to get rid of her 36 crocodilians, some of which she's had for 28 years. The woman did school presentations with the animals and local animal welfare officials said she takes good care of them. [USA Today, August 12, 1994 from David A. Webb]

• A crocodile farm has been founded in southeastern France. The first of its kind on that continent, the farm uses cooling water from the nearby Eurodif-Tricastin nuclear power plant to warm its hot houses. [The Ottawa Sun, August 11, 1994 from Captain Wes von Papineau.]

• Farmers in the African nation of Zimbabwe (formerly Rhodesia) have secured a lucrative market deal from Hong Kong, Thailand, and Malaysia for Nile crocodile meat and hides. Last year 40,000 crocodile skins worth \$3.13 million were exported. [The Salt Lake City Deseret News, June 6-7, 1994 from David A. Webb]

• A 265-lb (120 kg) American alligator bit two trainers at the Sunken Gardens tourist attraction in St. Petersburg, Florida. Attendance increased after the first attack although a spokesperson for Sunken Gardens, perhaps somewhat naive about human behavior, credited the increase to advertising, not morbid curiosity. [San Francisco Chronicle, August 6, 1994 from Matthew and Laurie Aikawa]

• A Saltwater crocodile in Australia recently took a chunk out of a chef who regularly cooks crocodile meat. The croc lost several teeth, the man was covered with puncture marks and deep scratches. [The Provo, UT Daily Herald, July 21, 1994 from David A. Webb]

GHASTLY DISCOVERY LEADS TO ARREST

A decaying human body was found floating in a canal in Fort Lauderdale, Florida. It was missing both arms and a leg. Nearby floated an 8-ft (2.4 m) American alligator. Authorities shot the gator and found the arms and the leg inside the beast. However, the medical examiner reported that the man was beaten to death and was already dead when the alligator decided to recycle him. Police arrested a man who later confessed to the killing. [USA Today, July 26 and The Salt Lake Tribune, September 2, 1994, both from David A. Webb]

ASSAULT WITH A HARMLESS SNAKE

A couple was robbed in the wee hours of the morning by two men brandishing a black snake in

Camden, NJ. The *Trenton-Metro Times* [August 14, 1994 from Paul Mitchell, Jr] reports the couple was walking down the street when four men in a late model car pulled up. Two men leaped out of the car and threatened the couple with the snake, then the other two got out and robbed them. They took \$20 in cash, and a \$30 personal stereo and a \$95 watch. A police supervisor said, "I'm sure when the officer went off duty he told his wife and neighbors, 'Yeah, I had this case the other day, robbery at point of a snake.'"

STUDY THREATENED BY NEIGHBORS

Alan and Barbara Savitzky are in the second year of a multi-year radiotracker study of the locally threatened canebrake rattlesnake (*Crotalus horridus*) at the Northwest River Park near Chesapeake, VA. Recently, two of the snakes swam across a creek to some adjoining farmland. The landowners prevented the Savitzky's from entering their property and have complained to a state legislator about the study, the snakes, and the government intrusion onto their land. According to the local farm bureau's president, farmers are worried that if the snakes remain on their land, the state will tell the farmers what they can and cannot do on their own property. A Game and Fish Department official said "We only wish the farmers would let the Savitzkys have access to their land so we can learn more about an animal we know very little about." [Washington *Times*, September 1, 1994 from Carl A. Hess]

WAKE UP AND SMELL THE BOA

A young couple in Colorado Springs woke up at 4:00 A.M. one morning to find a large snake, misidentified as a "20-ft (6 m) boa," nearby on the floor. It had apparently entered their apartment through a window. The 120-lb (54 kg) animal was removed by police. No one had reported a snake of this description missing. [June 22 *USA Today* and Salt Lake City *Deseret News* from David A. Webb, Delaware County *Daily Times* from Kim Sanders, and June 23, 1994 Wyoming *Tribune-Eagle* from Bryan McCarty]

OOOH, BAD PUNS!

• Tom Quinn, of the Salt Lake *Tribune*, used up every ophidian metaphor, simile, pun, and word play he'd ever heard on a recent story. Quoting Tom: "The scales of justice tipped against two teenagers after they rolled snake eyes in their attempt to purloin a python . . ." The teens were busted, the 2-ft (60 cm) long juvenile Burmese python was unhurt and returned to the pet store from which it had been taken. [August 9, 1994 from David A. Webb]

• A U.S. Army soldier recently transferred from Germany back to "the States" is "in squeeze over snakes" reports the Tacoma, WA *News Tribune* [July 16, 1994]. Apparently, the soldier may face the end of his 9-year Army career as well as confinement in the stockade because his wife tried to take her two pet baby pythons home from Germany on a military-chartered airplane. The officer in charge got wind of the plan and notified the soldier that he couldn't transport the reptiles home on the plane. However, the wife snuck them aboard without the husband's knowledge, she said. She initially stuffed the snakes under her blouse and walked through the metal detector, later transferring the reptiles to a canvas carryall. The burlap bag attracted the attention of fellow passengers because it was writhing in flight. The wife said the snakes are part of their family. Contributor Marty Marcus wrote, "This certainly supports the old saying, 'There's a right way, a wrong way, and the Army way.'"

SNAKE COLLECTING CONTROVERSY

Contributor Gerald Keown sent a series of clippings about reptile collecting in the state of Texas. The *Austin-American Statesman* [June 13, 14, and 15, 1994] reports that collectors eagerly seek gray-banded kingsnakes (*Lampropeltis alterna*) in west

Texas. The prices for hatchlings are from \$100-150 wholesale and up to \$300 retail. Most collectors say they only capture a snake or two a year, then take them home and breed them to their captive animals. The owner of a reptile store in Austin was quoted, "It's the demand. When you convert these reptiles into a business, you have to look at supply and demand." He said he could see the need for some sort of permit and control system to monitor sales and track reptile transport. According to the article, Texas only requires a standard hunting license and has no restrictions on harvesting, no reporting requirements, and no ongoing studies of the biology and habitats of frequently collected snake species, including the gray-banded kingsnakes. A reporter with the paper spent time snake hunting with collectors and reported many snake collectors were in violation of the general Texas hunting law which prohibits using motor vehicles to hunt animals from state roads. A representative of the Lone Star Chapter of the Sierra Club said, "I'd like to see collection of reptiles be done only for scientific purposes. This issue keeps coming up with non-game species. You either need to monitor the taking or you need to prohibit possession of any kind." A visiting California snake hunter said that he thought only captive-bred offspring should be allowed to be sold. Another collector said that he thought reptile stamps (like duck stamps) should be sold and the revenue generated be used for herpetile conservation in the state. He said, "I would like to see it legislated and controlled. It's a resource. Use it wisely." Perhaps the first action will be for Texas to sell herpetile hunting licenses and non-commercial as well as commercial collection licenses.

SEA TURTLE BRIEFS

• Authorities posted a \$10,000 reward for anyone violating sea turtle protection laws after 33 dead sea turtles were found washed up on Texas beaches. [USA *Today*, September 7, 1994 from David A.

Webb] You can contribute to the reward fund. Contact HEART, P.O. Box 681231, Houston, TX 77268-1231 for more information.

• Three green sea turtles are being studied by means of radio-sized satellite transmitters strapped to their shells. A researcher pointed out that much of the life history of these marine reptiles is unknown, and hopes that this study will shed some light on just where they spend their time when they are not nesting. [The Provo, UT *Daily Herald*, August 18, 1994 from David A. Webb]

• The Earth Island Institute and Ralph Nader's Public Citizen organization filed suit against the U.S. Commerce Department in federal court in San Francisco. They accuse the agency of ignoring the destruction of endangered sea turtles by shrimpers in the Gulf of Mexico. The plaintiffs said that fishermen either do not use or disable their Turtle Excluder Devices (TEDS), and often mutilate any turtles that drown in their nets to look like the turtles are the victims of shark attacks. A spokesperson for the Earth Island Institute said that when the feds cracked down, sea turtle deaths have dropped sharply. [The Las Vegas *Review-Journal*, September 14, 1994]

Thanks to everyone who contributed to this column and to Steven M. Coogan, Melody Smith, John Barrie, Michael Perez, Marty Marcus, Ann Townsend, and Eric R. Skov. This column is reader-supported. What you send is what I use; and I've used all of it. The file folder is empty. Don't wait to contribute! Send clippings with the date and publication slug and your name firmly attached (or photocopied or send the whole page) to me in care of the AFH at the address on the masthead.



The Reptile Service

Trying our best
to get you the best
Reptiles, Amphibians,
Mammals & Arachnids
at the best possible price. . .
. . .and succeeding!

The Reptile Service

740 S. Deerfield Ave. #1

Deerfield Bch, Fla. 33441

(305) 428-8005 Fax: (305) 698-0012

HERPETOCULTURE IN A CHANGING WORLD

On the Relationship between Herpetology and Herpetoculture

A herpetoculturist can be a herpetologist and a herpetologist can be a herpetoculturist, but not all herpetoculturists are herpetologists and not all herpetologists are herpetoculturists.

There has been some confusion regarding the relationship between herpetoculture and herpetology that I feel needs to be clarified. Recently, arguments have been presented in an effort to separate herpetoculture and herpetology—perhaps in some cases, for the purpose of demeaning private herpetoculture and criticizing private herpetoculturists. I think it is worthwhile to explain these two terms and clarify how these fields are different from each other.

Definitions

Herpetology: 1. The branch of zoology that deals with amphibians and reptiles. 2. The scientific study of the biology of amphibians and reptiles. 3. The study of amphibians and reptiles including their anatomy and taxonomy, history and behavior, and also embracing ecology, biochemistry, immunology, zoogeography, toxicology, and computer science.

Herpetoculture: 1. The interdisciplinary field involving the captive husbandry and propagation of amphibians and reptiles. 2. A variation derived from the definition of agriculture: the science, art, and business of raising and breeding amphibians and reptiles. 3. The interdisciplinary study and implementation of methods allowing for long-term husbandry and multigenerational breeding of amphibians and reptiles.

Considering these definitions, the differences should be obvious. Implied in herpetology as it is understood in academic circles is the application of the scientific method—including the gathering of data and data analysis. A good overview of the current status of herpetology can be found in Gans (1992). There are certain protocols for the gathering of data in herpetology depending on the objectives of the research. For example, taxonomy requires different types of data from either ethology or ecology.

Some of the protocols for gathering data can be applied to herpetoculture.

Herpetoculturists who gather detailed data—on feeding, shedding, weight gain, number of eggs laid, weight of eggs, weight and length of hatchlings, growth rates, minimum adult weight for sexual maturity, temperature and lighting, sex ratios of hatchling from eggs incubated at different temperatures, and so on—are practicing herpetology. In the course of their research, some herpetologists set up experimental conditions that include herpetoculture; thus, some herpetologists are also herpetoculturists. The differences between herpetology and herpetoculture can be narrowed to differences in the scope of the fields of study and differences in the scope of the methodologies used.

Herpetology includes a wide range of subjects related to the biology of amphibians and reptiles that can be studied and investigated using the protocols for scientific study and research in a particular area of specialization. Herpetologists can specialize in morphology, physiology, biochemistry, taxonomy, ethology, ecology, etc. On the other hand, herpetoculture is a specialized interdisciplinary field which focuses on the captive husbandry and propagation of amphibians and reptiles. One primary difference between herpetology and herpetoculture is the range of the fields of study; herpetology is a much broader field than is herpetoculture. Another major difference is in the range of methodologies used. Herpetology is limited to the application of methods which comply with certain established protocols of the scientific method in the various areas of specialization. When compared with herpetoculture, the range of methods used in herpetology is considerably narrower.



When well designed complex naturalistic vivaria will elicit a sense of wonder and a consciousness of consciousness in nature. Art by Kevin Anderson.

Some herpetoculturists apply a methodology characteristic of herpetology. Others use more archaic visceral, empathic, and artistic methodologies. For example, some herpetoculturists talk about “reading” their animals, suspecting that something is not quite right, having intuitions or gut feelings. Herpetoculturists commonly design enclosures for their animals based on unorthodox methodologies involving an individual sense of aesthetics and environments, and they construct these enclosures on the basis of empathic or intuitive feelings about the animals. Some herpetoculturists have good success breeding their animals by simply following these visceral impulses. In addition, herpetoculturists often find anecdotal information—not necessarily supported by methodical gathering of data or by the keeping of detailed records—to be of significant value. The diversity of herpetocultural methods can be summarized by *pono*, a principle of Huna (ancient Hawaiian wisdom) which states, “Effectiveness is the measure of truth.” (In this case, animal health, longevity, and reproductive success prove the merit of the methods used.) Clearly, the range of

methodologies will be broader in herpetoculture than in herpetology.

Because they do not abide by the protocols of herpetology, private herpetoculturists are sometimes confronted by holier-than-thou attitudes of some members of the academic community. This narrow-minded point of view is unfortunate, as are prejudices against paradigms and world views that do not necessarily coincide with those of science. The majority of people who keep amphibians, reptiles, and other animals, keep them for reasons that have little to do with scientific study. Their reasons have more to do with how the animals affect their experience of living, of being human, and of their relationship with the world in which they

live. To ignore or demean the psychological and sociological effects of animal keeping and exposure to the natural world, is to deny some of the broader dimensions of our humanity. The successful conservation of biological diversity will depend as much on how biodiversity influences the feelings and quality of life of human beings as on any scientific or detached paradigms of the world. As I mentioned in the last issue of *The Vivarium*, it will require broad-minded, interdisciplinary, and complex wisdom to effectively deal with the current state of affairs in our world—including the rapid rate of change, the burgeoning human population, the loss of natural environments and species diversity. The policies and goals of many wildlife enforcement and regulatory agencies including, at times, the U.S. Fish and Wildlife Service (USFWS) and the Convention on International Trade in Endangered Species (C.I.T.E.S.), do not always reflect these changes.

It is unwise to suggest a schism or a major difference in ideals between herpetoculture and herpetology. Both fields (and remember that they can overlap when the scientific method is applied) have a primary goal in common—that amphibians and reptiles continue to be part of human experience for years to come. Ultimately, for those of us who choose to focus on the scaled and slimy-skinned creatures (whether herpetologists or herpetoculturists), our experience of the world is broadened, our lives are enriched, and in some way, we are transformed.

Herpetology and herpetoculture fulfill different needs (these needs can overlap). Herpetoculture can fulfill needs that are social, biophilic, personal, financial, educational, spiritual, scientific, conservation-oriented, and so on. For people with a broad, complex, and interdisciplinary outlook, herpetoculture can be seen as a relatively recent expression of a civilization in troubled and fast-changing times, on a planet where the natural world—the oldest relationship that our species has had—appears to be on the verge of leaving our field of relationships. Herpetoculture is a way to regain a sense of bearing; it is one expression of an attempt to regain a lost sense of relationship with the natural world. Presented in a responsible manner—such as in an educational context (particularly in conjunction with naturalistic vivaria)—herpetoculture resonates with deep human feelings of yearning for connection with a greater whole (a complex of consciousness). The right to fulfill these needs should *not* be limited just to the academic and zoo communities. In the long run, exposure of the general public to amphibians and reptiles raises awareness and ultimately elicits caring in people. Herpetology fulfills needs that are scientific, educational, conservation-oriented, environmental, medical, and so on. There are possible zones of synthesis between herpetology and herpetoculture; their combined impact—in terms of causing positive changes in the quality of life (human and nonhuman)—has potential that we can only begin to imagine. Both herpetology and herpetoculture, if practiced in a responsible manner, can play important and complementary roles in the conservation of biological diversity and natural environments. We should spend more time finding ways that we can work together rather than bickering over whether the needs and methodologies of one field have more value than those of the other.

Biophilia Reexamined

I am currently involved in research for a book I am coauthoring with Terence McKenna on the role of hallucinogenic plants in the emergence and evolution of human consciousness. In the course of my research it became apparent that my interpretation of the origins of biophilia required reexamination. A review of the literature on human evolution revealed a sequence in the origins of biophilia that I had previously missed. An understanding of the origins of biophilia has far-reaching implications which include

enabling us to understand differences in the ways human beings experience and interpret the world; also, an explanation of the rise in the popularity of herpetoculture, and strong counter arguments to the growing and increasingly dangerous animal rights movement.

Autocentric biophilia

A turning point in the evolution of humankind involved changes in climate and landscape that converted what was once tropical forest into savanna and grasslands. In order to survive in this new habitat, our forest-dwelling vegetarian ancestors became opportunistic omnivores. They developed a keen awareness of other species (extraspecies consciousness); not only of plants, but also of animals. This is the origin of what I call autocentric biophilia. I adopted the word autocentric—a mode of perception in which the emphasis is on the subject, on sensory qualities, on

feelings in relation to perception. Edward O. Wilson's original definition of biophilia, "The innate tendency to focus on life and lifelike forms," has often been misinterpreted as "love of nature" or "love of wildlife." Autocentric (one could probably also use anthropocentric) biophilia is a ten-



To know is to become is to be transformed. Herpetoculture satisfies personal and biophilic needs that underlie a yearning for relationships with the world in which we live. Photo by Chris Wood.

dency to focus on wildlife as a means to the fulfillment of personal, familial, and social needs—whether as food or as sources of usable materials. The origins of autocentric biophilia date back more than 2.5 million years. This type of biophilia is very much tied to needs; as the needs of a civilization are fulfilled, this type of biophilia typically wanes.

Autocentric biophilia has had a disastrous impact on wildlife. Jonathan Kingdon, in his thought-provoking book *Self-Made Man* (1994), makes a good case for human beings as a significant cause of the extinction of macrofauna, including almost all of the Australian giant marsupials. In *The Biophilia Hypothesis*, Jared Diamond presents a study of the devastating impact of New Guinea hunter-gatherers on the local fauna. The once-hypothesized model of hunter-gatherers living in ecological harmony with nature has, in many areas, not stood up to scrutiny. Today the continued effects of autocentric biophilia can be witnessed in many different countries—from the local markets of Asia and Tropical America to the compounds of animal collectors. Although some authors have placed blame on Judeo-Christian biblical rhetoric for the destructive exploitation of nature by human beings, this trend can be traced back to the origins of humankind. The story of Genesis can be interpreted to include an acknowledgment of this type of biophilia. This initial, exploitative self-serving focus on other forms of life should not, however, be seen as negative; it was critical to our emergence as a novelty-seeking and eventually other-centered form of consciousness.

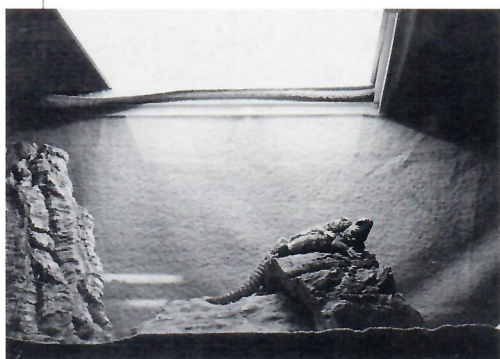
Continued on page 42

LET THERE BE LIGHT

by
Kevin M. Wright, D.V.M.

The proper illumination for health and reproductive success for any species of herptile is subject to more debate and controversy than any other physical parameter addressed in captive husbandry. In herpetoculture, undiluted sunlight has been the gold standard by which all artificial light sources are compared, yet few published field observations of herptile species document the behaviors with respect to objective quantification of light, such as radiant flux density (i.e., the amount of energy received on a unit surface in a unit time). Of those species with well documented field data, a relatively small portion of the daily time budget is spent in undiluted sunlight.

Thus an artificial source that exactly duplicated the noontime sun's spectral range and radiant flux density would have to be used with caution or else a vivarium's inhabitants could end up with various physical injuries such as sunburn and corneal cataracts.



Metal halide lighting systems and self-ballasted mercury vapor lamps are being used by herpetoculturists for their ultraviolet output and high-intensity light. This vivarium contains *Uromastyx ocellatus ornatus*. Photo by Chris Wood.

The challenge for the herpetoculturist is to choose from among the available artificial light sources with the object being the provision of a radiation spectrum that encourages the complete range of natural behaviors (e.g., feeding, basking, courtship, etc.). This in turn should be based on the

known natural history of the species as well as climactic data for known localities within that species' natural range. Although personal fieldwork is an invaluable key to discovering a species' natural history, it is often more practical and convenient to pursue armchair research through the consultation of appropriate texts as well as people familiar with the species. Unexpected facts may be discovered in unlikely sources (e.g., *Journal of Biochemistry* has

published research documenting nutritional needs of various herptiles, a *FODOR's Travel Guide* often will provide concise climate information from major cities within its geographic focus), and these facts may in turn provide vital clues to a successful captive management plan. Quite often, popular concepts of certain species may limit the design of the vivarium—individuals of many nocturnally active species, (e.g., captive prehensile-tailed skink (*Corucia zebrata*) may also spend a small portion of the day basking, a fact that should not be overlooked when designing a captive management program. Sungazers (*Cordylus giganteus*) come from a climate where frosts are not uncommon during the winter, thus year-round exposure to high-intensity light and heat is completely unnatural for this species. The more that is known about a species, the more likely the herpetoculturist will be able to successfully design an ap-

propriate lighting program for that species.

Much of the debate about artificial lighting is focused on the influence of ultraviolet radiation on calcium metabolism. Several excellent reviews of this topic are available, but the fact is that the ultraviolet needs of most animals, and especially amphibians and reptiles, are unknown. Given the paucity of data on the spectral requirements for vitamin D activation and the current level of lighting technology, prevention of metabolic bone disease in herptiles is best accomplished by proper dietary levels of vitamin D₃ coupled with proper levels of calcium and phosphorus (The diet should have at least 2% calcium, with a Ca:P ratio of at least 1.5:1.). Full-spectrum and ultraviolet light sources should be used for their other effects on behavior and metabolism (e.g., reproductive cycling), but at this time they should not be relied upon to prevent metabolic bone disease.

Each species of amphibian and reptile probably has a spectral exposure cycle that is of greatest benefit to that species. I use the term spectral exposure cycle to encompass two aspects of electromagnetic radiation balance in relation to an organism: a) the changing proportions of the frequencies of electromagnetic radiation encountered during a 24-hour period (i.e., the variation in radiant flux density of a given electromagnetic frequency over a



"Third wave" naturalistic vivarium. With the increased interest in creating complex systems for keeping amphibians and reptiles, herpetoculturists are experimenting with a variety of lighting systems. Photo by Chris Wood.

24-hour period), and b) the insolation, the absolute amount of electromagnetic radiation encountered in each 24-hour period (often referred to as "photoperiod").

It is well documented that the different frequencies of electromagnetic radiation show different levels of penetration, absorptivity, and emissivity, depending on

whether the photons of light encounter a forest canopy, water, grass, rocks, or soil. Thus certain anatomical traits may be specific adaptations to the electromagnetic radiation encountered in an animal's environment. Oil droplets act as filters in the eyes of some species—the presence of these filters could affect that animal's color perception if conditions do not match its natural spectral exposure cycle. The anatomy of the retina, with regards to the relative abundance of rods and cones, as well as the pupillary morphology, can have significant impact on the necessary lighting regimen of an enclosure for similar reasons. For species that are extremely visually oriented, this could affect food recognition and other behaviors. Even discounting the effect of ultraviolet light on calcium metabolism, it may play an important role in herpetoculture for other reasons. The absorptivity or emissivity of a herptile's epidermis varies for different bands of electromagnetic radiation. Certain parts of an anole's dewlap may reflect a large portion of ultraviolet light thus revealing an otherwise invisible pattern that could provide important cues for conspecifics. On the other hand, an Old World chameleon may absorb a large portion of ultraviolet light and reflect infrared wavelengths instead.

The radiant flux density may not be as important as is a relative change in its value throughout the day. This fact is often used in the nocturnal facility of a zoo where the light is dim during public hours (approximating a moonlit night), and the intensity is brighter at other times so that the animal shifts its activity period to correspond to the period of least illumination. Some facilities accomplish the same behavioral shift of the displayed animals by using different frequencies of the electromagnetic spectrum during the night cycle. This is often accomplished by using blue filters over standard fluorescent or incandescent bulbs. Red filters used to be commonly used but there is evidence to suggest that this has contributed to ocular problems in some animals. The use of these blue or red lights may have significant behavioral effects that are as yet undocumented. One can provide periods of darkness, periods of low illumination, and periods of high illumination. The moonlight bulbs designed for marine aquariums may have some utility in the herpetoculture of nocturnal species.

A 15-year-old study suggests that among five sympatric species of frogs, there is a niche partitioning based on particular aspects of the spectral exposure

MAIL ORDER PET SHOP

CALIFORNIA & NEW YORK

TELEPHONE	DIRECTORY
Product Info. & Order Line	800 - 366 - 7387
Customer Service FAX	800 - 326 - 6677
California Local	800 - 877 - 3834
New York Local	916 - 928 - 0215
	516 - 595 - 1717

Herpetoculturists!

*Tired Of Having To Buy Your Supplies
From A Number Of Outlets Instead Of Just One?*

Well, We Are Just The Place That You Have Been Looking For.

A Few Samples Of Our Product Line

Reptile Sexing Probes (Set Of 6).....	(H4003) ... \$ CALL
Flexwatt Reptile Heat Strip.....	(H5101) ... \$ CALL
(11 inches wide / 20 watt / Priced per Foot)	
Flexwatt Reptile Heat Strip.....	(H5102) ... \$ CALL
(3 inches wide / 6 watt / Priced per Foot)	
Microclimate Thermostats #DLI.....	(H5202) ... \$ CALL
Green Iguana Manual.....	(IG0404) ... \$ CALL
Aspen Bedding (1700 Inch).....	(H6837) ... \$ CALL
Super Preen (125 gm.).....	(H3062) ... \$ CALL
Reptivite (16 oz.).....	(H3113) ... \$ CALL
Nekton Rep (20 gm.).....	(H7412) ... \$ CALL
Phillips BL - Blacklight (24 Inch).....	(H3121) ... \$ CALL
Zeigler Cricket Diet.....	(H3181) ... \$ CALL
Zeigler Iguana Diet.....	(H3180) ... \$ CALL

FREE Shipping

FREE FAX Lines

FREE Catalogues

FREE Order Lines

FREE Customer Service

FREE Product Information

NO Minimum Orders

We Accept:

MasterCard - Visa - Discover &
American Express

Next Day and Second Day Air
are available.

WESTERN REGION
1338 North Market Blvd
Sacramento CA 95834

1 - 800 - 366 - 7387

24 Hours A Day - 365 Days A Year

EASTERN REGION
250W Executive Drive
Edgewood NY 11717

cycle (Jaeger and Hailman, 1981). The implications of this study have largely been overlooked in the herpetocultural literature. The spectral exposure cycle of captivity must correspond to the animal's activity cycle to elicit typical behaviors such as feeding, mating, combat, and thermoregulation.

With the wave of herpetoculture being toward naturalistic settings (e.g., "third wave vivaria"), it must be understood that the plants within a vivarium have their own spectral needs that may not be in keeping with the needs of the herptile inhabitants of the vivarium. If a plant does not appear to be thriving, another species of plant may be more suited to the vivarium. Another option is to use potted plants, and rotate different plant specimens through the vivarium as needed, allowing each specimen time to recover under conditions more suited to its needs.

For species that appear to have more stringent spectral requirements, the herpetoculturist is advised to invest in a light meter. Relatively simple ones are in use in horticulture, and can be used to document the intensity of artificial illumination within a vivarium. Multiple readings should be taken from sites throughout the vivarium (e.g., at basking sites and at ground level). More sophisticated (= ex-

pensive) devices are required for specialized measurement (i.e., measurement of specific frequencies such as ultraviolet radiation). Although the spectral needs of a given herptile species may be unknown, documentation of a regimen that is used for successful long-term reproduction would be eagerly received by other people working with that species.

Illumination and its effect of herptile behavior is a complex field and an important aspect of long-term husbandry and breeding. Lighting regimens that have worked for various species need to be more thoroughly documented, as do regimens that have not worked so that other herpetoculturists will try something different. The exotic pet supply industry has produced a number of artificial light sources in the past several years, each touting the merit of its "unique" design. Herpetoculturists have an unparalleled opportunity to research and comparison shop among products in order to develop a program best suited to the particular herptile species with which they work.

Literature Cited

Jaeger, R. J., and J. P. Hailman. 1981. Activity of neotropical frogs in relation to ambient light. *Biotropica* 13(1): 59-65.



TAXONOMY: THE MAKING OF SCIENTIFIC NAMES

Where do they come from, what do they mean, what rules govern them?

by

Robert George Sprackland

The process of naming living organisms, with an eye on illuminating relationships, when done in a scientific manner, is termed **taxonomy**. Taxonomy is a branch of a more encompassing field called sys-

tematics, which seeks not only to name, but to determine degree of relationships and path of evolutionary history. Though many systems were tried and rejected over the centuries, the pressing need for a stable nomenclature continued, and was initially codified in a manner acceptable to most scientists in 1753 by a Swedish botanist named Carl von Linné (Latinized as Carolus Linnaeus).

Europeans of the mid-eighteenth century, so Linné named his plants (and, later, animals) in Latin. Additionally, as a "dead" language, Latin was not likely to evolve new meanings for established words (consider the English "bad" as used by your mother and as used by, not about, your favorite musical group; or "hot" describing first, temperature, or next, venomous snakes). Using Latin apparently disturbed no one of consequence, and is the main reason the system quickly became accepted and used around the world. (It might also be argued that a second, equally compelling reason for Linné's success is that his classification was based upon the sexual organs of plants. In the puritanical and sexually repressed Western societies of the time, almost any mention of sex, however peripheral, caused a book to become a sensation, which may help explain

why Linné's books were always sell-outs.)

This Swedish father of taxonomy did not only restrict his names to words of Latin origin, thus accounting for the predominance of words of Greek origin for many animal genera, but insisted that any word chosen must be **Latinized**. For example, the lizard genus *Basiliscus* derives from the Greek words for "king beast," *Shinisaurus* is named for Chinese Professor Shin, and *Phelsuma* is the Latinized version of a Dutchman's name. While all the world's taxonomists adhere to this format, it does often provide some interesting, almost unpronounceable epithets. Names may honor people, places, anatomical features, chromosome structures, color patterns, or sheer nonsense. The famous English zoologist John Edward Gray (who essentially founded the herpetology section of the Natural History Museum in London during the mid-

1800s) was a self-taught man unfamiliar with classical languages. Many of his coined names, such as *Corucia* and *Egernia* mean nothing specific in any language. However, they conform to the rules of being pronounceable and Latinized, and so are valid generic names. In short, the names can come from anywhere, so long as they are translated into the Latin format. Linné must have been pretty impressed with himself, for he even Latinized his own name into the more familiar Carolus Linnaeus.

What Do The Names Mean?

We can see from Gray's example that the names don't necessarily have to mean



Green tree python (*Morelia viridis*). Photo by Jim Bridges and Bob Prince.

tematics, which seeks not only to name, but to determine degree of relationships and path of evolutionary history. Though many systems were tried and rejected over the centuries, the pressing need for a stable nomenclature continued, and was initially codified in a manner acceptable to most scientists in 1753 by a Swedish botanist named Carl von Linné (Latinized as Carolus Linnaeus).

Where Do Scientific Names Come From?

Linné's system was not an earth-shaking new idea, rather it was taken and modified from a variety of earlier ideas of uniting organisms based on shared, observable similarities, and looking beyond superficial anatomical similarities or habitat preferences. Linné's greatest contribution came in the language of his system. He circumvented the nearly universal jingoism of the time, that any nomenclatural system be in a particular modern language of the day by choosing a "dead" language to speak the parlance of living things. Latin was well-known to most educated

Some Names Translated From Latin (L) and Greek (G)

Common Name	Genus	Translation
Death Adder	<i>Acanthophis</i> (G)	Spine snake
Mole Salamanders	<i>Ambystoma</i> (G)	Cup mouth
Dart Poison Frog	<i>Dendrobates</i> (G)	Tree climber
Leopard Gecko	<i>Eublepharis</i> (G)	Good eyelids
Anaconda	<i>Eunectes</i> (G)	Good swimmer
Gila Monster	<i>Heloderma</i> (G)	Studded skin
Kingsnakes	<i>Lampropeltis</i> (G)	Bright scales
King Cobra	<i>Ophiophagus</i> (G)	Snake eater
Bearded Dragons	<i>Pogona</i> (G)	Bearded one
Softshell Turtles	<i>Trionyx</i> (G)	Sharp claws

Trivial Names	Translation
<i>acanthurus</i> (G)	spiny-tail
<i>ater</i> (L)	black
<i>atrox</i> (L)	hideous
<i>bivittatus</i> (L)	two-spotted
<i>fuscus</i> (L)	brown/cloudy
<i>maculatus</i> (L)	spotted
<i>magister</i> (L)	teacher
<i>occidentalis</i> (L)	western
<i>melanocephalus</i> (L)	black-headed
<i>reticulatus</i> (L)	net-like
<i>viridis</i> (L)	green

anything. Sometimes the names are coined simply for the amusement of the namer and a few specialists. For many groups, species are named for zoologists or people who have contributed to zoology. More than half the named monitor lizards are so named for people (as is the longest complete dinosaur skeleton,



Striped basilisk (*Basiliscus vittatus*). Photo by Jim Bridges and Bob Prince.

Diplodocus carnegii, named for the Pennsylvania entrepreneur/philanthropist who financed the expeditions that lead to its discovery). Usually, just one person is honored by the trivial name: *mertensi*, *kingii*, *glauerti* being examples. Rarely, more than one person is so honored, as in *Varanus kingorum*, for the unrelated Max King and Dennis King (had they been named Smith and Jones, the epithet would be a more unwieldy *smithjonesorum*, or, if coined by a Latin scholar, *smithionesorum*, as there is no "j" in classical Latin). Most frequently, zoologists name animals so that the name reflects some unusual feature or identifying characteristic. Thus, many species have been termed blue-tailed (*cyanura*), unspotted (*immaculata*), collared (*col-laris*), flat-tailed (*platyurus*), keeled (*carinatus*), short-tailed (*curtus*), rock-dwelling (*thalassinus*), cloudy (*nebulosus*, *obscura*), or striped (*vittatus*). The choices for names are unlimited, but I provide a short list of some more familiar generic and trivial names. Note that most generic names are from Greek, while trivial names are more often Latin. If you are really interested in translating your beastie's names, read one of the books listed at the end of this paper.

Rules Governing Names and Naming

It often seems as if the scientific community has a vested interest in confusing people by periodically changing scientific

Continued on page 16

Custom Cages

We Also Carry a Complete Line of Supplies Including:

- Dry Goods
- Heating
- Lighting
- T-Shirts
- ...and More!

Call for Our Free Catalog!



14 Dry Run Road • River Falls, WI 54022

1-800-766-6354

1-715-425-8888

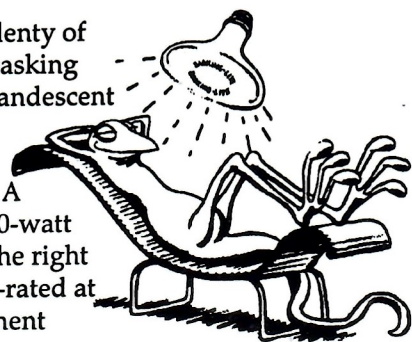
High Quality Reptile Housing

FROM THE MAKERS OF



Reptiles Relish Basking-Lite™

Reptiles always get plenty of "sunshine" for daily basking with Basking-Lite incandescent lamps. Use one to replicate your pet's natural environment. A choice of 30-watt or 50-watt bulbs lets you select the right size for your pet. Life-rated at 4,000 hours. Replacement warranty included.



New Aquatonic®
fluorescent for saltwater tanks.

DuroLite
NATURAL LIGHT FOR LIVING THINGS

DIRECT TO DEALERS **800-688-5826**

Written by Professionals
for the
Serious Herpetologist

**A VETERINARY GUIDE TO
THE PARASITES OF REPTILES:**

Vol. 1, Protozoa

by Susan M. Barnard & Steve J. Upton
Orig. Ed. 1994 ISBN 0-89464-832-2
164 pp. \$26.50

**REPTILE CLINICIAN'S
HANDBOOK:**

**A Compact Surgical
and Clinical Reference**

(based on BIOMEDICAL AND SURGICAL
ASPECTS OF CAPTIVE REPTILE HUSBANDRY)
by Fredric L. Frye

B.Sc., D.V.M., M.Sc., CBiol, FIBiol,
Fellow, Royal Society of Medicine

Orig. Ed. 1994 ISBN 0-89464-783-0
288 pp. Paper \$24.50

FEATURES

- Compact Size
(4 3/4" X 6")
- Wire-O Binding

INCLUDES

- Formulary of Drug Dosages
- Conversion Tables
- Index and Cross References

**SNAKES OF THE UNITED
STATES AND CANADA:**

**Keeping Them Healthy in Captivity,
Volume 2, Western Area**

by John Rossi & Roxanne Rossi

Orig. Ed. 1994 ISBN 0-89464-808-X
Price Not Set
(Volume 1, Eastern Area is also available)

In Preparation for 1995

**REPTILE AND
AMPHIBIAN VARIANTS:
Colors, Patterns and Scales**

by H. Bernard Bechtel
ISBN 0-89464-862-4

CORAL SNAKES:

Biology, Identification, Venoms
by Janis A. Roze
ISBN 0-89464-847-0

**Please call or write for our
FREE Herpetology Catalog**

Domestic orders, please add \$5.00 for first book, \$1.50
each additional (Paper - \$3.00 for the first book, \$1.00 each
additional) to cover shipping charges. Foreign
shipping costs available upon request.



KRIEGER

PUBLISHING COMPANY

P.O. Box 9542, Melbourne, FL 32902-9542
(407) 724-9542
Direct Order Line (407) 727-7270
FAX (407) 951-3671

names. After all, why else would American water snakes no longer be *Natrix*, or subspecies suddenly become species. Isn't taxonomy supposed to **stabilize** names? Arguments over such seemingly minor alterations can become quite acrimonious, not only between taxonomist and herpetoculturist, but between taxonomists from opposing viewpoints. Governing the naming of species is a series of rules, published as the International Code of Zoological Nomenclature (ICZN). Here is an outline of the major rules:

All scientific names are required to consist of two parts. The first part is the always-capitalized genus name, and the second is the never-capitalized trivial name. Combined, they form a species name, which is always to be italicized or underlined. A genus may have one species or many; if it has only a simple species, then it is a monotypic genus. If it has many, it is species-rich (**not** "speciose" a word often used by evolutionary biologists who are, ironically, unaware that "speciose" is not evolved from the same root as "species," but is from the root for "specious"; or as a linguist would say, the words "species" and "speciose" are not etymologically consanguineous). Any named group—species, genus, family, order, etc., is also called a **taxon** (plural, taxa), but "taxon" is not a particular rank, not always equated with "species" or "subspecies."

A genus or species must be described from a particular "typical" specimen that is preserved in a museum or university collection where other researchers may examine it. This original specimen is called a **type**. A **holotype** is the single specimen designated by a describer as the name-bearer for the new species. If there are many specimens available, one is designated a holotype, and the others listed as **paratypes**. If the types are lost or destroyed, a researcher may designate a replacement, or **neotype**.

Names, of course, must be Latin or Latinized, and the genus and trivial names are to be in gender agreement, e.g., *Crotaphytus*, a masculine term, must go with *collaris*, not the feminine *collara*. This is primarily an esthetic holdover from a time when all scholars actually knew the words to *Gaudiamus Igitur*, and though no careers are in danger over publishing names not in agreement (there is provision for correction in the Code), it does seem to irk some people. Such is the price of tradition!

One of the most important rules concerns **priority**, thus assuring credit to the

original namer of a taxon. According to the Code, the first published name is the proper name for an organism, barring very unusual circumstances. There is a famous example among the dinosaurs: *Brontosaurus*. The discoverer of skeletal remains of "*Brontosaurus*" was also the discoverer, a year earlier, of the giant *Apatosaurus*. It later turned out that "*Brontosaurus*" was just a different part of the already-named *Apatosaurus*, so *Brontosaurus* became a junior synonym. Technically that means that both beasts are the same critter, and if for any reason it should be shown that *Apatosaurus* is not a valid name (e.g., if it had already been used for, say, a beetle, or another dinosaur), then *Brontosaurus* would become the next available, and correct, name. For now, however, it's still *Apatosaurus*. In order for the Code to allow a later name to take priority, there must be a strong case that doing so will maintain taxonomic stability. For example, if a species is given a name in an obscure journal, then named by someone else in a more widely read journal, the researcher rediscovering the original article may petition to suppress this senior name in the interests of stability. Just such a case occurred in the 1980s with the California legless lizard (*Anniella*), with the result that the later (and familiar) name was retained.

In taxonomic accounts, the scientific name is often followed by the name of the original describer, and the year of publication of the name, e.g., *Varanus teriae* Sprackland, 1991. If, however, the original description placed the new species in a different genus, the describer's name is placed in parentheses: *Varanus indicus* (Daudin, 1802). In this case, Daudin described the lizard as *Tupinambis indicus*.

Perhaps the greatest confusion occurs when generic and species names are changed. After so many years of stability and familiarity with the green tree python as *Chondropython*, why is it now changed to *Morelia*? The answer is simple: after careful reviews by anatomists, it was determined that green tree pythons are not really significantly different from similar Australian species, and should be included in the older named genus *Morelia* (for the detailed studies, see Underwood and Stimpson, 1990, and Kluge, 1993).

More frequently, species names are changed (usually just to agree in gender with genus names), sometimes with confusing results. For example, G. Storr named a large Australian monitor lizard *Varanus panoptes* in 1980, but had not

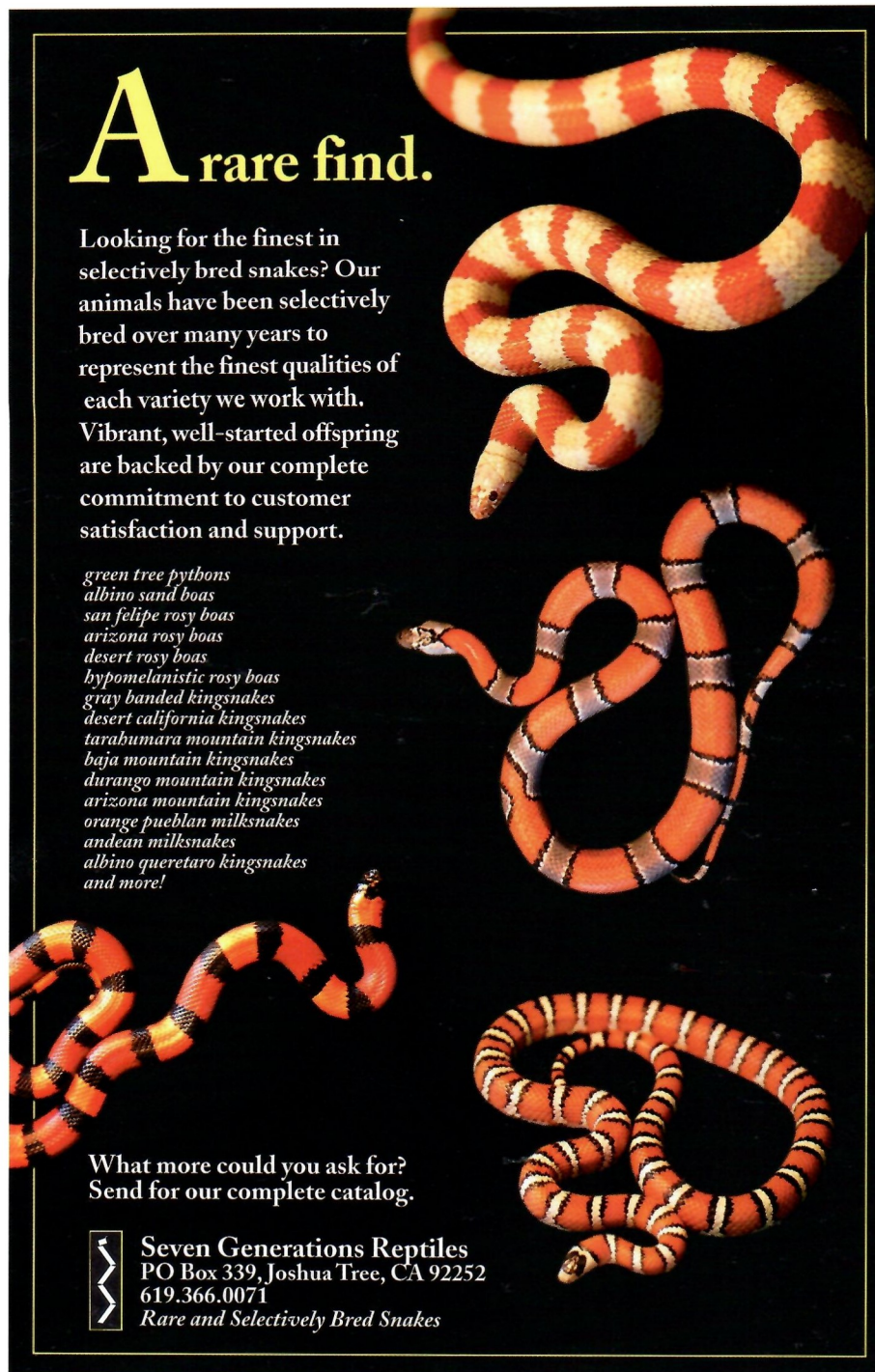
examined type specimens of similar species, including *V. gouldii*. Later, German varanid expert Wolfgang Boehme, examined the types in the British Museum of Natural History (itself recently, and officially, renamed "The Natural History Museum") and noted that Storr's *panoptes* was identical with Gray's type for *gouldii*. Thus, *panoptes* ceased to exist as a species (except on some price lists), and its use is no longer justified. Unfortunately, the taxonomic literature and popular publications are not always aware of each other, resulting in the perpetuation of outdated or junior names.

One other important rule governing taxonomy is that new names or changes of names must be presented in published format. Mimeographs, e-mail, and other distribution systems do not constitute "formal" publication, and neither do graduate theses. So far, unrefereed publications can and do print new names, though the scientific community has found many legitimate errors in such presentations, and may urge the ICZN to close that loophole. Sometimes, changes are published in such a forum without much (if any) explanation, leading to vociferous debates, long printed rebuttals, and a bit of name calling among the antagonists (see Villa, 1993). There are safeguards, and a later reviewer may change a name back to an old name, or come up with something completely new. In short, there is always something requiring attention, another name to clarify, another species to describe for the first time.

Like it or not, good taxonomy is important to good herpetoculture. If you want to breed animals, it really helps to know if they are from the same species! If names change, don't see it as cause for despair—rather, it signals that something new has been learned, giving you and the taxonomist more data. You may each use this information differently, but you are also both better off for having it now. Remember, too, that for every species you find particularly vexing to reproduce in captivity, the taxonomist is similarly confounded trying to find out just where in the vast animal kingdom that species truly belongs.

Useful References

- Borrer, Donald J. 1971. Dictionary of Word Roots and Combining Forms. Mayfield Publishing Co., Palo Alto, CA.
- Gotch, A. F. 1986. Reptiles—Their Latin Names Explained. Blandford Press, Dorset, England.
- International Code of Zoological Nomenclature, Third Edition. 1985. London.
- Kluge, Arnold. 1993. *Aspidites* and the phylogeny of pythonine snakes. Records of the



A rare find.

Looking for the finest in selectively bred snakes? Our animals have been selectively bred over many years to represent the finest qualities of each variety we work with. Vibrant, well-started offspring are backed by our complete commitment to customer satisfaction and support.

green tree pythons
albino sand boas
san felipe rosy boas
arizona rosy boas
desert rosy boas
hypomelanistic rosy boas
gray banded kingsnakes
desert california kingsnakes
tarabumara mountain kingsnakes
baja mountain kingsnakes
durango mountain kingsnakes
arizona mountain kingsnakes
orange pueblan milksnakes
andean milksnakes
albino queretaro kingsnakes
and more!

What more could you ask for?
Send for our complete catalog.

 **Seven Generations Reptiles**
PO Box 339, Joshua Tree, CA 92252
619.366.0071
Rare and Selectively Bred Snakes

Australian Museum, suppl. 19: 1-77.

Quicke, D. L. 1993. Principles and Techniques of Contemporary Taxonomy. Blackie Academic & Professional, London.

Underwood, G. and A. Stimpson. 1990. A classification of the pythons (Serpentes, Pythoninae). Journal of Zoology, London 221: 565-603.

Villa, Jaime. 1993. Nomenclature changes in herpetology. The Vivarium 5(2): 22-33.



109 West Cherryhill Road • Reisterstown, MD 21136

Phone & Fax: 410/ 526-4184

1000's of Discount Books and
Related Herp Supplies.

Send legal size S.A.S.E. for a Free catalog.
Dealer Inquires Welcome



CASQUE HEADED FROGS

of the genus *Hemiphractus*

by
**Danté Fenolio and
Michael Ready**



The forest seemed impenetrable looking on from the waterways we traveled along in our motorized canoe. Photo by Danté Fenolio.



Anolis transversalis was an attractive find along a trail in primary forest where *Hemiphractus* was encountered. Photo by Danté Fenolio, Terry Vandeventer, and W. W. Lamar.



Fearing that our canoe was really a large predatory fish, shovel-nose catfish of the genus *Pseudoplatystoma* leaped from the water attempting to escape; occasionally landing in the canoe. Photo by Danté Fenolio.

Mile after mile of lush, Amazonian forest passed by in a blur. Seated in a motorized canoe, we barreled up the Rio Momon, a small tributary river of the immense Amazon in Peru. Hidden by the evening shadows, partially submerged logs scattered throughout the waterway proved no challenge for our experienced guide. Bats fluttered along the water, their wing tips skimming the glassy surface. Mistaking our boat's shape and shadow for the image of a huge predatory fish, the arapaima, nearby shovel-nose catfish leaped frantically from the water in an attempt to flee the area. Quite a number of these fish landed in the canoe with a loud thump as they hit the bottom of the boat.

Arriving at the foot of a trail passing through secondary (regrown) forest, we set off for a night hike. The vegetation grew thick with tangles of vines and shrubs. Without consciously noticing the area where the habitat distinctly changed, we suddenly found ourselves in primary (virgin) forest. Bearing exceptionally tall trees and very little undergrowth, primary forest is the exclusive biome for many native herpetile species. Herp hunting in this undisturbed habitat is incredibly exciting with the possibilities of "once in a lifetime" discoveries. The South American anole (*Anolis transversalis*) and lichen-mimicking frog (*Osteocephalus buckleyi*) were the first of many interesting finds.

As our flashlights lit the foliage to the sides of the trail, one of the beams fell upon two eyes peering back through a stand of saplings. Perched about 2 feet (0.6 m) above the ground, the animal looked away, revealing a perfect side profile of its unusual head. Could it be? Two hornlike extensions protruded from the large, triangular head distinguishing this frog from all others. There was no doubt about it. It was a casque headed frog of the genus *Hemiphractus*. Keyed out later as Johnson's casque headed frog

(*Hemiphractus johnsoni*). This spectacular species is poorly known to herpetologists.

The word *Hemiphractus* is derived from the Greek words *hemi* meaning "half" and *phraktos* meaning "protected." The name *Hemiphractus* refers to the casqued head, characteristic of this genus of frogs, which affords some protection to the front portion of the animal (Duellman, 1970). Frogs of this genus have gone through considerable taxonomic change since the first species was described by Spix in 1824 as *Rana scutata*.

At various times, there have been more than a dozen different species of frog described and delegated to *Hemiphractus* and other now nonexistent genera. Two of the previously existing genera were *Cerathyla* and *Ceratohyla* which were incorporated into *Hemiphractus* by Trueb in 1974. Proposed relationships between these frogs and other groups of frogs over the years have been varied. Some taxonomists in the 1800s felt that *Hemiphractus* should have been allied with the leptodactylids, a large assortment of primarily terrestrial frogs (Trueb, 1974). The superficial resemblance between the leptodactylid frogs of the genus *Ceratophrys* (horned frogs) and casque headed frogs of the genus *Hemiphractus* accounts, in part, for the erroneous taxonomic correlation.

Casque headed frogs were first properly associated with arboreal frogs in 1862 by Peters (Trueb, 1974). Currently, *Hemiphractus* is still allied to the arboreal frogs and is placed in the family Hylidae. The genus is also assigned to the subfamily Hemiphractinae. Along with *Hemiphractus*, there are several other Latin American genera of frogs included in the Hemiphractinae: *Gastrotheca* (marsupial frogs), *Stefania*, *Flectonotus*, and *Cryptobatrachus*.

Several characteristics are present in all of the genera collectively forming the subfamily Hemiphractinae. All species either store exposed, fertilized eggs directly on the back or fertilized eggs are



Hemiphractus johnsoni may be the rarest of the Casque Headed Frogs. Photo by Danté Fenolio.



A *Hemiphractus johnsoni* "gaping." This is a defensive measure noted in four of the five *Hemiphractus* species. The mouth is held open in an elaborate display warning would-be predators and antagonists of their formidable bite. Photo by Danté Fenolio.



A female *Hemiphractus johnsoni* is carrying eggs on her back depicting the parental care this group is noted for. Photo by David Wake.



A *Hemiphractus bubalus* encountered in Pastaza, Ecuador. Photo by R.W. McDiarmid.



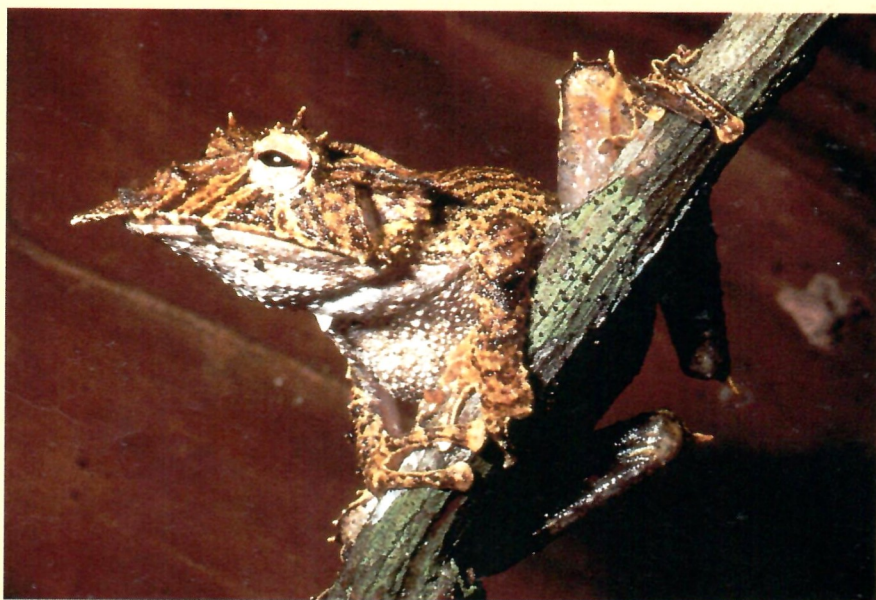
Hemiphractus fasciatus is the only species of Casque Headed Frog ranging into Central America. Photo by W.E. Duellman. Courtesy of the University of Kansas.



Hemiphractus scutatus is the only primarily terrestrial species of *Hemiphractus* and lacks the expanded toe pads that the other four species have. Photo by R.W. McDiarmid.



The yellow to orange mouth cavity and tongue is displayed through the gaping response. At least three of the five species of *Hemiphractus* are adorned with these colorful mouths. Photo by R.W. McDiarmid.



Hemiphractus proboscideus is one of three Casque Headed Frog species known to have a brightly colored orange or yellow tongue and mouth cavity. Photo by Danté Fenolio and Terry Vandeventer.

Subfamily Hemiphractinae



Another member of the Hemiphractinae, *Cryptobatrachus fuhrmanni* carries eggs on its back just like *Hemiphractus*. Photo by W.W. Lamar.



Flectonotus fitzgeraldi, a member of the subfamily Hemiphractinae, carrying eggs in specialized compartments on her back. Photo by John C. Murphy.



Gastrotheca (Marsupial Frogs) are probably the most common frogs in captivity from the subfamily Hemiphractinae. *Gastrotheca cornuta* is a seldom seen inhabitant of the forest canopy. Photo by George Grall. Courtesy of the National Aquarium in Baltimore and Jack Cover.



Gastrotheca guentheri, formerly *Amphignathodon guentheri*, is a large frog bearing true teeth. Photo by R. McDiarmid.

kept in a specialized brood pouch or pouches (Trueb, 1974). All species within these genera provide some form of parental care. In some species tadpoles are deposited into water sources. In other species, juvenile, fully developed froglets emerge directly from the dorsal pouches. Yet, in other species, fully developed froglets hatch out of exposed eggs.

Since Trueb's extensive revision of *Hemiphractus* in 1974, the genus has contained only five species with no additions to date. The species currently included are: *Hemiphractus johnsoni*, *H. proboscideus*, *H. bubalus*, *H. fasciatus*, and *H. scutatus*. The genus ranges from Panama south to the upper Amazon Basin in Colombia, Peru, Ecuador, Brazil, and into Bolivia. These frogs inhabit primary lowland, montane, and cloud forests at elevations of approximately 825 feet (250 m) to 6300 feet (1910 m) (Trueb, 1974). The group exploits a variety of niches.

Trueb (1974) pointed out that there are likely groupings within the genus *Hemiphractus*. *Hemiphractus proboscideus* and *H. bubalus* form one group within the genus and are primarily arboreal. They

have a more disruptive body style and pattern with smaller amount of skull ossification. They are usually encountered perched on branches approximately 6 feet (2 m) or lower to the ground. *Hemiphractus johnsoni* is considered a transitional species between the two major groups and is a semiarboreal generalist. This species is thought to most closely resemble the common ancestor from which all the frogs in this genus evolved. *Hemiphractus fasciatus* and *H. scutatus* form the second group. Both species have a more cryptic body style and pattern. They also have the greatest amount of skull ossification. *Hemiphractus fasciatus* resembles *H. johnsoni* in that it too is semiarboreal but *H. scutatus* is primarily terrestrial, lacking the extended toe pads which all the other species have to some degree. Semiarboreal species are usually found in the leaf litter by day and perched in low foliage by night.

Casque headed frogs feed primarily on other frogs, lizards, and invertebrates. Stomach content analysis has shown that they consume both diurnal and nocturnal organisms (Duellman, 1970). Further study may show hemiphractines to utilize a "sit

and wait" hunting method by day and a strategy of active hunting by night. Unwary prey items have little chance once grasped as casque headed frogs are adorned with strong jaws and a modified mandible forming a fang toward the front of the jaw (Duellman, 1970).

These anurans are famous for their aggressive behavior and accounts of painful bites have been recorded. Charles W. Myers made mention in field notes of a bite he received from *H. fasciatus* where the frog "held on like a vise" making "two puncture marks which bled real blood" (Trueb, 1974). These frogs are equally famous for their threat displays. When threatened, most of the species will "gape," jaws wide open, displaying their enormous mouths and formidable cutlery. In addition, some species possess a brightly colored yellow or orange tongue which stands out immediately when gaping begins.

Proving to be bizarre in many ways, their reproductive process is no exception. The mature female *Hemiphractus* secretes mucus from specialized glands in her back. This secretion forms a matrix into which the eggs are deposited (Duellman and

Trueb, 1985). The exact process by which the eggs are positioned and fertilized is not known. It is speculated that the male places the fertilized eggs onto the female's special pad. In the closely related genus *Gastrotheca*, males are known to help place the fertilized eggs into the dermal pouches of the females (Trueb, 1974). The pouch serves to protect the larvae as they develop. Female casque headed frogs, however, carry the eggs completely exposed on the back.

Finding females carrying clutches or with depressions from eggs still present in the skin has been a rare occurrence for herpetologists. Clutch size seems to vary from 2 to about 14. In 1917, Stejneger described a female *H. fasciatus* with depressions from at least 14 eggs. Comparatively, there have been 5 females of the related species *Stefania evansi* found carrying the following numbers of young or eggs on the back: 11, 12, 21, 22, and 24 (Jungfer and Boehme, 1991). There seems to be no specific time of the year that is favored for breeding.

The following account of the hemiphractine developmental and structural process was derived from Trueb (1974) and Duellman (1970). Embryos undergo direct development while in the egg. In other words, the larvae form and fully metamorphose within the egg to hatch out as juvenile froglets. Adding to the complexity of the reproductive process, each developing larva has two pair of bell-shaped gill structures. These structures are attached to the body, at the neck, by two pair of chords. These gills conform tightly enough to the pit in the female's back to act as an anchor; holding the egg and its precious cargo in place. Larvae, bell-shaped gills, and the attachment chords are all packaged up within the egg. Duellman and Trueb (1985) explained that the gill structures completely surround the larvae and the yolk, acting as a conduit of oxygen exchange with the parent female's highly vascularized epidermal tissue. The specialized gill structures accomplish all necessary respiration for the larvae, but there is no evidence that any nutrients are transmitted through these means from the mother to her young. The gills are separated from the female's back by a thin egg membrane.

This form of parental care acts to ensure the survival of a large number of the young. All genera included in the Hemiphractinae exhibit similar forms of parental care leading taxonomists to consider the subfamily as a line of evolutionary descent that is completely distinct from all other neotropical anurans (Trueb, 1974).

CAPTIVE BRED WILDLIFE FOUNDATION

P.O. Box 515
Portal, Arizona 85632
(602) 558-2458



JEFF GEE
&
KIM GEE

TORTOISES Galapagos, Radiated, Spurred, Leopard, Brown, Red-Footed
TURTLES Albino Red-Ear Sliders, Amazon Yellow Spot Sideneck
LIZARDS Caribbean Island Iguanas, Leopard Geckos
BIRDS Emus, Rheas
PYTHONS Albino Burmese, Carpet, Childrens, Indian, Ringed
BOAS Brazilian Rainbow, Dumerils, Rosy, Argentine, Columbian
MILKSNAKES Honduran, Sinaloa, Pueblan, Mexican, Nelsons
KINGSNAKES Albinos, Gray-Banded, Mexicana, Blotched, California
RATSNAKES Albinos, Trans-Pecos, Texas, Black, Corns, Asian
GOPHERSNAKES Albinos, Striped, Pacific, San Diego, Sonoran, Pines
SUPPLIES Books, Frozen Rodents, Heat Pads, Probes, Hide Boxes
T-SHIRTS Same as our Logo (gray, heavy, 100% cotton, M,L,XL) \$13
PRICE LIST Please Send Your Complete Name & Address and 2 Stamps.

Unfortunately for hobbyists, *Hemiphractus* has not been a genus regularly imported through the exotic pet trade. In the mid-1980s, one of the large importing houses in Southern California received a shipment containing a number of specimens from either Ecuador or Peru. Reports of how the animals acclimated to captivity were grim. They reportedly refused food items, eventually starving to death. Some hobbyists have kept these frogs with success, however, although there appears to have been no captive reproductions.

Information on *Hemiphractus* in captivity is scant. The following is a compilation of captive husbandry notes and observations derived from conversation with amphibian herpetoculturists and institutions worldwide: All species in the genus seem to ship poorly if conditions are anything less than perfect. Ideal shipping procedures would require shipping the frogs in a Styrofoam box within an outer cardboard box for temperature insulation. A "heat pack" or a "cold pack" should be attached correctly inside, depending on local seasonal temperature variations so that temperatures in the shipping container are consistently in the 65-75°F (18-24°C) range. The frogs themselves should be packed in Styrofoam deli cups, each with one or two air holes punched in the top. In-

THE REPTILE RESOURCE INC.

7507 SOUTH TRAIL #64
SARASOTA, FL 34231

Specializing in the
Captive Propagation of Reptiles

• BOAS • LIZARDS
• PYTHONS • COLUBRIDS

Write for price list **MARC BIRKNER**
(owner)

Carolina Mouse Farms

P.O. Box 382
Salem, SC 29676
803-944-6192



MICE AND RATS

Frozen
Competitive Prices
Discounts for large quantities

For a Free Price List write or call
Darrin & Libby Reed

FOR SALE: Wally Broda and Gerry Merker are proud to present for sale two high-quality snake posters: **Snakes of the Western United States** (second edition with updated Latin names) and **Milk Snakes of North America**. Both posters feature 20 snakes in full color (many of which are rarely photographed). These posters are \$9.95 each (or both for \$16.95) POST-PAID. For more information, please contact: Broda-Merker Enterprises, P.O. Box 51163, Pacific Grove, CA 93950. **ALSO AVAILABLE:** the ultimate alterna poster: **Geographic Variation in the Gray-banded Kingsnake, *Lampropeltis alterna***. Like the other two posters, this features 20 different animals from the range of this highly variable kingsnake (cost: \$12.95 post-paid). To commemorate the release of this poster, a special LIMITED edition has been printed for sale. This poster has been printed on a heavier stock (suitable for framing) and has been numbered (a total of 100 have been printed - hurry, less than 50 copies are left). The cost of the LIMITED alterna poster will be \$29.95 post-paid. To purchase any of the above posters, please send check or money order to: Broda-Merker Enterprises, P.O. Box 51163, Pacific Grove, CA 93950. PLEASE allow three to five weeks for delivery. Those making orders outside of the United States must make special arrangements by correspondence to determine shipping costs.



DEALER INQUIRIES WELCOME. NEW, NEW, NEW: A beautiful photograph (8" x 12") of the nation's rarest rattlesnake the Animas Mountain Rattlesnake (*Crotalus willardi obscurus*) is now offered for sale. The photograph will be matted and is available for \$25.95 POSTAGE PAID. Only 30 of the photographs have been made.

Broda-Merker Enterprises, P.O. Box 51163, Pacific Grove, CA 93950
DEALER INQUIRIES (408) 372-5426

FLORIDA INTERNATIONAL REPTILE SHOW

Presented in Cooperation with the
Tampa Bay, Suncoast and Manasota Herpetological Societies

**Tampa Convention Center
September 30 - October 1**

- Complete Selection of Captive-Bred Reptiles on Sale
- Amphibians, Cages, Supplies, Books, Artworks & More
- Herp Photography Contest & Display
- Guest Speakers • Book Signings

Bill Haast
Miami Serpenterium Labs
Dr. Richard Funk
Amazon Veterinary Services
Paul Beaver, Ph.D.
Amazonia Expeditions
Rick Hudson
Fort Worth Zoo
Peter Weis
Weis Reptiles

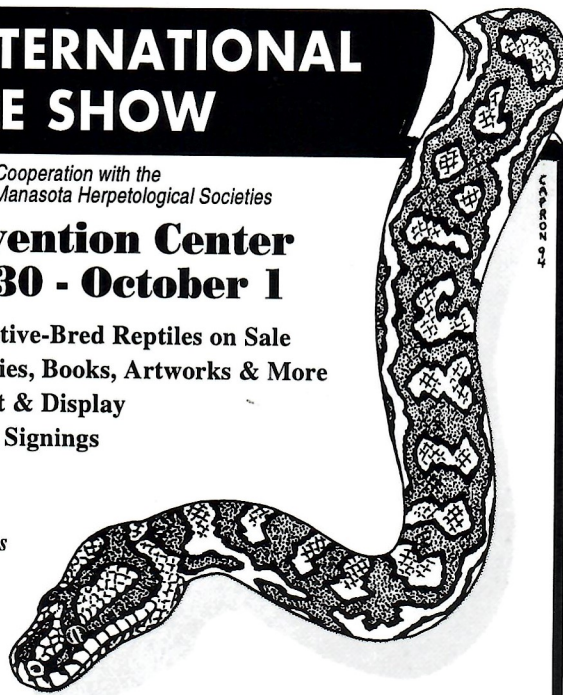
For more information:
Doug Wagner
P.O. Box 2725
Dunedin, FL 34697
PH: (813) 736-1368

**Vendor Booths
Available Now
75,000 Sq. Ft.
Reserved!**

Hotel Reservations:
Holiday Inn
1-800-275-8258
1-800-465-4329
(Request show rate)

Show Hours: Sat.-Sun. 10 A.M.-5 P.M.

Speakers: Sat. 7-11 P.M. Holiday Inn



side the cup, include a slightly dampened (nonbleached) piece of paper towel on the bottom. Surround each of the deli cups with newspaper in the box to prevent the cups from being shaken around during travel. Also, plan the routing so that the shortest travel time possible is utilized to reduce the stress of travel on the frogs. Adverse shipping conditions will greatly increase the likelihood that the surviving frogs will refuse to eat and/or that other complications may arise, leading to their demise.

Once received, the *Hemiphractus* frogs should be fed a variety of foods, including other small, non-toxic frogs, **captively reproduced** if possible. Conversely, they should not be fed wild-caught frogs from continents other than South America as this might introduce harmful internal parasites foreign to these anurans. Other food items can include soft-bodied insects, small newborn (pinkie) mice, and earthworms, if they will accept them. Once established, these frogs are not shy feeders and are very accepting of new food items. It may be necessary to treat the frogs for internal parasites especially if the frogs are eating regularly, but appear to be losing weight.

A well planted vivarium is required with a shallow, 1/2 in (1 cm) deep dish of clean, chlorine- and chloramine-free water. These frogs need a regular humidity of approximately 70%. The use of an ultrasonic humidifier may aid in maintenance of this humidity. It is also important that the vivarium be appropriately equipped with drainage so as to avoid stagnant, potentially problematic water sources.

Due to *Hemiphractus* being "frog-eating frogs," it is recommended that only one specimen be housed per vivarium. Costly mismatches in size could prevent any chances for future reproduction projects. Individual frogs should only be introduced in a carefully observed reproductive attempt. Lighting should be on a timer to establish a 12-hour day/night cycle. Provide a variety of hiding places such as overlapping branches or cork bark, inverted half coconut shells with an opening cut into the side, etc. Once a favorite perching spot is chosen, each frog will typically remain there for days on end. Under these situations, it is very clear that they practice a "sit and wait" hunting methodology, at least in part.

Casque headed frogs are typically very alert in captivity, watching an observer's motions around the vivarium and retreating to more concealed positions if they sense a threat. Turning their head while following the movements of prey items around the vi-

varium, these frogs calculatingly wait until quarry mistakenly comes too close. The unsuspecting victim is disabled with one quick motion. The bulk of activity in the vivarium takes place at night.

Due to the fact that casque headed frogs are restricted primarily to primary forest, they are threatened by the quickly vanishing undisturbed habitats which they need in order to survive. Captive reproduction projects are of primary importance to teach us more about the requirements of these frogs. However, such projects are extremely difficult to initiate due to lack of specimen availability.

Michael Ready and Danté Fenolio would like to thank the following people for their generous contributions to this project through one or a combination of the following: photography, assistance/recommendations, and information: Bill Lamar of the University of Texas at Tyler and of Greentracks—ECOTOURISM{1-800-9-MONKEY}—without which this project would not have been possible—and of course ANOTHER great trip to Peru; Roy McDiarmid of the Smithsonian Institute, William E. Duellman of the University of Kansas, David Wake of the University of California, Berkeley, Arthur Scott, Martha Crump, John Todd, Terry Vandeventer, Dave Rhodes, and the Minolta Corporation; and Segundo Mesias and René "Cosho" from Peru, both exceptional guides; John C. Murphy, Jack Cover, and photographer George Grall of the National Aquarium in Baltimore.

Literature Cited

Duellman, W. E. 1970. The hylid frogs of Middle America. Monograph of the Museum of Natural History. University of Kansas. Lawrence, Kansas.

Duellman, W. E. 1993. Amphibian Species of the World: Additions and Corrections. University of Kansas Museum of Natural History, Lawrence, Kansas. Special Publication No. 21: 1-372.

Duellman, W. E., and Trueb, L. 1985. *Biology of Amphibians*. McGraw Hill Book Co., New York.

Frost, D. R. 1985. *Amphibian Species of the World*. Allen Press and A.S.C., Lawrence, Kansas.

Jungfer, K. H., and Boehme, W. 1991. The backpack strategy of parental care in frogs, with notes on froglet-carrying in *Stefania evansi* (Boulenger, 1904) (Anura:Hemiphractinae). *Aquariol.*, 18 (1991), 3, 30. December.

Stejneger, L. 1917. A New Species of Horned Tree-Toad from Panama. *Proceedings of the Biological Society of Washington*; Vol. 30: 31-34.

Trueb, L. 1974. Systematic Relationships of Neotropical Horned Frogs, Genus *Hemiphractus* (Anura:Hylidae). *Occasional Papers of the Museum of Natural History, University of Kansas*, No. 29: 1-60. Lawrence, Kansas.



MEGA - VARIETY



WE OFFER THE LARGEST SELECTION OF HERPS,



both captive-bred and

imported, in the U.S.

Call, write or FAX for our latest

monthly list

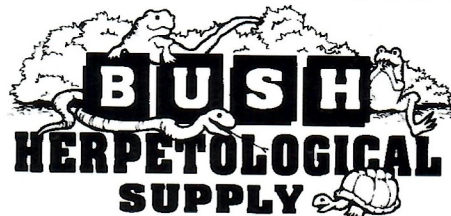


GLADES HERP INC.

P.O. BOX 50911 • Ft. Myers, Florida 33905 U.S.A.

HOURS: 11:00 a.m. - 5:00 p.m. Monday - Saturday

PHONE: 813-693-1077 • FAX 813-693-1901



1-800-451-6178

Full line of herpetological supplies
Call for catalog

Ask the Experts

by Winston Card



Q. An article entitled "Husbandry and breeding of the dart-poison frogs" by Rick Emmer, appeared in *The Vivarium* 2(6). The author mentioned "The International Society for the Study of Dendrobatid Frogs (ISSD)." Can you forward the address of this organization to me?

Iquitos, Peru

A. The American Federation of Herpetoculturists recently received a notice that the International Society for the Study of Dendrobatid Frogs (ISSD) made a painful decision to disband due to increased time restraints of its officers. The ISSD funds were distributed to worthwhile herp societies as according to their bylaws. The AFH received \$400 of these funds with great appreciation from that now-dissolved organization.

Q. I have been researching the captive care of green iguanas in anticipation of purchasing one or two in the near future. There seems to be some conflicting opinions on several aspects of their captive management, most notably in the area of diet. Would you care to add your opinion to the list?

Miami, FL

A. The bulk of a green iguana's diet in the wild consists primarily of foliage (Iverson, 1980, 1982; Rand et al., 1990; Troyer, 1984; Baer, 1994). Although there is at least one report in the literature (Hirth, 1963), and a personal observation by the author, of juveniles taking invertebrate prey in the wild, the evidence suggests that free-ranging green iguanas acquire the necessary amino acids, which are the constituents derived from digested proteins, for proper development of muscles and other soft tissue from plant sources and not from live prey items. Based on the above information, a diet consisting primarily of fresh dark green leafy vegetables such as kale, bok choy, collared greens, escarole, and spinach is recommended. There are certainly other greens that could be used, but the above staples are usually readily available. These leafy greens should comprise at least 75% of the diet. Another 15% of the diet can

consist of grated sweet potato, carrot and a wide variety of other vegetables. The last 10% can be fresh fruits such as apple, banana, cantaloupe, and grapes. Food should be chopped into bite-sized pieces and mixed thoroughly in order to prevent specimens from selectively feeding on specific food items. According to Baer (in press), cultivated fruits and vegetables alone may not provide a nutritionally balanced diet when compared to food stuffs consumed in the wild, and he recommends supplementing with one of the commercially produced iguana diets to make up the deficits. Whether or not to supplement this diet with additional animal protein is probably a matter of choice and not necessity. A few studies have shown that a balanced diet high in protein (up to 30%) may promote growth in herbivorous reptiles, especially in juveniles (Wood and Wood, 1981; Allen et al., 1991). However, excessive amounts of protein in the diet may contribute to the high incidence of gout in long-term captives (T. Boyer, personal comm.). This problem can also be attributed to chronic dehydration. In light of what we don't know about the long-term nutritional consequences of excessive amounts of protein in the diet of green iguanas, perhaps the best advice is to limit items with a high-protein content to less than 5% of the total diet. I would tend to discourage the use of commercial dog and cat foods, as these products were never intended to be used for reptiles. In addition, some specimens become imprinted on these diets and refuse to eat anything else.

It is recommended that vitamin supplements be used with caution, especially in adults. There have been no studies that indicate the effects of vitamin supplements one way or the other on green iguanas. However, there is ample anecdotal evidence that suggests supplements may be used far too often. If you are providing your animals with a balanced diet, they may not need supplements anyway. If you choose to use a dietary supplement, it is recommended that they not be used more than once a week.

As important a topic as diet is, it probably won't matter what you feed your iguana if you don't provide it with a

source of unfiltered ultraviolet light (UV) of the right wavelength. While it is true that there is no conclusive evidence documenting the benefits of UV in reptiles, Some members of this family, particularly *Iguana* and *Cyclura*, tend to be heliothermic (demonstrate strong basking tendencies) in the wild. Considering the available anecdotal evidence, it is unlikely that this behavior simply contributes to thermoregulation. There is no substitute for natural sunlight. However, it is obviously not possible to house green iguanas outdoors year-round in most parts of the country. There are several artificial UV lights that seem to provide at least enough UV for vitamin D synthesis to occur. Many sources advocate the use of a vitamin D supplement such as cod liver oil in place of UV. However, there is some evidence to suggest that green iguanas may not be able to utilize a dietary source of vitamin D (Allen and Oftedal, in press). In addition, remember to provide your specimen with a basking area. This is best accomplished with an incandescent spot light. A temperature gradient between 80°F (26°C) and 95°F (35°C) is optimal. Avoid the use of hot rocks as these products tend to cause low-level burns over time. This may be because heliothermic reptiles, including green iguanas, may not be receiving appropriate cues that are received when basking in a light source. This may be an important function of the pineal eye.

In conclusion, green iguanas can be difficult to maintain in captivity by the average herpetoculturist. While there has been some success over the years using the types of techniques outlined, there is still considerable gray area in the proper maintenance of this species. If you are just beginning with reptiles and/or cannot have an outdoor screened, perched, enclosure for the warmer months of the year, it might be better to target another mid- to large-size lizard species. Bearded dragons (*Pogona* sp.), blue-tongued skinks (*Tiliqua* sp.), or Solomon Islands tree skinks (*Corucia zebra*) are excellent alternative choices.

In an attempt to answer this question with the greatest possible accuracy, an attempt was made to achieve a consensus of opinions from several individuals that I consider experts in the field. Tom Boyer, D.V.M., D. M. Boyer, A. Mitchell, J. B. Murphy, O. T. Oftedal Ph.D., and Dr. Tom Alvarado.

Suggested Readings

Allen, M. E., O. T. Oftedal, D. J. Baer, and D. Werner. 1994. Nutritional studies with the green iguana. In: Proceedings of the Eighth Dr. Scholl Conference on the Nutrition of Captive Wild

Animals. Editors: P. Meehan, S. D. Thompson, and M. E. Allen. Lincoln Park Zoological Society, Chicago, Illinois. 163 pp.

Allen, M. E., and O. T. Oftedal. In press. The nutrition of carnivorous reptiles. In: *Captive Management and Conservation of Amphibians and Reptiles*. Editors: J. B. Murphy, K. Adler, and J. T. Collins. SSAR Contributions to Herpetology.

Baer, D. J. In press. The nutrition of herbivorous reptiles. In: *Captive Management and Conservation of Amphibians and Reptiles*. Editors: J. B. Murphy, K. Adler, and J. T. Collins. SSAR Contributions to Herpetology.

Gehrmann, W. H. In press. Light requirements of captive amphibians and reptiles. In: *Captive Management and Conservation of Amphibians and Reptiles*. Editors: J. B. Murphy, K. Adler, and J. T. Collins. SSAR Contributions to Herpetology.

Hirth, H. F. 1963. Some aspects of the natural history of *Iguana iguana* on a tropical strand. *Ecology* 44:613-615.

Iverson, J. B. 1980. Colic modifications in iguanine lizards. *J. Morphol.* 163: 79-93.

Iverson, J. B. 1982. Adaptations to herbivory in iguanine lizards. In: *Iguanas of the World: Their Behavior, Ecology, and Conservation*. Editors: G. M. Burghardt and A. S. Rand. pp. 60-76. Noyes Publ., Park Ridge, New Jersey.

Rand, A. S., B. A. Dugan, H. Monteza, and D. Viand. 1990. The diet of a generalized folivore: *Iguana iguana* in Panama. *J. Herpetol.* 24: 211-214.

Rodda, G. H. 1994. A review of iguanas: A guide to their biology and captive care. *Herp. Review* 25(2): 85-87.

Troyer, K. 1984. Diet selection and digestion in *Iguana iguana*: the importance of age and nutrient requirements. *Oecologia* 61: 201-207.

NEKTON® NEKTON®

NEKTON-REP

A COMPLETE VITAMIN SUPPLEMENT FOR REPTILES & AMPHIBIANS.



Other fine products for Reptiles & Amphibians from Nekton

TONIC-R

- contains the nutritional requirements an animal's organism needs.
- is an effective aid to preventing vitamin and mineral deficiencies.
- helps support the organism in times of stress.
- is an excellent aid to treatment in illness.
- the ideal diet for hand raising.

MSA

- supplies breeding and young animals with essential trace elements and minerals.

REP-COLOR

- contains supplementary Canthaxanthin and Apocarotenal.
- develops deepest color and brings out faded colors.

For more information call or write:

NEKTON U.S.A., INC.
14405 60th Street North
Clearwater, Florida 34620
Phone (813) 530-3500
FAX (813) 539-0647

NEKTON-PRODUKTE
W.-GERMANY

REPTICARE DELUXE ROCK HEATER

Choose the temperature you need for your pet! Turn it up for tropical or desert species or turn it down for subtropical and moderate temperature species.

Standard.....#231027.....\$19.98
Giant.....#231040.....\$27.74

REPTITHERM UNDER TANK HEATERS

Heat the inside air temperature of your terrarium a minimum of 5-10 degrees warmer than room temperature. Note: Heater cannot be removed once attached.

6" x 8" fits 10-20 gal.....#231053.....\$14.96
8" x 12" fits 30-40 gal.....#231066.....\$25.85
8" x 18" fits 50-60 gal.....#231079.....\$32.66
4" x 5" Mini fits 1-5 gal.....#231092.....\$11.98

REPTI PORCELAIN CLAMP LAMP

Features a porcelain socket which can be used with a 250 watt spot, heat, or incandescent bulb or a 150 watt Ceramic Heat Emitter.



REPTICARE CERAMIC HEAT EMITTER

Provides natural radiant heat without light so it won't disturb your animals' sleeping habits, or yours. Screws into a porcelain light fixture.

60 watt fits 10-20 gal.....#231118.....\$24.67
100 watt fits 30-40 gal.....#231131.....\$26.39
150 watt fits 50-100 gal.....#231144.....\$27.95

FREE BOOK
with any purchase.
order # 231625



ZOO MED'S
BEGINNER'S GUIDE TO
REPTILE CARE BOOK



REPTI-CRICKET

Fresh, freeze dried crickets, dusted with vitamins and coated with an all natural flavoring. 1 oz. 165 crickets

AQUATIC TURTLE FOOD

A low protein, floating pellet food for your aquatic turtles. 18 oz.



TOLL-FREE 24 hours
1(800) 443-1160

To order by mail:

Please send your name, address, phone and check (2 weeks clearance), money order or credit card number, and include delivery charges. OH residents please add sales 6.5% tax.

PET WAREHOUSE
Dept. V1
P.O. Box 310
Xenia, OH 45385

UPS delivery charges

Total	Add
up to \$45	\$4.75
\$45-\$75	\$6.75
\$75-\$150	\$8.75
over \$150	\$10.75



FREE Color Catalog!

Contains supplies for fish, dogs, cats, and birds too!

PET WAREHOUSE

NATURAL AND CAPTIVE-SELECTED COLOR PHASES OF *California Kingsnakes* (*Lampropeltis getula californiae*)

by Patrick Briggs and Sean McKeown

Perhaps no snake stands out more vividly in the minds of herpetologists growing up on the West Coast than the California kingsnake (*Lampropeltis getula californiae*). Easily recognizable by its smooth shiny scales and contrasting light and dark bands or stripes, this snake typically has a gentle disposition. These assets, combined with a willingness to take a wide variety of prey, and thus do well in captivity, make it a favorite with herpetoculturists, both young and old. What 8- to 15-year-old youngster, encountering one of these strikingly attractive snakes in the wild, failed to bring it home, usually naming it "King," "Royal" or other praiseworthy epithet?

The common kingsnake, *Lampropeltis getula*, has one of the broadest ranges of any snake in North America. The westernmost subspecies, the California kingsnake (*L. g. californiae*), is widely distributed throughout the Golden State,

excluding higher elevations where it is replaced by the California mountain kingsnake (*L. zonata*). The California kingsnake also occurs in parts of southern Oregon, southern Nevada, southwest New Mexico, western Arizona, and Baja Cali-

fornia, Mexico (Stebbins, 1985; Perlowin, 1992; Markel, 1990).

It is found from sea level to over 5,000 ft (1,500 m). Individual specimens aver-

Continued on page 44



Desert striped phase. Snake courtesy of Lloyd Lemke.



Newport striped phase. Snake courtesy of Lloyd Lemke.



Mendota (San Joaquin Valley) phase. Snake courtesy of Bill Cochrane.



Yuma phase. Snake courtesy of Bill Cochrane.

All photos by Patrick Briggs



Desert banded. Snake courtesy of Lloyd Lemke.



Carlsbad banded light phase. Snake courtesy of Brian Hubbs.



Covina brown phase. Snake courtesy of Brian Hubbs.



Standard banded phase swallowing a N. Pacific rattlesnake. Snakes courtesy of Richard Johnson.



Carlsbad blotched aberrant. Snake courtesy of Brian Hubbs.



Intermediate aberrant. Snake courtesy of Lloyd Lemke.



San Joaquin Valley banded aberrant. Snake courtesy of Bill Cochrane.



Fresno faded (washboard) phase. Snake courtesy of Brian Hubbs.



Albino yellow striped phase. Snake courtesy of Lloyd Lemke.



Albino banded phase. Snake courtesy of Lloyd Lemke.



Hypomelanistic zig-zag striped. Snake courtesy of Bill Cochran.



Lavender banded. Snake courtesy of Lloyd Lemke.



Banded with dark-edged cream scales. Snake courtesy of Lloyd Lemke.



Chocolate ghost. Snake courtesy of Lloyd Lemke.



Broad-stripe. Snake courtesy of Brian Hubbs.



Aberrant brown broken-stripe.



Different morphs hatching from the same clutch. Snakes courtesy of Lloyd Lemke.



Albino blotched aberrant. Snake courtesy of Bill Cochran.



Albino desert banded (two headed). Snake courtesy of Lloyd Lemke.



50-50 (dark). Snake courtesy of Lloyd Lemke.



Juvenile banana on left, anerythristic on right. Snakes courtesy of Lloyd Lemke.



Aberrant wide-banded. Snake courtesy of Brian Hubbs.



Reverse-stripe. Snake courtesy of Lloyd Lemke.



Coast wide-stripe. Snake courtesy of Brian Hubbs.

THE SOUTHERN STARS OF AUSTRALIA

Australia's Small Pythons

by Dave and Tracy Barker

Australia encompasses the area of the greatest python diversity in the world; 15 of the 26 recognized species of pythons can be found there, 10 species of pythons are found only in Australia.

Two genera, *Aspidites* and *Antaresia* are confined to Australia. Our title for this column refers to the four species of python in the genus *Antaresia*; the Children's python, *A. childreni*, and its three close relatives, the spotted python, *A. maculosa*, pygmy python, *A. perthensis*, and large-blotched python, *A. stimsoni*. *Antaresia* translates to "of Antares," referring to the double star that appears as the brightest star in the skies of the southern hemisphere. In this column we will illustrate these four species and their distributions, and discuss some of their characteristics.

In 1804 the diamond python became the first python species to be described with an Australian type locality. The next description of Australian python species with scientific names that today are still recognized as valid came in 1842, when John Edward Gray of the British Museum published a paper containing the descriptions of three python taxa, the Children's python, olive python, and carpet python.

So begins our awareness of the Southern Stars of Australia. During their taxonomic history, their common and scientific names have been complicated by several changes. For more than 140 years Gray's scientific name of *Liasis childreni* was used to refer to all of the small brown

pythons lumped together as the Children's python; this "species" could be found throughout most of Australia excepting the southernmost areas. During this time

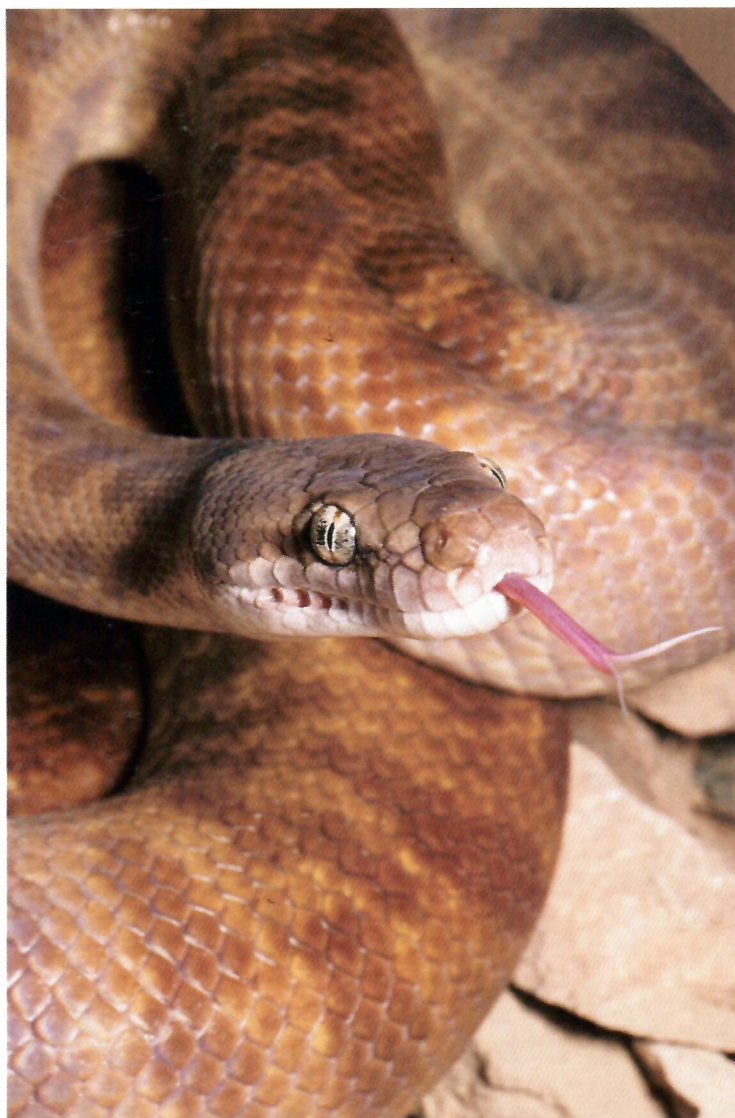
largely ignored, placed in synonymy with *Liasis childreni*. Stull named *Liasis childreni perthensis* in 1932, based on her examination of a single specimen; her description was also mostly ignored. However, by the late 1970s, several authors had begun to refer to the pygmy python as a full species.

In 1983, Cogger formally recognized *perthensis* as a full species. However, in the same catalog he proposed that the genus *Liasis* be synonymized with the genus *Bothrochilus*, and placed *childreni* and *perthensis*, along with the water python, olive python, and white-lipped python, in the genus *Bothrochilus*. Several of the Australia herpetological texts published in the next few years followed this recommendation, (Wilson and Knowles, 1988; Hoser, 1989) and some herpetologists first learned the scientific name of the Children's python as "*Bothrochilus childreni*."

This synonymy of *Liasis* with *Bothrochilus* resulted from a misidentification in the literature of one of the original type specimens on which the name *Liasis* was based. When it was finally verified that this important specimen was a freckled python, *Liasis mackloti*, and not a scrub python, *Morelia amethystina*, the name *Liasis* came back into use.

In 1985 Smith published a revision of the *Liasis*

childreni group, naming four species in the group by recognizing *childreni* and *perthensis*, resurrecting *maculosus* and describing a new species, *stimsoni*. A systematic analysis of all of the pythons



The pattern of adult Children's pythons, *Antaresia childreni*, becomes less contrasting with age. This particular color phase is the most commonly seen among the U.S. captive lineages. It likely originated from northwest Queensland.

there were several published attempts to recognize that the geographic variation seen in this widespread group was of taxonomic importance. The description of *Liasis maculosus* in 1873 by Peters was

published by Kluge in 1993 concluded that these four species are more closely related to each other than to any other python species, and that they should be recognized as a distinct lineage by placing them in their own genus *Antaresia*.

The pythons in the genus *Antaresia* are small brown pythons usually patterned with blotches. They range in size from the smallest python species in the world, the pygmy python with an average adult size of 18.8–22 in (48–56 cm), to the largest specimens of spotted pythons measuring 69 in (175 cm). These pythons have a high number of teeth, relative to most pythons, ranging from an average of 136 teeth in spotted pythons to an average of 150 teeth in large-blotched pythons. Typically, a python in the genus *Antaresia* has an unpitted rostral scale, and on each side of the head a thermoreceptive pit in the first supralabial scale, and 4–6 pitted posterior infralabials. These are typically terrestrial pythons, round-bodied, muscular constrictors most often encountered on rocky hillsides. In nature, lizards comprise a major portion of the diet of all but the largest specimens.

The easiest way to identify one of these pythons species with certainty is to know its geographic origin. However, that's often not possible or practical. Many of the captive lineages have been in captivity for more than 20 years, bred through three or four generations, and their origins are no longer known. Even in Australian collections most specimens no longer have locality data associated with them; many such specimens in zoos and licensed snake parks are confiscated animals, deposited by authorities without the collecting data. The following is a brief discussion of each of the species and the characters that define them.

The pygmy python, *A. perthensis*, is fairly easy to identify. It is a small species, seldom (if ever) exceeding 27.5 in (70 cm) in total length. Most adult pygmy pythons are reddish brown or medium brown with a distinct orange hue. They are patterned with darker reddish brown or brown flecks and irregular small blotches; in some specimens the dorsal pattern appears to be organized into identifiable paired blotches while in others the darker flecks and blotches on the dorsum appear to be randomly placed. The markings and pattern lose contrast with age and older specimens are very indistinctly marked or are unicolored. Pygmy pythons have a very low average number of ventrals and subcaudals relative to the other *Antaresia* species, averaging 232 ventrals (with an



This spectacular phase of the spotted python, *Antaresia maculosa*, is typical of specimens from the coastal forests in the vicinity of Cairns, Queensland.



A large adult specimen of large-blotched python, *Antaresia stimsoni*, from the coastal plains in the area north of Perth, Western Australia.



The pygmy python, *Antaresia perthensis*, is the smallest python species in the world. This large adult female measures about 44 cm (17 in) in total length.



Within the extensive range of the large-blotched python, *Antaresia stimsoni*, is considerable variation of color and pattern. The pale lateral stripe characteristic of this species is easily observed on this beautiful adult specimen from Laverton, Western Australia.



Spotted pythons, *Antaresia maculosa*, are known to lay large clutches, numbering up to 21 eggs. The large size, color, and pattern of this female, a third-generation captive, most closely resembles the populations of spotted pythons from the Cape York Peninsula of northeastern Queensland.



Hatchling Children's pythons, *Antaresia childreni*, are very small snakes. Hatchlings have a contrasting pattern that quickly begins to fade as soon as they begin to grow.



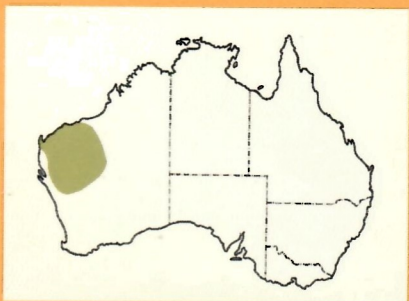
A "spotted" variety of the spotted python, *Antaresia maculosa*, is a commonly seen pattern among U.S. captive lineages of this species.



Spotted python.



Children's python.



Pygmy python.



Large-blotched python.

observed range of 212–250,) and 39 subcaudal scales (with an observed range of 34–45.)

The scientific name *perthensis* literally translates to "from Perth," but, oddly enough, pygmy pythons are not known from anywhere near Perth in Western Australia. The original description is based on a single female specimen that Stull received while she was working at the Museum of Comparative Zoology at Harvard. The specimen was sent to that institution by Winthrop Sprague Brooks. For some reason, Stull incorrectly inferred that the specimen had been collected in Perth, and named it *perthensis*. As is dictated by the rigid codes and traditions of taxonomic practice, the name is extremely difficult to change, even though it refers to an incorrect type locality.

Pygmy pythons are known from the Pilbara and adjacent rocky territories, an area in northwest Australia which is approximately the size of California. There is abundant habitat and they appear to be widespread throughout their distribution. This species is rare in captivity because

Helix Controls

The Leader in Environmental Control Systems

**Proportional
Accurate
Versatile
Reliable
Safe
Modular
User Friendly**

Modular design of systems and accessories allow unlimited expansion. All systems use a temperature probe that is completely isolated from the 110v supply and employ other unique safety features. All products designed and manufactured in the USA.

Basic System

Provides a day and night temperature setting with LCD display. Continuous incremental power adjustments maintain a constant temperature. Controls heat sources up to 500 Watts. Accessories expand system to 5000 Watts. Synchronize lighting with day and night temperature cycle. Provides minimum and maximum temperature readout and more!

Other options include gradual day and night temperature change, analogue output suitable for computer monitoring, and a preset for both day and night temperatures.

Super System

Incorporates all the features of the basic system. Unique design allows easy connection of various heating and lighting devices. Controls a combination of heat and light sources up to 1500 Watts. Controls incandescent lamps to simulate dawn and dusk periods of about one hour. Activates UV lights after dawn and before dusk minimizing stressful changes in light intensity.

**Ideal for
Iguanas
and
Bearded
Dragons.**



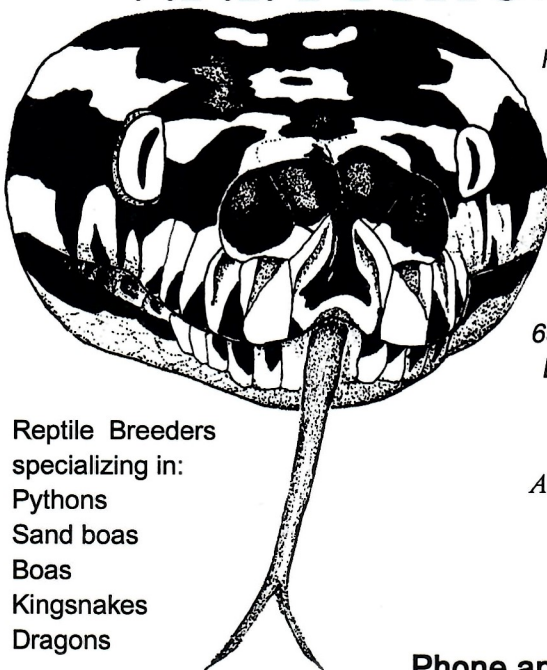
For more information please write or call.
Helix Controls · 8535 Commerce Ave. San Diego, CA 92121
Phone 619-566-8335 Fax 619-566-9472

they are endemic to the Australian state of Western Australia. The wildlife regulations of Western Australia are particularly restrictive with regard to collecting and maintaining reptiles—herpetoculture is discouraged, even treated as a criminal activity by the Department of Conservation and Land Management, the controlling government agency. A tremendous amount of energy and money is spent keeping interested herpetologists and herpetoculturists from obtaining reptiles, particularly pythons, even when there is no conceivable threat to widespread animals such as pygmy pythons. As a direct consequence, even though pygmy pythons have been known to science for 52 years and they are easily collected and make extremely hardy captives, the pygmy python remains one of the least known snakes in the world.

The large-blotched python and Children's python share a particularly distinctive and characteristic marking. This marking has been correctly described in several texts as a "lateral pale stripe" on the neck and anterior body. But this description has led many observers to look for a yellow or white stripe on the side of the body, which is not exactly the case. Our own description of this character

Vida Preciosa International, Inc.

V.P.I. PYTHONS



Reptile Breeders
specializing in:
Pythons
Sand boas
Boas
Kingsnakes
Dragons

We sell Non-Contact
Instant Temperature-sensing Equipment,
With or Without Laser Sights

*The Largest and most Diverse
Python Collection in the World*

Dave and Tracy Barker

*Selling only the finest
Captive-Hatched stock.*

*65 Years combined experience
Breeding 22 forms of pythons*

*WE BUY AND BROKER
CAPTIVE HATCHLINGS
AND PRIVATE COLLECTIONS*



**V.P.I., Inc
P.O. Box 300**

Boerne, TX 78006

Phone and Fax: (210) 537-5000

*Send \$2.00 for Price List
se habla español*

"BOAS & PYTHONS"

"Their Care & Handling" Videotape

TOPICS

Care & Handling • Food & Feeding

• Housing & Provisions

• Diseases & Parasites

• Intro. to Captive Breeding

\$29.95 + \$2.50 P & H

VISA/MC/DISC ORDERS:
(217) 442 - 4707 (9-5 Mon-Fri CST)
OR

Send Check or Money Order to:
Cunningham Photo
807 W. Williams
Danville, IL 61832

ALL TAPES VHS UNLESS OTHER-
WISE SPECIFIED BY CUSTOMER

Produced by McElhaney
Productions, Hoopeston, IL 60942

would be somewhat different: on both of these species the dorsal and lateral blotches on the neck and anterior body are arranged in such a way that neither encroaches onto an area just below the dorsolateral area of the body (the "dorsolateral area" is the area of the body where the flat of the back turns down to become the side of the body.) With the blotches arranged in this manner, there is created an uninterrupted longitudinal stripe of the background color that is apparent for the first third to half of the body length of the snake. This obvious condition of pattern is characteristically found on most specimens of both large-blotched pythons and Children's pythons.

The large-blotched python, *A. stimsoni*, is a small species; average adult size is probably about 35-39 in (90-100 cm) total length. Relative to the other *Antaresia*, this species has a long head, a long sculpted snout and large eyes. Western specimens have the highest number of loreal scales of any *Antaresia*, as many as 18 loreals on each side of the snout; central and eastern specimens typically have 4-10 loreals, averaging about 7, a more typical number for *Antaresia*. Large-blotched pythons have an average total number of 150 teeth, a close tie with the white-lipped python *Leiopython albertisii*, for the python species with the most teeth (Kluge, 1993).

Large-blotched pythons have a gigantic distribution, occurring on the west coast and throughout the center of Australia. There is considerable geographic variation of size, color, and pattern among the different populations of this species, and we anticipate future taxonomic distinctions to be made within this species as it is presently defined. Large-blotched pythons can be found in very arid areas, though it is not known if they occur in the interiors of the several large and harsh deserts located within the distribution. Among the many places where this species is known to shelter are termite mounds and caves with bat colonies.

Large-blotched pythons are seen with increasing frequency in captivity in Australia; there are only a few captive specimens outside of Australia. Little is known about the natural history of this species.

Children's pythons are very similar to large-blotched pythons in size and possess many characteristics of pattern. As hatchlings these two species can be indistinguishable. However, as soon as hatchling Children's pythons start growing, they begin to lose their contrasting pattern, fading to a near unicolored condi-

tion by 3-6 years of age. Most adults retain some trace of their juvenile pattern, but some do become absolutely patternless. Relative to large-blotched pythons, the snouts of most Children's pythons are not as long and the eyes are not as big. Children's pythons often have a purplish cast to their brown coloration; larger specimens have a beautiful purplish iridescence on their skin.

Children's pythons, *A. childreni*, are more common in captivity in U.S. collections than in Australian collections; they are nowhere near as common in either U.S. or Australian collections as are spotted pythons, *A. maculosa*. Children's pythons have done well in captivity, at least four generations have been bred in U.S. collections. The hatchlings are small; most begin feeding on pink mice while some may require that mice be scented with skinks for the first few meals. Children's pythons are hardy and low maintenance captives; their even disposition makes them a pleasure to keep.

The spotted python, *A. maculosa*, is the most common *Antaresia* species in captivity in both U.S. and Australian collections. This is the largest of the four species, though not radically so. The average adult size of captives is probably about 43-47 in (110-120 cm); in our collection we have five captive-bred specimens 14-15 years old that measure 63-69 in (160-175 cm).

Spotted pythons have a contrasting pattern that does not fade with age. Smith (1985) noted that the blotches of spotted pythons are "ragged-edged (dark pigment confined to whole scales)" while the blotches of large-blotched pythons and Children's pythons tend to be more rounded and smooth-edged. This is a good general description, though, as might be expected in such widespread species, there are exceptions. Spotted pythons typically do not have the pale lateral stripe of *stimsoni* and *childreni*. Also, the dark dorsal blotches of *A. maculosa* may join to form large blotches or straight or wavy stripes for portions of the length of the body.

This has been a prolific python species in U.S. collection; we would estimate that in 1994 somewhere between 300-500 spotted pythons hatched in U.S. collections. This species has been bred for at least four generations in the United States. There are several color phases present in captivity, some have large bold blotches and some have small spots. There is a lineage of beautiful and large spotted pythons in captivity in the United States that is descended from a pair of animals origi-

Cold Blooded
DESIGN



REPTILES
RULE

BLACK & WHITE DESIGN NO. T-12

HOW TO ORDER T-SHIRTS

Specify No. T-12 and size: M, L, XL, XXL. \$15 ea.
+ \$3.50 S/H. Add \$1 S/H ea. additional shirt. International orders add \$5 S/H per shirt. U.S. funds only.
CA residents add sales tax. All T-Shirts are Hanes
Beefy-T, 100% cotton and pre-shrunk.

SEND TO

COLD BLOODED DESIGN

386 East "H" St., Ste. 209-405, Chula Vista, CA 91910

nally at the Dallas Zoo; this original pair strongly resembled and most likely came from a population on the Cape York Peninsula of northeastern Queensland; as adults, animals in this lineage are easily distinguished by their pale yellow bellies.

The small size and pleasant disposition of all four *Antaresia* species make them ideal pythons to maintain in captivity. There is still much to learn about them, both in captivity and in nature. We would hope that, in the near future, private herpetoculturists in Australia will be allowed to assemble and maintain viable and potentially self-sustaining captive populations representing numerous localities for each of the species. Such a policy, sanctioned by the Australian wildlife authorities, would create the most efficient and least expensive means to generate data important to herpetology, herpetoculture, and conservation. Such a policy would reduce the workload of the national and state agencies of Australia now charged with enforcing the outdated, ineffective and oppressive "faunal protection regulations." These regulations protect pythons only from herpetoculturists and herpetologists, rather than from habitat destruction, a ridiculous policy, at best. It is now time to learn as much as possible about the pythons of *Antaresia*, the Southern Stars of Australia.

Literature Cited

Cogger, Harold G. Elizabeth E. Cameron and Heather M. Cogger, 1983. Zoological Catalogue of Australia, Vol. 1, Amphibia and Reptilia. Australia Government Publishing Service, Canberra.

Gray, J. E. 1842. Synopsis of the species of prehensile-tailed snakes, or family Boidae. In: Zoological Miscellany. Gray, J. E., editor. Treuttel, Wurtz and Co., London: 41-46.

Hoser, Raymond T. 1989. Australian Reptiles and Frogs. Pierson and Company, Sydney.

Kluge, Arnold G. 1993. *Aspidites* and the phylogeny of pythonine snakes. Records of the Australian Museum. Supplement 19: 1 December 1993.

Peters, W. 1873. Über ein neue Schildkrotenart, *Cinosternon effeldti* und einige andere neue oder weniger bekannte Amphibien. Monatsberichte der Koniglich Preussischen Akademie der Wissenschaften zu Berlin (1873): 603-618.

Smith, L. A. 1985. A Revision of the *Liasis childreni* species-group (Serpentes: Boidae). Records of the Western Australia Museum. 12(3): 257-276.

Stull, Olive Griffith. 1932. Five new subspecies of the family Boidae. Occasional Papers of the Boston Society of Natural History. 8: 25-30.

Wilson, Steve K. and David G. Knowles. 1988. Australia's Reptiles, a Photographic Reference to the Terrestrial Reptiles of Australia. Collins, Sydney.



INCUBATORS
CAGES
HEATING
THERMOSTATS

DON'T MISS THIS!

Get the Nation's Largest Catalog
of Reptile & Amphibian Supplies

Guaranteed Lowest Prices!

◆ FREE 48 Page Catalog ◆

Big Apple Herpetological
(Formerly Big Apple Snakes)

For Catalogs & Orders (800) 666-6672

Big Apple Herpetological • 33 Main St. • Port Washington, NY 11050

WE WELCOME RETAILERS!
ASK FOR OUR WHOLESALE PRICE LIST!

HUSBANDRY
FEEDING/DOSING
MEDICATIONS
VITAMINS

CAPTIVE BRED SNAKES
BOOKS
HERP SHIRTS

LIGHTING
THERMOMETERS
FOODS
ACCESSORIES

Florida
Iguana & Tortoise
Breeders

Captive Bred Galapagos and Spur Thigh Tortoises
Rhino, Cuban, Cayman and Lewisi Iguanas
Bearded Dragons

A select line of imported reptiles, amphibians and
arachnids at wholesale prices

Personalized Care • Door to Door Service • Special Orders

OUR PRIVATE FARM

Kurt Leckie

IMPORT / EXPORT DIVISION

Sam Pascucci Rudy Pascucci

Tel: (305) 680-8492 • Fax: (305) 434-4959 Tel: (305) 846-1370 • Fax: (305) 846-1368
P.O. Box 291413 Davie, Florida 33329-1413

Wanted: Boa, python and colubrid snake husbandry and captive breeding articles for **THE VIVARIUM** magazine. Also desired are frog and salamander articles. Gratis copies of that issue and compensation available in exchange for articles. Writer's Guidelines are available from **THE VIVARIUM** Editor.

The
Bean Farm

Complete line of quality mail order dry goods

Specializing in Flexwatt Heat Tape,
Books, Lighting, & Health Products

Write or call for FREE catalog!

32514 N.E. 77th
Carnation, Washington 98014-6701
Phone (206) 861-7964 FAX (206) 333-4205

Product Review

Tera Top (screen top)

by
David Perlowin

Before I get into this issue's product review, there is something which needs to be addressed. There seems to be a dearth of products being sent to the AFH for evaluation. Perhaps there is something *The Vivarium* needs to do in order to acquire necessary products, or is it that most manufacturers are apprehensive about having their products critically scrutinized? In any case, manufacturers please get it in gear and SEND YOUR PRODUCT if you believe in it.

The product I will discuss in this issue is an aquarium screen top that uses Velcro to secure it to the top of the cage. It's

called the Tera Top and is manufactured and distributed by Oasis pet products. It is marketed as the world's first flexible screen tank cover, touts total security from escapes, and comes in rectangular and hexagonal shapes. My sample was 10 in x 20 in (24.5 cm x 50.8 cm) for a regular 10-gal (approx. 40 liter) aquarium. They do come in sizes all the way up to a 55-gal (approx. 220 liter) aquarium with your choice of fine or regular screening. Mine came with regular screen which is too coarse and rough and could allow for significant snout damage from rubbing. The difference between the two for ventilation purposes is negligible.

What did I like about this product? Well, for one thing, it really seals around wires, hoses, and tubes running into the tank from the outside. Not even a 2-week-old cricket could escape up a wire and out of the tank. It definitely holds very securely, and I doubt that most types of reptiles could push up the top to escape. The Tera Top is fine for terrestrial reptiles and amphibians and presents an impenetrable barrier to them. Herps that can climb glass, unless they are very small, should also be securely contained. Another feature of its strong holding power is that it is relatively toddler/small child proof. It takes strong finger force to pry up even

one of the corners and should prevent small children from reaching inside the enclosure.

What didn't I like? For starters, its most significant positive feature also presents its weakest point. It is extremely hard to open. In fact, it is almost impossible to open with one hand, which is the way I am used to opening most screened enclosures. With food in one hand and trying to open the top with the other, I found myself frustrated trying to get the top open. I found installation of the Velcro fastener around the perimeter of the aquarium top to be somewhat of a challenge. It is supposed to extend 1/4 in (6 mm) above the top of the aquarium frame.



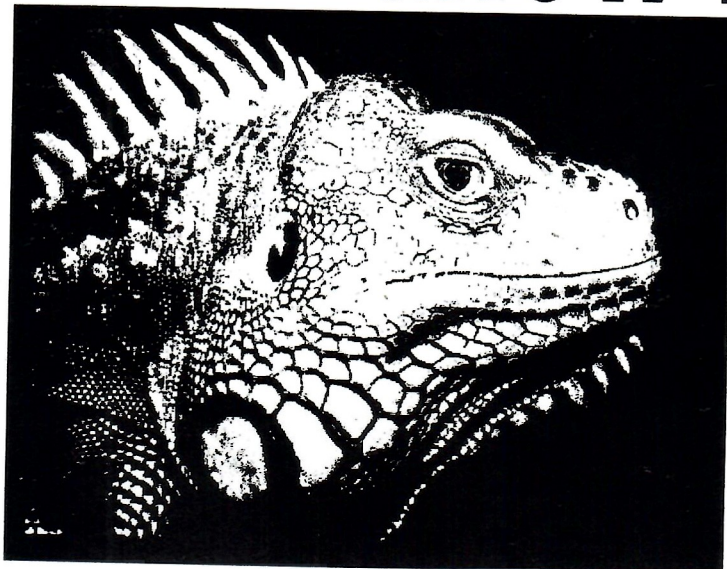
ECUADOR
ADVENTURE

Join Dante Fenolio, Michael Ready, and experienced herpetologist Bill Lamar in search of amphibians, reptiles, and other wonderful wild life of the ECUADOR RAINFOREST. Rare photographic opportunities. Group now forming for SUMMER '95. Call now, limited space available.

CONTACT: OUT BACK
HERPETOLOGICAL
COMPANY
408.741.4911

NUTRI GROW Iguana Diet

TM



- tested and successful
- a nutritious diet
- feed dry or moist
- available in four sizes
- order through your local pet store or through :

AMERICAN REPTILE INC.

118 S. MAIN, DRY RIDGE, KY. 41035
TEL. 606-824-9950 FAX. 606-824-5434

finally... a product that makes feeding your iguana as easy as feeding your dog!

Adjusting the Velcro tape to uniformly extend 1/4 in (6 mm) above the frame took several tries. It is critical that the corners of the Velcro tape fit into a perfectly flush mitered joint or notched joint for the top to fit with total security. I came pretty close. Oasis recommends that, in order to reduce wear on any one corner, one should alternate the corners that are lifted and rotate the cover occasionally. Is it just me or do other herpers landscape their enclosures so that there is a front and back? Alternating opening corners is very impractical, at best, and sometimes impossible. In addition, my feeling is that, as the size of the Tera Top increases, so too the negatives also increase in magnitude.

If any of you read my product review in the last issue of *The Vivarium*, you know I really liked the Ultratherm heat mat. I was therefore surprised at how disappointing their thermostat performed. The model I received from the gracious folks at The Bean Farm was not a pulse proportional type but a typical on/off thermostat. The temperature setting knob is recessed and hard for my pudgy fingers to turn, and the temperature control was 6.2°F (2.8°C) off according to my digital thermometer from Radio Shack. With the temperature setting at 90°F (32.5°C) the actual temperature just above the Flex-Watt heat tape was, you guessed it, 83.8°F (28.8°C). To me, this is unacceptable performance. I don't know if it was the thermostat itself or the temperature probe that is permanently wired to the thermostat. Perhaps it was just my sample and I would welcome another sample for further tests. The only positive about this product was that it was prewired to be plugged into a wall outlet. Unfortunately the plug was not a grounded type which I feel is necessary when heating herps to avoid any unpleasant accidents.



Call or write
for a list of
available
back issues!

Reptile Nutrition Series

Iguana Fruit & Flower Formula



... with
**FRESH FRUITS
and FLOWERS**
to duplicate
the Iguana's
NATURAL DIET.



**SCIENTIFICALLY
FORMULATED**

with **ALL NATURAL INGREDIENTS** to provide the optimum attraction and balanced nutrition for the Green Iguana.

available in **JUVENILE or ADULT Diets**

Also try

Iguana Vegi Formula

A **FROZEN**

Product of OCEAN NUTRITION CORP. San Diego, CA 91950

SANDFIRE DRAGON RANCH



**BOB MAILLOUX
PROPRIETOR**

P.O. Box 3152 • Vista, CA 92085
(619) 726-4878 • fax (619) 726-9980

Herp Photography

Succeeding By Technique, Not Technology

by
William B. Love

A visitor at my shop recently noticed me engrossed in posing a hyperactive day gecko (*Phelsuma*) at the shop photo studio. Upon spying my open camera gear bag, his first question to this ostensible image of photographic proficiency was something to the effect: "Which would you recommend, the center-weighted micropism parallax focusing of the Canon EOS-DX@\$, or the quartz-timed TTL, aperture-priority, matrix-metering system of the new Nikon F3HP4@%?" It took a moment to translate to the vernacular—I was being asked about two cutting-edge cameras that might as well have been Russian Sputnik components for all that I knew about them. I politely explained this, much to his amazement. How could I be active in the competitive photo market of today's full-color, crystal-clear publications without relying heavily on the latest equipment?

It's not that my choice of camera, lenses, flash, etc. dates back to the primeval days of a decade ago or more. But before I scare away some readers with the idea that this will be a "techno talk," rest assured that I too find all the new brands of mechanical wizardry expensive, confusing and technically intimidating. While high-tech equipment can help create great shots, the three most important aspects that will guide photographers to successful herpetological horizons can't be bought in an afternoon at a camera store.

Insight, composition, and patience are the instinctual (or acquired) traits of all successful photographers of herps, and probably a number of other subjects as well. I had always felt, and now know, that it's these abilities, not gadgetry, that result in the outstanding photos that burn lingering images in our memories. For all the herpers who are hesitant about pursuing photography more seriously due to the fear that it's a bottomless money pit for equipment that's "absolutely essential" to get great results, this column's for you. Maybe you can find some of the satisfaction in photography that I've come to appreciate as it extends my enjoyment of herpetology.

Having hopefully aroused your curiosity thus far, I'm compelled to offer these initial few hints about acquiring "basic" gear—



The two-in-one approach. Getting two fast lizards to stay still, especially in your selected positions, can be challenging. It's worth it for double-duty shots like the above, demonstrating sexual dimorphism in Clark's spiny lizards (*Sceloporus clarki*). Below, comparing hatchling size and color of a giant day gecko (*Phelsuma madagascariensis grandis*) (top) and a Standing's day gecko (*P. standingi*) (bottom).



the kind I would have appreciated hearing back when I got started in the mid-1970s. Slides (transparencies) reign supreme! They're cheaper to develop than print film, especially if you don't have them all mounted as part of the process. You can individually mount only the "keepers" in plastic frames later at home. Like nega-

tives, they can be used to make any size print as needed. But in the meantime, they're easier to judge on a light table, or to use to enhance natural history talks. Most importantly, they're the unanimous choice of publishers for reproduction in books, magazines, etc.

Through-the-lens metering (TTL) is a feature of most, if not all, new professional cameras. It'll save you a fortune in covering your bases with thousands of bracketed slides (those purposely slightly under and overexposed to assure that some are perfect) over the years. Far more importantly, it goes a long way toward preventing the agony of viewing badly illuminated, once-in-a-lifetime shots that you were really counting on. TTL is expensive, but worth it.

Buy a macro as your first lens. Photo shops routinely sell 35 mm cameras "complete" with 50-mm lenses as standard equipment for average users. This is analogous with the way some new cars used to come with only AM radios. The first thing



"A magnificent young adult red-footed tortoise (*Geochelone carbonaria*)."

Leaving the explanation at only that would be misleading and irresponsible. This aberrantly patterned animal, while indeed remarkable, should never be left to be assumed to represent a "regular" redfoot as the lead sentence alone would imply.



A yawn is about the only comment fitting for the top boring shot looking down upon a "resting" eastern coachwhip *Masticophis f. flagellum*. This snake is much better typified by the lower viewpoint that highlights the alert stance characteristic of this active diurnal predator.



Taken mere seconds apart, is there any doubt about which shot you'd want to illustrate a venomous Australian Collett's blacksnake (*Pseudechis colletti*) in your article about elapids? Bumping the studio sharply was all it took to elicit this species' unusual prolonged tongue flick while it spread its narrow hood.

you did was replace it with an FM stereo cassette or CD player, which probably had AM too. To avoid this kind of wasteful redundancy photographically, ask to purchase the camera body only. Spend the extra bucks for a macro (close-up) lens that will do everything the normal one would do, plus focus to within a few inches away.

THE VIVARIUM Volume 6 Issue 4



This long-term captive anerythristic eastern diamondback rattlesnake (*Crotalus adamanteus*) appears anything but majestic as a coiled heap in the middle of a sparse lawn. Showing the odd color was (hopefully) the only goal of this photo. A move to the woods' edge and only a little refined effort might have resulted in the more exciting rattler pose with the rattle up and tongue extended, as for this western diamondback rattlesnake (*C. atrox*).



If you spend much time in southeastern swamps, you'll eventually encounter a water moccasin (*Agkistrodon piscivorus*) sitting exactly like this first one, the perfect picture of serenity. Note in the next photo, a little gentle persuasion tempted the snake to reveal the basis for its alternate and more inspiring name, "cottonmouth"!

This allows you the freedom to fill the shot edge-to-edge with the head of a baby matamora turtle (*Chelus fimbriatus*) or the headwaters of the Amazon River, all with one lens.

Get an electronic flash that's compatible with TTL. These little black boxes can perform miracles like stop action to eliminate



These three shots each clearly depict healthy herps in naturalistic settings, but at least one glaring problem spoils, or at least detracts from each effort. Can you spot them?

(Top to bottom): This Australian Mertens' water monitor (*Varanus mertensi*) was leaving the scene as I took this final shot. Note that the head is no longer in the preferred "up front" attention-grabbing position. The nocturnal lifestyle of the long-nosed snake (*Rhinocheilus lecontei*) may be one reason this one was actively resisting a quiet pose in the morning sun, resulting in this awkward overlap of its body as it tried to escape. I basically like this photo of a yellow and black dart-poison frog (*Dendrobates leucomelas*), but I was still careless in shooting from an angle that left that background leaf's bright central vein distractingly in line with the frog's eye.

blur (swaying bodies, vibrating tails, etc.) and calculate and control lighting needs. I'm now trying to unlearn my self-taught habit of excessive bracketing, at least somewhat, as modern units are so good that correct lighting is practically guaranteed. Now virtually every shot I take is lit beautifully, so I need take only as many as I

Reptile Nutrition Series

Iguana

Vegi Formula

... with
FRESH GREEN
LEAFY VEGETABLES
to duplicate
the Iguana's
NATURAL DIET.



SCIENTIFICALLY
FORMULATED

with ALL NATURAL INGREDIENTS to provide the optimum
attraction and balanced nutrition for the Green Iguana.

available in **JUVENILE or ADULT Diets**



with
EXTRA CALCIUM
and
VITAMIN D3



Also Try **Iguana Fruit & Flower Formula**

A **FROZEN** Product of OCEAN NUTRITION CORP. San Diego, CA 91950

wish to have as "in-camera dupes" for offering out to publishers.

Enough techno-babble. As a herper reading this, you already possess an advantage over free-lance photographers out on a reptile shoots to illustrate general interest articles. Your intimate knowledge of your subjects' natural histories is your insight. This increases with experience and awareness, and can't be quickly taught for the myriads of species and situations which necessitate individual experience. The same could be said of patience. Those lacking it totally "need not apply" for the job of herp photographer. Ultimately, nothing may be as valuable as the perseverance to wait out eventualities like the emergence of a timid box turtle's head or the ceasing of a sandfish's (*Scincus scincus*) relentless burrowing beneath the sandy substrate.

The following are some observations, techniques, and advice I've learned along the way which do not require expensive specialty equipment, yet can make a huge difference in the appeal of the finished product.

Choice of Subject

What's to discuss? The biggest, prettiest, and generally most spectacular specimen is virtually always the best choice for photography. This is often what we end up seeing on the pages of most publications, and it's no accident. People have always been fascinated by extremes of nature, especially as some animals' traits appeal to man's aesthetic sense of beauty more at certain ends of their ranges than others. An attractive specimen will attract more notice than a dull one for both the publication and the photographer. If a picture tells the story of a thousand words, a GREAT shot will shout out the message louder, clearer, and more unforgettably. Except for particular needs, such as showing ecdysis (shedding), injuries, natural variations in color or pattern, etc., shooting "the best" is good basic advice when the choice is yours to make and sale of slides is one of the intended goals.

This counsel is bound to make a few folks cringe at the suggestion that depicting normal or average representatives of a species is a waste of film. It actually works against those of us in herptile commerce to constantly have to favorably compare the stock we sell to the fantasy stunners adorning the month's hot new herp magazine covers or pictorial spreads. It also doesn't make identification of wild herps any easier when the picture in the book "doesn't look anything like the dull brown snake living under the house." The ultimate responsibility to recognize this human ten-

Frogs

Lizards

Reptile Specialties

John Uhem

Largest Selection of Chameleons Anywhere
C.B. • Farm Raised • Imports

Currently shipping
throughout the U.S. and abroad.

P.O. Box 11 • Tujunga, CA 91043 • USA
(818) 352-1795 • fax (818) 353-7381

Chameleons

Geckos

gency to photographically dazzle rests upon editors. They decide which submitted slides are most appropriate for the project at hand. The best plan is still to shoot the best, keeping in mind that "best" is not purely synonymous with our human concept of beauty.

In the following discussion of composition ideas, I've tried to stick to those that pertain particularly well to herps as opposed to drifting into a popular how-to lesson in "Beginning Photography 101."

Proper Habitat and Behavior

Herps are appreciated best when portrayed in some semblance of their natural habitat. This is especially true in light of the ecology movement that has stressed the importance of an animal's environment. Nothing beats a good quality candid photo taken in the field. When that's not an option, creating a shot choosing sand and cacti, as opposed to ferns and leaves, as the background for a Gila monster (*Heloderma suspectum*) will lend credibility if all other details are equal. An eastern indigo snake (*Drymarchon corais couperi*) basking on a tree limb would look as untypical as a vine snake (*Oxybelis*) peering up from a hole in the ground. Each reptile might be clearly in focus, but the "acting" is off and misleading, creating major distractions. Basically, simulate natural conditions to as great a degree as possible to compliment the subject for believable photos.

Low Angle of View

Humans are always looking down on herps—literally—and it becomes rather boring to also see them from above in pictures. A low, belly-to-the-ground level of view is vastly more interesting in virtually all situations. Maybe the simulation of eye-to-eye confrontation triggers some ancient danger instinct that now equates to excitement in the same way roller coasters provide us thrills. Or maybe the "equal footing" stance is more acceptable now that the dogma is "appreciate all wildlife as part of the ecological balance." Whatever the reason, consider getting down on knees and elbows to add a little pizzazz to that next thrilling shot.

Head Angle/Focus One Eye

Anywhere from a broadside lateral view to a straight-on front shot of the head is preferred in most poses. A posture of alertness adds life. Animals looking away from you are generally dull. The head, and particularly the eyes, are what people seek out first when initially spotting a herp, live or pictured. The business end of an animal always commands one's immediate attention. Avoid distractions behind it like the straight lines of twigs and leaf edges, the

camouflage of the animal's similarly patterned skin, bright leaves or singular spots of sunlight that "glow" among the background foliage, etc. Focus on the eye nearest to you. Base any further deviation from that primary focusing point when calculating the range of focus attainable in other parts of the picture. Don't forget to include the tail. Showing the tail in its entirety, helps to establish the total length of the specimen. And to not put it in plain sight on a rattlesnake, sea snake, or any of the stubby-tailed dwarf boids or skinks possessing unique caudal tips or colors would verge on herpetologically negligent photography.

Natural, "Comfortable" Pose

This is where a genuine familiarity with herps' individual idiosyncrasies separates the pros from the amateurs. The most common "offense" is when a snake appears in a loose heap of awkwardly intertwined coils that you can guess at a glance is a phony, human-induced pose. It looks as if had been stuffed under a bowl seconds before (a common calming technique for flighty snakes). The trick is to allow the animal a short time to relax after the shelter is pulled, a notion that often doesn't occur to an impatient or inexperienced person. This kind of flaw, typical of an "assignment" photographer totally unfamiliar with the day's subject and whose news story for tomorrow may be a fishing tournament, is obvious to a seasoned herper.

A variation of this "discomfort" occurs when trying to show a portion of the ventral surface by creating a clumsy loop of the body. Since belly-up isn't the normal resting stance of most healthy, non-gravid snakes, it helps to be creative to show dorsal and ventral views simultaneously. Sometimes the best compromise is a climbing scene where a section of belly can be aimed toward the camera as it drapes over a branch. If working in a studio, maintain a collection of three-dimensional props for natural obstacles so you're ready to show the venter of interestingly patterned species.

Two-In-One Shots

Related to the above idea of letting one shot take the place of two is capturing two or more different variations of a species on one piece of film. It can be as basic as setting "Blair's" and "alterna" phases of gray-banded kingsnakes (*Lampropeltis alterna*) together. Other examples include demonstrating sexual dimorphism or juvenile versus adult pattern coloration or size in the same picture. These comparative portraits hold substantial appeal to herpers,

and editors who get double duty out of the fee they pay.

Show Action

Liven things up by convincing the viewer that your subject is indeed alive and exciting. Besides the obvious examples of snakes shedding, turtles laying eggs, or cobras spitting or hooding, little things such as simple tongue flicks do wonders. It's a cinch with most snakes and lizards. Try a puff of breath directed at the head. The combined stimuli of air movement and strange (bad?) scent nearly always elicits the desired response. The assistance of an associate is handy to allow you to stay focused while waiting for the precise second to catch it. A strobe flash is also very helpful here to freeze the tongue's motion to capture on film the crisply focused prongs.

A slow hand movement near the herptile's head often achieves the same result, though it also may scare the animal into flight. Conversely, to make tiny adjustments to a nervous lizard or a snake's tail after it has finally settled into photographic stasis, use a slender tweezers, snake hook, or slender, but sturdy stick to maneuver the body part. It seldom frightens herps the way a hand does. Other examples of "action" can be as elementary as a gecko licking its eyeball or a chameleon aiming an eye turret in an unusual backward angle. Threat postures, like puffing throats or, simply, open mouths, add zest to portraits of herps that are otherwise "just sitting there." The difference between a monitor with its head down and chin resting on the ground, versus up in classic alert varanid stance, can make all the difference in the world.

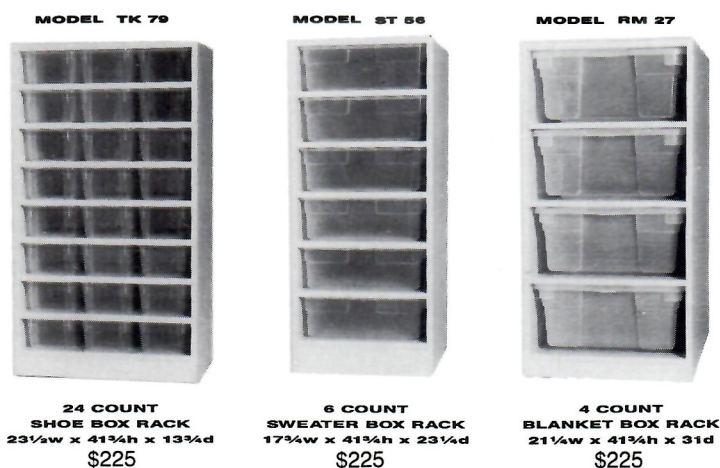
Action can be implied by a story about to unfold, such as the sight of a potential predator or prey species in close proximity to the subject, or a sleeping snake with a huge bulge inside. Partial concealment shots also logically lead one's mind to imagine the how and why of the scene, making them inherently more interesting.

The methods to be learned are only limited by the hours per day you're willing to devote to discovering and refining them. If just a few herpers are inspired or helped by the techniques I've outlined above, I'll feel I've passed the torch for dozens of shutterbugs who have constructively criticized me along the way, and who shared the tricks of their trade in doing so.





**WE OFFER PROFESSIONALLY
MANUFACTURED RACK SYSTEMS.
STOCK SIZES ARE AVAILABLE AND
CUSTOM ORDERS ARE WELCOME. THESE
UNITS ARE PRE-WIRED WITH UL RATED
HEATERS AND CAN BE SHIPPED READY
TO PLUG IN AND USE. RHEOSTATS AND
MICRO CLIMATE THERMOSTATS ARE
STOCKED AND SOLD SEPARATELY.**



CABINETS ARE CONSTRUCTED USING 3/4" WHITE THERMOFUSED MELAMINE. HEATERS ARE POSITIONED TO ESTABLISH THERMAL GRADIENT. EXACT TOLERANCES ARE PROVIDED FOR LIDLESS SYSTEMS.

**SANDMAR ENTERPRISES
484 VERNON WAY EL CAJON, CA 92020
619-579-2350 FAX 619-579-2106.**

Allocentric Biophilia

As an alternative to Edward Wilson's original definition, allocentric biophilia would be "the innate tendency to focus on the characteristics of mind in life and life-like processes." It is an awareness of mind in nature.

There is a second stage in the evolution of biophilia which becomes clearly apparent in prehistoric art dating back to 27,000 BP (before present). South African archaeologist Lewis Williams and others (1988) have presented a three-stage neuropsychological interpretation of certain forms of South African cave art and European cave art. The third-stage representations—the chimeras (part human, part animal forms), such as *The Sorcerer of les Trois Freres*, are clear indications of shamanic states of consciousness including identification with animals, and personal transformation as a result of that identification. We shifted (at least some of us) from a consciousness of what was other (other species) to a consciousness of consciousness (early-stage empathy) and to a consciousness of the content of the consciousness of that which was other (empathy). I call this second stage allocentric biophilia. It is an other-centered perception. (Not, "What can it do for me?" Rather, "What does it feel?" "What is it like?") This type of perception is strong evidence of "consciousness of consciousness" and of "consciousness of the content of consciousness" of a nonhuman species ("What does this animal feel? see? think?").

The ability to have empathy and compassion for animals must be linked to the emergence of compassion in humans. I see this empathy for animals as a spillover of increasing empathy and compassion in our protohuman ancestors. (See Eccles, 1989 for detailed information on changes in the limbic system in humans that are associated with increased empathy and altruism). Precisely when empathy and compassion emerged in human consciousness is difficult to determine, but it may have been an ongoing evolving process, possibly starting with *Australopithecus* and becoming more refined with the genus *Homo*. Interestingly, the evidence for compassionate behavior in other primates, including chimpanzees, is at best controversial (Eccles, 1989; Washburn, 1969; Goodall, 1971). For the genus *Homo*, the clearest evidence for compassionate behavior appears relatively late in the fossil record with the Neanderthals. Ceremonial burial customs dating back to at least

BYRON BARNES

CAPTIVE BRED RARE & UNUSUAL REPTILES

- Texas Alligator Lizards
- Albino & het. ruthveni
- Savu Island pythons
- Chondropythons

Call or write for
complete list of available species.

P.O. BOX 690423, S.A., TX. 78269
PHONE & FAX (210) 698-1268

Herpetoculture in a Changing World
Continued from page 11

Evolution of Awareness (or Consciousness) of an Other

Step 1. We become aware of another individual or another species (consciousness of an other).

Step 2. We become aware that the other individual or species is also aware (consciousness of consciousness).

Step 3. We become aware of what the other individual or species is aware of, from its perspective (consciousness of the content of consciousness of an other).

80,000–60,000 years BP, clearly suggest feelings for others and an awareness of death. Another interesting piece of evidence was the discovery of the skeleton of a Neanderthal man, apparently with birth defects and later injuries. This individual managed to survive for as long as 40 years. This would not have been possible without altruistic behavior from group members.

Empathy

My personal definition of empathy is: varying degrees of consciousness, or awareness, or experience of the content of consciousness of an other. Empathy can vary in its accuracy; it is not the distorted, overemotional, and anthropomorphic "empathic" experiences of some animal rights members or some pet owners.

Empathy is an important component of allocentric biophilia. I consider empathy to be an allocentric (other-centered) form of perception. What one does with the perception (such as react emotionally or indifferently) is a separate process. For many people who keep amphibians and reptiles, it is also an important, if not essential, aspect of herpetoculture. Herpetoculturists are transformed through their empathy for amphibians and reptiles. Indeed, it is the sudden satori-like realization of the existence of another type of awareness—in the beings with the slimy-skinned and scaled bodies—that usually captivates the budding herpetoculturist. The dragons and fantasy creatures see and experience the world in a different way than we do. Invariably, as a result of observing the behavior of the animals we keep, we develop an empathy—an inkling of the content of their awareness, of their psychological nature. This empathy for a nonhuman species is transformative. You see, feel, and know something that some others may not, because you have had an experience which they lack. It is a personal expansion of the experienced world and it can be a vehicle for transcendence. *To behold is to become.*

Empathy can be limited to certain areas of experience and can be limited by one's education, needs, etc. Empathy can be anthropomorphic—a process whereby one assumes the existence of, or projects the existence of, an homunculus (little man) in the mind of the animal. The result is an experience of animal as human in animal form—with limitations imposed by the animal body and mind, but at the core an entity that experiences the world as we do. This can be the result of autocentric perception and a drive to fulfill personal, social contact, and possibly neurotic needs.

DAVID BLAIR'S CRITTER CORNER

Call: (800) HERP-NUT

(800) 437-7688

For Orders or to Request a Catalog



Quality Lighting, Heating, Housing, and Nutritional Supplies
for Reptiles & Amphibians at Discount Prices by mail!

For Product Info. CALL:
CRITTER CORNER, INC.

316 W. Mission #117 Escondido, CA 92025

(619) 746-5422



Open 7 DAYS a WEEK
Mon - Thur 10 a.m. - 6 p.m.
Friday 10 a.m. - 7 p.m.
Saturday 10 a.m. - 5 p.m.
Sunday 11 a.m. - 5 p.m.

To differentiate empathy which may be distorted by one's personal needs or limitations from one that strives to be accurate, I have divided empathy into two categories. Autocentric empathy (self-centered, personal-need fulfillment, anthropomorphic) and allocentric or allomorphic empathy (other centered—literally *from* the point of view of the person or organism observed). Allomorphic empathy strives to obtain information to develop accurate experiential simulations or references of the experience of others. The basic steps to allomorphic empathy are as follows.

Step 1. Empathic identification with the body. The minute an animal is born it emerges from a world of aduality (in the womb or egg) and becomes aware of separateness because of sensory structures in the skin, including proprioceptive structures. An animal's body will play a key role in an animal's relationship to its environment and in determining experiential, activity, and ecological limitations. A temporary experience of identification with the body of an other ("What is it like to be robust?" "What is it like to have a long, thin cylindrical body?") is an important step in developing empathy for an animal. "What does it feel like being in this body?" "How does it feel to move with this body?" "How does it affect the way I experience the world?" "How does it affect my experienced relations to predators or prey?"

Step 2. Determining the sensorium. "What does an animal perceive?" Following the initial feeling of separateness and of experiencing body limits associated with birth, an animal will next experience information from its sensory apparatus. "What does it hear? smell? taste? feel?" Remember that this will also be affected by factors mentioned in No. 1. (above), such as height of the body from the ground and areas of activity. With reptiles, heat-sensing, and the taste and smell-sens-

ing associated with tongue flicking and the Jacobson's organ must be considered.

Step 3. Determining the interpretational system of an animal. "What are the components of its experience that have a meaning for it in terms of needs and drives?" "What does it feel?" "What does it think?"

Addressing the issues of biophilia, personal needs, empathy, transformation, and even transcendence are critical if we are to understand the scope of human needs and experiences that are satisfied by herpetoculture. *To behold is to become.*

The third article in this series will cover the collapse of an internal vision of the future and the resurgence of animal totemism. Stay tuned. . .

[Philippe deVosjoli's views are his own and do not necessarily reflect those of the American Federation of Herpetoculturists.—Ed.]

References

- Eccles, J. C. 1989. *Evolution of the Brain: Creation of the Self*. London, New York: Routledge. 282 pp.
- Diamond, J. 1993. New Guineans and Their Natural World. In: *The Biophilia Hypothesis*. Washington, D.C.: Island Press. pp. 251–274.
- Gans, C. 1992. The Status of Herpetology. In: *Herpetology: Current Research on the Biology of Amphibians and Reptiles*. Society for the Study of Amphibians and Reptiles. pp. 7–20.
- Goodall, J. 1971. *The Shadow of Man*. Boston: Houghton Mifflin.
- Kingdon, J. 1993. *Self-Made Man*. New York: J. Wiley & Sons. 369 pp.
- Wareham, D. C. 1993. *The Reptile and Amphibian Keeper's Dictionary*. London: Blandford. p. 101.
- Washburn, S. L. 1969. The Evolution of Human Behavior. In: *The Uniqueness of Man*. Amsterdam, London: North-Holland. pp. 167–189.
- Williams, L. J. D., and T. A. Dowson. 1988. The signs of all times. *Current Anthropology* (29): 202–245.
- Wilson, E. O. 1984. *Biophilia: The Human Bond with Other Species*. Cambridge: Harvard University Press.

Farm Raised

For Today And Tomorrow

Since 1957, Flukers has provided quality products at great prices, and we will continue to keep high standards while going the extra mile for customer satisfaction.

Choose from our complete selection of **Crickets, Mealworms, Iguanas, Veiled Chameleons, Geckos, and our renowned Fluker Labs Iguana Diet.**



Fluker Farms Est. 1957

Baton Rouge, LA.
☎(800)735-8537 Ask For Ext. 50

Kingsnakes - -Continued from page 26

age about 43–47 in (109–119 cm). The maximum recorded length is just over 5 ft (1.5 m). Peak surface activity for this snake is in April, May, and June. In the wild, a female typically lays a single clutch of 3–15 eggs depending on her age, size and condition. This contrasts with the potential for multiple clutching and larger clutch sizes in captivity.

The banded and striped color morphs of the California kingsnake were initially classified as two different subspecies, the banded as *L. g. boylii* and the striped as *L. g. californiae*. It was not until 1936, when the renowned San Diego herpetologist Lawrence Klauber hatched out both banded and striped young (as well as intermediate patterns) from a single clutch, that these morphs were reclassified under a single subspecies. The older term *californiae* took precedence (Pickwell, 1947).

Considerable variation in color pattern is evident in California kingsnakes. The expression of pattern varies widely within both specific populations and from one population to the next. However, the typical banded color morph is the most common wherever it occurs (Zweifel, 1981). Readers wishing a better understanding of

the Mendelian fashion of inherited color pattern in this species should refer to Zweifel's important 1981 paper, "Genetics of color pattern polymorphism in the California kingsnake."

Klauber acknowledged two standard patterns (ringed and striped) as well as three color morphs which he designated as "aberrants." The latter included individuals with mixed combinations of stripes and rings, broken stripes, and a dark ventral surface. Zweifel (1981) modified and expanded Klauber's list to include six naturally occurring morphs. Blaney (1977) also noted the tremendous variation within *L. g. californiae*.

Just within the state of California, there are eleven separate geographic areas of which the authors of this paper are aware, where individual specimens with distinctive color patterning routinely occur. No doubt other populations with varying percentages of aberrants also exist. However, to date, no quantitative analysis for the entire state has been undertaken. Without rigorous statistical analysis, a definitive statement assigning color morphs within California cannot, in our opinion, be made at this time.

Our goals, therefore, are merely to identify these individual natural variants and the specific areas of the state in which

they are found. It is through the selective captive breeding of these snakes that distinctive, captive-selected color morphs have been produced.

The first of these variants is the "Davis" phase from the lower Sacramento Valley. The "Fresno," "Mendota" and "faded washboard" phases are often lumped together as "San Joaquin Valley" kings. They occur in northern areas of Fresno County as well as southern Madera County, extreme eastern San Benito County and extreme southern Merced County. The "Newport/Long Beach" can be found in southern coastal Los Angeles County, coastal Orange County and northern coastal San Diego County. The "Covina/Whittier" is from central Los Angeles County. Interestingly, the area around Carlsbad in northern San Diego County has six different color variants including the "wide striped," "high spotted," "50-50 banded," "50-50 combination banded/striped," the "blotched" and the "triple striped." The Del Mar area in central coastal San Diego County is where "dash in stripe" and "banana banded" variants can be found. The "Winchester" occurs in central Riverside County. The "Santa Maria faded" is present in southern San Luis Obispo County and extreme northern Santa Barbara County. One of the most widespread variants, the coastal brown and cream striped, occurs over wide areas of San Diego County, Orange County and western Riverside County. In addition, the "black and white banded" and "black and white striped," both sometimes also referred to as "desert phase," are most common in southern California desert areas. The "Yuma" occurs in southwestern California extending well into Arizona.

We hope you enjoy this color essay which features several of the naturally occurring phases and a majority of the captive-selected color morphs that are now available to herpetoculturists.

Descriptions for illustrated captive produced color morphs

(see centerfold pg. 28-29)

Albino striped Cal King

The captive-produced color morph shown is typically obtained by breeding albino striped individuals, preferably those with an unbroken vertebral stripe, together. However, banded albino or heterozygous normal color phases with recessive genes for striping may also produce some striped offspring. Courtesy of L. Lemke.

Albino banded Cal King

This form has narrow yellow rings. The snake shown is bred for its yellowish color

and narrow yellow banding. In contrast, an albino desert banded phase typically has broad white rings. Courtesy of L. Lemke.

A clutch of Cal King eggs hatching

Note that normal-phase, striped, and banded individuals, as well as albinos are present in the same egg clutch. The parents of these were desert morph individuals heterozygous for albinism.

Blotched albino Cal King

This color variant is the product of parents from diverse blood lines. However, the high degree of lateral blotching suggests "Newport" founder stock. Courtesy of Bill Cochrane.

Hypomelanistic (lavender)

zig-zag striped Cal King

This captive-bred lavender morph comes in "J. D." and "J. R." strains. In order to typically get hypomelanistic offspring, each snake can only be bred to another of the same strain. If this is not done and a "J. D." is bred to a "J. R.," the result will be normal-phase offspring. As lavender babies mature, they develop into light-phase adults and lose much of the lavender coloring. By breeding individuals with less than perfect striping, zig-zag patterned individuals are occasionally produced. Courtesy of Bill Cochrane.

Hypomelanistic (lavender)

ringed Cal King

This form is produced by breeding either a "J. D." or "J. R." strain specimen to an individual of the same strain. This particular morph is characterized by cream-colored or yellowish rings. Courtesy of L. Lemke.

Albino desert banded Cal King (two headed)

This morph is distinguished by its striking, wide white bands. It is most commonly produced from breeding two desert-phase banded individuals together. Courtesy of L. Lemke.

50-50 dark-phase banded Cal King

The term "50-50" refers to equal parts yellow to equal parts black in the width of the bands which comprise the dorsal pattern. Additionally, "spotted" individuals are sometimes produced. These typically have random spotting or blotching laterally. Courtesy of L. Lemke.

Dark-edged Cal King

This morph is characterized by light scale edges with dark borders. It is a banded form similar to some coastal Southern California individuals. These characteristics are maintained by breeding snakes with similar pattern characteristics together. Courtesy of L. Lemke.



WEST COAST CHAMELEON FARMS

**LARGE SELECTION
OF CAPTIVE BRED AND
PARASITE FREE
IMPORTED ANIMALS.**

**SPECIAL ORDERS
WHOLESALE / RETAIL**

**(408) 685-8136
(408) 685-3166 Fax**

P.O. Box 585 • APTOS, CA 95001

Chocolate ghost Cal King

A relatively new aberrant-patterned form characterized by suffused blotching. This color pattern is most often achieved by breeding snakes with similar markings with each other. Courtesy of L. Lemke.

Banana Cal King

Two hatchling siblings are shown. The one to the left is the more typical banana yellow color while the one on the right is anerythristic (lacking red pigment). Courtesy L. Lemke.

Wide-banded Carlsbad Cal King

This form is typified by a striking light blotch on the neck and broad light-colored bands on the body. It is usually bred from

stock descended from the Carlsbad area of San Diego County in southern California. Courtesy of Brian Hubbs.

Broad-stripe Del Mar Cal King

This phase typically has random dark dashes within the light-colored vertebral stripe. It is most often produced from snakes with Del Mar bloodlines. Courtesy of Brian Hubbs.

Broken-stripe brown Cal King

A color morph that is typified by a broken light vertebral stripe or vertebral spots, dots, or dashes. It is most commonly produced by breeding ringed and

Continued on page 46

Dear Philippe de Vosjoli,

Sir, as a budding herpetoculturist I would like to personally thank you for founding the American Federation of Herpetoculturists (AFH). Thank you for the numerous books you have authored or co-authored regarding the keeping of reptiles in captivity and for your efforts in the arena of politics regarding herpetoculture.

Perhaps you receive "fan mail" regularly, perhaps not. I have no way of knowing. I know that I and others like me greatly appreciate the work and efforts of individuals like you. In regards to keeping reptiles, there is much misinformation out there. The "General Care and Maintenance" herpetocultural library series of books has proven invaluable in my efforts to provide the best care possible to my animals. I, like many others, sometimes initially know

little about the animals for which I am responsible. Some of the available material is inaccurate or incomplete. I would be at a real loss if it were not for the information I have found in the books you publish.

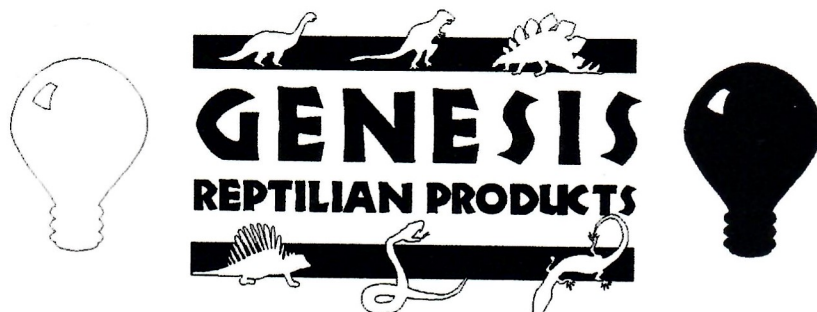
I assume that you are a very busy man and have little time for my frivolous letter but you deserve a pat on the back for your effort to improve the information and care techniques for animals that have inhabited this planet since long before we were here.

In closing, I would like to do what I can to support you and your organization. It is not much on my part financially but I would like the opportunity to join the AFH and receive your magazine. Once again, thank you and let me know if I can do anything to aid you and your organization.

*Sincerely,
Tommy Carpenter
Lubbock, TX*

Errata

The VIVARIUM inadvertently left out some text in the 6.2 issue *The Story Behind The Shot*. Our apologies to the author, Bill Love.



**IN THE BEGINNING THERE WAS LIGHT
AND IT WAS GOOD...**

**NOW THERE ARE GENESIS BULBS,
AND THEY'RE BETTER.**

The GENESIS bulbs are perfect for all of your reptile's needs. We offer Lunar and Solar bulbs that not only provide heat, but also give your reptile an ideal basking area. They are available in several sizes and wattages. GENESIS BULBS are uniquely coated from within to virtually eliminate chipping and scratching, while maintaining a natural day or night environment.

**AVAILABLE IN SELECT PET STORES AND BY MAIL ORDER
FOR MORE INFORMATION CALL (909) 599-3809
OR WRITE TO: GENESIS REPTILIAN PRODUCTS,
1034 W. ARROW HWY., SUITE D-175, SAN DIMAS, CA 91773
DEALER/DISTRIBUTOR INQUIRIES WELCOME**

Amazon Herp Expedition

*with
Philippe de Vosjoli and Bill Lamar*

Experience the Amazon river of Peru, the largest rainforest in the world, and home to 290 herp species.

April 8 - 15, 1995, with optional 1-week extension to April 22

Learn about our mightiest river, her fantastic herps, great wildlife, mystical pink dolphins, and exotic culture. We'll travel on our own chartered "floating hotel," hiking (day and night), swimming, fishing, and relaxing as we cruise some of the upper Amazon's more interesting tributaries. Such trips have averaged 75 to over 100 herp species.

Philippe de Vosjoli and Bill Lamar, two vastly experienced and internationally known herpetologists will guide you on this 8 day trip.

Contact GREENTRACKS, Inc., at 1-800-9-MONKEY or fax at 903-597-5131 for cost and application forms. Trip will be filled on a first-come-first-served basis.

Kingsnakes - Continued from page 45

striped specimens together or sometimes by breeding striped individuals to each other.

Reverse-stripe Cal King

One of the more recently developed color varieties, it was produced from progressive breeding of light banana-phase individuals to each other. Courtesy of L. Lemke.

Coast wide-stripe Cal King

This color morph is typified by a clean light dorsal stripe that is more than three scales wide. One of the more recently developed designer kings, it is produced from breeding striped Carlsbad individuals together. Courtesy of Brian Hubbs.

Acknowledgments:

The authors extend their appreciation to Bob Hansen, Brian Hubbs, Lloyd Lemke, Brian McGurty, Bill Cochrane, Ed Wiley, Gary Keasler, Ron Tremper, and Bob Applegate. These individuals have, over time, provided useful information on either natural or captive-produced color phases of the California kingsnake.

Literature Cited

Blaney, Richard M. 1977. Systematics of the Common Kingsnake, *Lampropeltis getulus* (Linnaeus). Tulane Studies in Zoology and Botany. New Orleans.

Markel, Ronald G. 1990. Kingsnakes and Milk Snakes. T.F.H. Publications, Inc. Neptune City, NJ. 144 pp.

Perlowin, David. 1992. The General Care and Maintenance of Common Kingsnakes. The Herpetocultural Library Special Edition. Advanced Vivarium Systems. Lakeside, California.

Pickwell, Gayle. 1947. Amphibians and Reptiles of the Pacific States. Stanford University, California.

Stebbins, Robert C. 1985. A Field Guide to Western Reptiles and Amphibians. Second Edition, revised. Houghton Mifflin Company, Boston.

Zweifel, Richard G. 1981. Genetics of color pattern polymorphism in the California kingsnake. The Journal of Heredity 72: 238-244.



Coming Events

February 18-19, 1995: Houston Family Pet Show will be held in Houston, Texas. For info, call (708) 469-4611.

February 18-20, 1995: Northern California Herpetological Society's 7th Conference on the Captive Propagation and Husbandry of Reptiles and Amphibians will be held in Davis, California. For info, contact: NCHS, P.O. Box 1363, Davis, CA 95616-1363.

March 4-5, 1995: Rhode Island Pet Show, Rhode Island Convention Center, Providence, Rhode Island. For info, contact: Osborne/Jenks Productions, Inc., ph. (203) 563-2111.

March 24-26, 1995: Chicagoland Family Pet Show, Illinois. For info, call (708) 469-4611.

March 31-April 2, 1995: 7th Annual Pet Industry Spring Trade Show will be held in Atlantic City, New Jersey. For info, contact: H.H. Backer Associates Inc., ph. (312) 663-4040 or fax (312) 663-5676.

April 8-9, 1995: South Jersey Exotics & Family Pet Showcase will be held in Cherry Hill, New Jersey. For info, contact: Vicki Clark, Expo USA, 503 E. Penn Blvd., Woodbury, NJ 08096, ph. (609) 848-3312 or fax (609) 384-6704.

April 21-23, 1995: America's Family Pet Show will be held in Pomona, California. For info, contact: GES, 16220 Carmenita Rd., Cerritos, CA 90701, ph. (310) 921-4648 or fax (310) 802-0542.

April 22, 1995: 18th Annual All Florida Herpetological Conference. University of Florida, Reitz Union. For info, contact: Dr. David Auth, ph. (904) 392-1721.

April 22-23, 1995: New York Pet Show, Rockland Community College, Suffern, New York. For info, contact Osborne/Jenks Productions, Inc., ph. (203) 563-2111.

April 28-29, 1995: North Texas Herpetological Society (NTHS) Spring Symposium, Arlington, Texas. La Quinta Inn & Conference Center. For info, contact K. C. Rudy, ph. (817) 274-4825.

April 30, 1995: Northern Ohio Association of Herpetologists (NOAH) Reptile and Amphibian Showcase will be held in Cleveland, Ohio. For info, contact: Matt ph. (419) 433-3639.

May 20-21, 1995: Chicago Herpetological Society's 2nd Annual Live Reptile & Amphibian Exhibition will be held in River Grove, Illinois. For more info, contact: Ron Humbert c/o CHS, 2001 N. Clark St., Chicago, IL 60614; or call (708) 620-7377.

June 23-25, 1995: International Gecko Society Symposium, Palm Springs, California. For info, see page 49 in this issue of *The Vivarium*.

July 6-9, 1995: International Congress of Chelonian Conservation, Gonfaron, France. For info, write to Secretariat, SOPTOM, B.p. 24, 83590 Gonfaron, France.

July 7-9, 1995: Herpetoculture in the Classroom, 2 graduate credit hours from University of Wyoming, will be held in Rock Springs, WY. For more info, contact: Dan McCarron, Science Dept., White Mountain Junior High School, P.O. Box 1089, Rock Springs, WY 82902, ph. (307) 382-4160, fax (307) 382-7351.

July 15-16, 1995: 2nd Annual International Reptile Breeders Convention will be in San Diego, California. For info, contact: IRBA, P.O. Box 85152-279, San Diego, CA 92186; ph. (800) 497-3550; fax (619) 263-6898.

August 8-13, 1995: Society for the Study of Amphibians and Reptiles (SSAR) Annual Meeting, Boone, North Carolina. For info, contact: Dr. Wayne Van Devender, Dept. of Biology, Appalachian State University, Boone, NC 28608, ph. (704) 262-2665.

August 19-20, 1995: National Reptile Breeders Expo will be held in Orlando, Florida. For info, contact: Wayne Hill, ph. (813) 294-2235.

August 25-30, 1995: Second International Asian Herpetological Meeting, Ashgabat, Turkmenistan. For info, contact: Theodore J. Papenfuss, Museum of Vertebrate Zoology, University of California-Berkeley, CA 94720.

August 26, 1995: New York Herp Expo, Syracuse, New York. Lemoyne Manor, 629 Old Liverpool Road, 9 AM-3:30 PM. For info, contact: Robert Cunningham, ph. (315) 446-9292.

August 27, 1995: St. Louis Reptile Breeders Expo, St. Louis, Missouri. Kirkwood Community Center, 9 AM-4 PM. Contact James Brumley, ph. (314) 892-6605 or (314) 845-2038.

September 2, 1995: Eastern Herpetological Expo, Pottstown, PA. For info, contact: G. Leonard Knapp, 215 Lawn Ave., Sellersville, PA 18960, ph. (215) 257-6088.

September 16-17, 1995: Mid-Atlantic Reptile Show, Baltimore, Maryland. Maryland State Fairgrounds. For info, contact: Tim Hoen, ph. (410) 557-6879.

September 30-October 1, 1995: International Reptile Breeders Convention, Concourse Plaza Hall, San Diego, California. For info, contact: Ray Busby, ph. (800) 497-3550.

September 30-October 1, 1995: First Annual Florida International Reptile Show will be held in Tampa, Florida. For info, contact: Doug Wagner, Suncoast Herp. Society, P.O. Box 2725, Dunedin, FL 34697, ph. (813) 736-1368.

October 8, 1995: Northern Ohio Association of Herpetologists (NOAH) Reptile and Amphibian Showcase will be held in Cleveland, Ohio. For info, Contact: Matt at ph. (418) 433-3639.

AMAZON



HERPETOLOGISTS, ENTOMOLOGISTS EXPEDITION

06/13 AUGUST 1995

EXPLORE & PHOTOGRAPH THE GREAT BIODIVERSITY OF THE FLOODED AMAZON RAIN FOREST

Led by research biologist in Herpetology and assisted by native, naturalist experts. Daily briefings, lectures, and day/night collection forays. Departs Port of Iquitos, Peru aboard riverboat "Amazon Discoverer" with American captain. *Thirteen years experience in the Peruvian Amazon.* Group size limited call for brochure.

**8 DAYS ALL INCLUSIVE FROM MIAMI
\$1598⁰⁰**

For details and reservations contact:

MARGARITA TOURS, INC.

Licensed • Bonded • Insured

P.O. Box 2513 • Ft. Lauderdale, FL 33303-2513
Phone/Fax: 305-764-8274

"We Are Professional Amazon Jungle Outfitters"

LORIO REPTILE SUPPLIES, INC.

Professional Herpetological Products

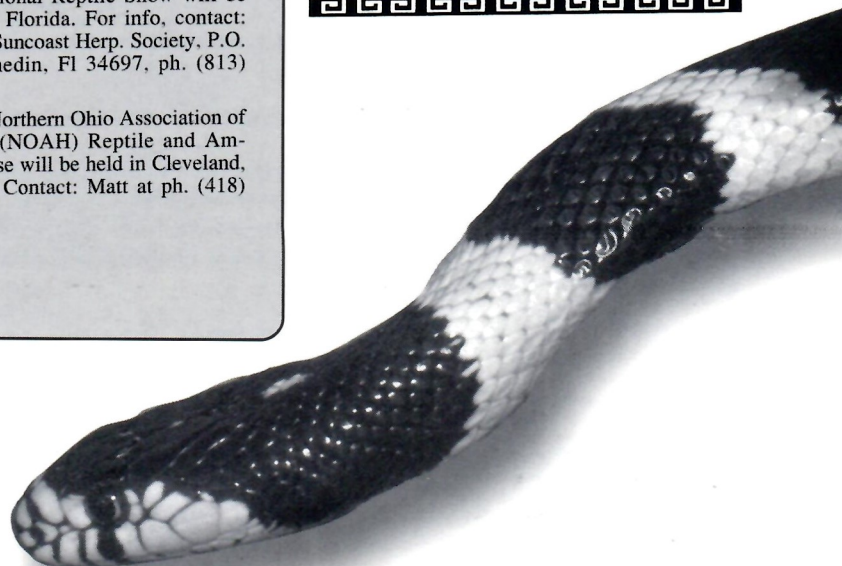
Also specializing in
rare Captive-Bred snakes.

*Dedicated to Excellence in Herpetology
and Customer Satisfaction*

For a free price list call:

(215) 757-8315

P. O. Box 892 • Langhorne, PA 19047



Classifieds

HOW TO PLACE A CLASSIFIED AD IN

THE VIVARIUM: Type or clearly hand write your ad in 30 words or less for a total of \$15.00. Any ad over 30 words costs \$0.50 per additional word. Payments must be made in advance and must include the correct amount in order to be placed in the next issue. Classifieds that run for one year (6 times) paid in advance, qualify for a 5% discount. For additional info, call (619) 747-4948 or fax (619) 747-5224.

Issue	Deadline
(6.5) March-April	Jan. 4
(6.6) May-June	Feb. 28
(7.1) July-August	May 1

THE VIVARIUM is not responsible for any false claims or misleading statements found in the classified ads.

ANIMALS

For Sale: Redding Reptile Breeders: A wide selection of captive-bred snakes. Write for our free 1994 price list. RRB, Box 1142, Project City, CA 96079, (916) 275-8782.

Free Pricelist of huge selection of quality captive-bred and cherry picked imports. Over 200 types of reptiles and amphibians on our monthly list to suit any taste and budget. For the discriminating collectors from beginners to advanced breeders, to pet shops, who want to stock nothing but the highest quality and variety at wholesale prices. Give us a call today at (813) 939-7377. Gulf Coast Reptiles, 3228 Fowler St., Ft. Myers, FL 33901.

For Sale: Tarantulas: mascarino spiderlings, juv., adults, price list, many species, goliath bird eaters, king baboons, tiger rump doppleganger, red

Martinique tree spider, more. 1187 Montecito Drive, Los Angeles, CA 90031, (213) 227-6566.

For Sale: AUSTRALIAN BEARDED DRAGONS (*Pogona vitticeps*) one month old \$75.00 each, 2 months \$100.00 each. Veiled chameleons: hatchlings \$75. Blue-tongued skinks: Northern \$200, Irian jayan banded adults \$200 ea., Australian water dragons (*Physignathus lesueurii*), 10-12" juveniles \$200 ea. Send SASE for pricelist and care sheets. Weis Reptiles, Rt. 4, Box 468, Tallahassee, FL 32304. (904) 574-1037.

For Sale: WHYTE ARK REPTILE. Northern California's leading reptile distributor offers a large, exciting variety of captive born and select imported herptiles. Highest quality wholesale/retail. Specialists in breeding rare tropical frogs. Call or fax for current projects or stock updates anytime. Ph./fax (415) 387-0927.

For Sale: R & M HERPETOCULTURE: Specializing in high quality captive-bred; colubrids, pythons, boas, iguanas and treefrogs. For a complete pricelist of available animals. Call or write: Rich Owings/Mark Walsh. 1435 Marsan Ct., Campbell, CA, 95008 (408) 374-9407.

For Sale: Looking for unusual snakes? Rare, collector specimens for serious herpetoculturists. Exclusively captive-bred. SASE to: Vince Scheidt, PO Box 22885, Dept. V, San Diego, CA 92192-2885.

For Sale: Captive-bred baby Bengal monitors. Born 7-6-93. Also have eggs incubating due to hatch this summer. First ever in U.S. mainland. New York sales only or with a U.S.D.I. permit. Call for info. Danny Gorman (516) 735-8283.

For Sale: Choice selection from over 35 of the most unusual reptiles being bred in captivity today. For the discriminating collector and investor. For free 1994 price list send SASE to: Bill Gaines, c/o GAINES REPTILES, INC., 6 Pine Tree Lane,



THE GOURMET RODENT™




RATS AND MICE

Bill & Marcia Brant
 6115 SW 137th Avenue
 Archer, FL 32618
 (904) 495-9024
 FAX (904) 495-9781
 © All Rights Reserved

Trafalgar, IN 46181, or call (317) 261-8417 (day), (317) 878-4042 (evening).

For Sale: Quality captive-bred pythons. Available in May, albino green patternless, green patternless, albinos, double and single heterozygous for all of the above. Competitive pricing. Special discounts on quantity purchases. Call for FREE price list. Clarence and Paula Hues d.b.a. H & H Reptiles. (409) 778-0742. Bryan, TX.

For Sale: QUALITY REPTILES at affordable prices. Snakes, lizards, turtles, tarantulas, frogs and a complete line of dry goods and frozen feed. For free monthly price list call or send SASE to special care 5, W. Prospect Ave. Pittsburgh, PA 15205. (412) 928-9433. Fax (412) 279-2913.

For Sale: SNAKES ALIVE! Captive-bred exotic, pythons, red-tailed boas, tri-colors, kings, gophers, corns and many albino snakes. Free 1994 price list available. Snakes Alive!, Star Route, Davis Creek, CA 96108. (916) 233-LIVE (5483).

For Sale: Captive reptiles from exceptional stock. If we don't have it, we'll find it, for you. Over 25 yrs. in the herp business. Hogg Is. boas, Turks Is. boas, emerald tree boas, gray band kings, Trans-Pecos rat (reg. & blond), lizards, turtles, frogs, insects, etc. Call or write for current stock. Black Canyon Reptiles, 3241 Calle Delabajada, Tucson, AZ 85746. (602) 883-1854.

For Sale: Bearded dragon hatchlings-\$65.00: Blue-tongued skinks-\$200; CB Chinese water dragon-\$40; Leopard geckos-\$20.00 and up. Call Bill or Lisa Applegate (704) 882-3486.

For Sale: SRI LANKA PYTHONs. These are one of the most beautiful large pythons, rarely offered for sale, and we have the best bloodline anywhere! \$300 ea. Jim Gregg (206) 776-3755.

For Sale: Adult and sub-adult specimens of African spurthigh tortoises, *Geochelone sulcata*. (909) 780-0715.

For Sale: QUALITY HERPS: Hogg Isle boas, all redtail forms, green & yellow anacondas, emerald tree, yellow phase Amazon tree, Kenyan sand, Dumeril's boas, yellow head retics, carpets, red phase carpets, green tree, diamond, ringed, D'Albert's, Macklott's, spotted, yellow phase scrub, Papuan, blood pythons, assorted colubrids, western hognose, red-eyed tree frogs, poison arrow, green basilisks, assorted monitors, blue-tongue skinks, Uromastix species, star, Kleinmann's, African spur, Hermann's, leopard & assorted tortoises & turtles. Too much to list. Honestly represented animals & no junk!! NEW ENGLAND REPTILE DIST. (serious inquires only) call Kevin or Josh (603) 382-6361.

For Sale: Baby Sonora black kingsnakes, \$25 & \$40; Cape kingsnakes, \$40; Indian python, \$300. Pick-up only at THE BONE ROOM (a natural his-

The Herpetocultural Library Series

The Cutting Edge of Herpetoculture. . .

Find out why these information-packed books have revolutionized herpetoculture by contributing to the successful propagation and husbandry of reptiles and amphibians. With over 1.5 books published to date, *The Herpetocultural Library* offers a series of bestselling books based on specific herps including green iguanas, ball pythons, red-tailed boas, box turtles, savannah monitors & much more!

*Rated by experts in their field as the most useful, no-nonsense books on the care and propagation of amphibians and reptiles.

*Recommended by herpetological societies and veterinarians nationwide.

*Written by expert herpetoculturists, not by professional writers.

Others have tried to imitate *The Herpetocultural Library Series*, but don't be fooled by the pretty pictures that don't address the essential needs of your pets. With a helpful, easy-to-read format, Advanced Vivarium Systems strives to publish literature that provides sensible guidelines and information to ensure the proper care and maintenance of reptiles and amphibians.

. . . Books That Save Lives

For additional information, please contact your local pet supplier or dealer for pricing and availability.

Published by: Advanced Vivarium Systems, Inc.
 P.O. Box 408 Lakeside, California 92040 USA

tory store) 1569 Solano Ave., Berkeley, CA. 94707. (510) 526-5252

For Sale: Burmese mountain tortoise, (*Manouria emys* ssp.) direct from breeder 93 yearlings \$350; 94 hatchlings \$225; captive born. Jacksonville, Florida. Vil Morgan. (904) 268-9671.

TORTOISES: red foots-leopards-Burmese mountain-stars. Monitors: crocodile-green & black tree-peach throat-roughneck-mangroves. Boas-Pythons-rare mammals and more. For a current price list send \$1.00 and a self-addressed stamped envelope to Living Jewels, PO Box 307 Hewitt, NJ 07421.

For Sale: WHOLESALE, PET STORES: We have reptiles, rodents & hard goods. We ship daily using UPS, postal & air. Call or fax for our weekly special. R&T Animals, 29005 Anderson Rd., Wickliffe, OH 44092.

PUBLICATIONS

AMERICAN DENDROBATID GROUP. Interested in Dendrobatid frogs, Mantellas or Atelopids toads? Consider the ADG, c/o Charles L. Powell, II, 2932 Sunburst Dr., San Jose, CA 95111-2264; (408) 363-0926. Bimonthly newsletter for \$10 a calendar year. Back issues for 1993 - \$10; 1992-\$5.

Wanted: Boa, python and colubrid snake husbandry and captive breeding articles for **THE VIVARIUM** magazine. Also desired are frog and salamander articles. Gratis copies of that issue and compensation available in exchange for articles. Writer's Guidelines are available from **THE VIVARIUM** Editor.

For Sale: HERP CLASSIFIED. Monthly classified publication for reptiles, amphibians, food items, supplies, literature, more. Excellent information source, worldwide circulation. Subscription \$14.00. Free sample. G.V.S., 2379 Maggio Circle #C, Lodi, CA 95240, (209) 369-7737 MC/Visa.

For Sale: 1995 HERPETOLOGICAL DIRECTORY. Excellent information source for private and commercial breeders, wholesalers, foreign exporters, societies worldwide, publications, agencies, suppliers of food items and supplies. \$15.00. G.V.S., 2379 Maggio Circle #C, Lodi, CA 95240, (209) 369-7737 MC/Visa.

For Sale: REPTILIAN MAGAZINE. Check out the European perspective in this monthly, full-color magazine from England. 12-issue (one year) subscription \$59.00. 6-issue trial subscription \$30.00. Sample copy \$8.00 post paid. Copies available for re-sale to stores. Serpent's Tale Books, 464 Second Street, Excelsior, MN 55331, phone (612) 470-5008, fax (612) 470-5013.



ALBINO BOA CONSTRICTORS

Peter Kahl
Reptiles

Specializing in Captive Born Boas & Pythons
FOR PRICE LIST, CONTACT: PETER KAHL REPTILES • P.O. BOX 150
LONG GREEN, MARYLAND 21092 OR CALL (410) 592-9675 • FAX (410) 592-6911

For Sale: Herp Books & Magazines. Huge selection at excellent prices with great service. Call or write for a current stocklist. Pet shops may request a wholesale catalog. Serpent's Tale Books, 464 Second Street, Excelsior, MN 55331, phone (612) 470-5008, fax (612) 470-5013.

1994-95 HERPETOLOGICAL BOOK CATALOG now out. Over 4,000 titles listed. Send \$2.00 refundable with order. Herp. Search Service & Exchange, 117 E. Santa Barbara Road, Lindenhurst, NY 11757.

SUPPLIES

Wanted: VitaLite® full-spectrum natural light. Dealers and distributors wanted. Supply breeders, stores and pet enthusiasts. New VitaLite® spotlight, screws into any socket. Also available, basking lights and red night lights. Free replacement warranty. Call Kenny, toll free See our ad on page 15. (800) 688-5826

For Sale: DURA-LAST CUSTOM CAGE & CABINETRY: Top quality, hand-crafted laminated wood products, reasonably priced. Free price list. Call (914) 961-2189 or send SASE to 82 Wallace St., Suite 5, Tuckahoe, NY 10707.

For Sale: The EXTRACTOR® Vacuum Pump. Powerful suction removes venoms & poisons directly from the bite cavity without cutting. For snakebites, spiders, stinging insects & more. \$16.00 per kit or two for only \$28.00. Price includes shipping & handling within continental USA. Certified check or money order, 1-2 week delivery, personal checks, 2-4 weeks. Outside continental USA add \$2.50 each

Advertiser's Index

Advanced Vivarium Systems	48
Amazon River Expeditions	47
American Reptile, Inc.	36
Barker, Dave-VPI	33
Barnes, Byron	42
Bean Farm, the	35
Big Apple Herpetological	35
Broder Merker	22
Bush Herpetological Supply	23
Captive Bred Wildlife	21
Carolina Mouse Farms	21
Clark, Bob	51
Cold Blooded	34
Critter Corner	43
Custom Cages	15
Florida Iguana and Tortoise Breeders ..	35
Fluker Farms	44
Genesis Reptile Products	46
Glades Herp	23
Gourmet Rodent	48
Helix Controls	33
International Gecko Society	49
Kahl, Peter	49
Krieger Publishing Company	16
Lorio Reptile Supplies	47
Mail Order Pet Shop	13
Maryland Reptile Farm	17
McElhaney Video Productions	34
Midwest Custom Products, Inc.	50
Naturer's Treasure	22
Nekton USA, Inc.	25
Neodesha Plastics	7
Ocean Nutrition	37, 40
Outback Herpetological Co.	36
Pet Warehouse	25
Pretty Birds	4
Rep-Cal	2
Reptile Haven	51
Reptile Resource Inc.	21
Reptile Service, The	9
Reptile Specialties	40
Reptile World	50
Sandfire Dragon Ranch	37
Sandmar Enterprises	42
Seven Generation Reptiles	17
Tetra Terra fauna	56
Vita Lite	15
West Coast Chameleon	45
West Coast Zoological	51
Zupreem	55

International Gecko Society Symposium

June 23-25, 1995
Palm Springs, California



Sean McKeown	Gecko fauna in the Hawaiian Islands
Arnold Kluge	Pygopodidae
Tim Tytle	Captive husbandry of <i>Coleonyx</i>
Frank Fast	Ecology of New Caledonian geckos
Aaron Bauer	Geckos of southwest Africa
L. Lee Grismer	Systematics of <i>Eublepharis</i>
Grant Macredie	Ecology of New Zealand geckos

Other speakers to be announced

Each registrant receives a copy of the proceedings.

• Deadline for registration at \$100 is May 1, 1995. Postmarked after this date registration is \$125 •

Hotel room: \$55 ⁰⁰ , single or double occupancy	Send check or money order for \$100 ⁰⁰ payable to:
Palm Mountain Resort. In US dial (800) 622-9451.	International Gecko Society Symposium
Outside US fax (619) 323-8937 or call (619) 325-1301.	P. O. Box 370423
	San Diego, CA 92137

Conference space is limited to the first 200 registrants.

REPTILE WORLD

IMPORTS OF TUCSON

SNAKES

LIZARDS

TORTOISES



Quality Exotic Reptiles From
Around the World

Captive Bred & Wild Caught

2727 E. Grant Rd
Tucson, AZ 85716

(602) 325-2340
FAX (602) 322-6164

Midwest Custom Products, Inc.

8608 E. 32nd St., Kansas City, MO 64129

Tel: (816) 861-3351 • Fax: (816) 861-4126

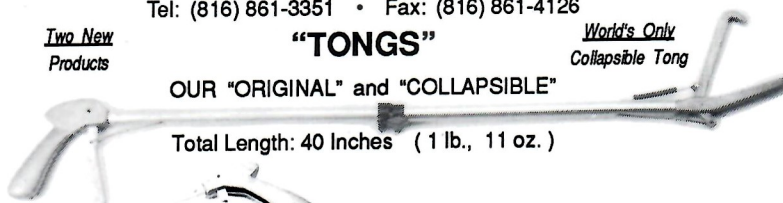
Two New
Products

"TONGS"

World's Only
Collapsible Tong

OUR "ORIGINAL" and "COLLAPSIBLE"

Total Length: 40 Inches (1 lb., 11 oz.)



Our 40 inch tong will collapse to under 22 inches in less than 10 seconds. Made to fit in most suitcases. Made with a "fine looking" anodized shaft!

Cost: \$70.00

Total Length: 39 Inches (8 oz.)

Our 39 inch hook will collapse down to 17 1/2 inches long. Made with anodized aluminum shaft and stainless steel hook.

Cost: \$38.00

"MOST POPULAR"

- *Our original 40 in. tong (25 in. also available), 1.7 oz. \$50.00
- *Std. 39 in. field hook (1/4 in. stainless steel hook), 8 oz. \$28.00
- *Heavy duty hook (39 in. lgth., 5/16 in. stainless steel hook), 9 oz. \$33.00
- *Small hook (3/16 in. stainless steel hook, 16-24 in. lgth.), 4 oz. \$17.00
- *Probes: Set of 6 probes (sizes ranging from .020—.187),
carrying case, lubricant (included). \$48.00

DISTRIBUTORS WANTED

and longer delivery. Golden State Distributing, PO Box 42831 Bakersfield, CA 93384. Dealer inquiries invited.

For Sale: Mouse watering equipment for sale! Used Edstrom Vari-Flo valves w/ 3/16" barb. Thousands available .50 each. Serious inquiries only, please. Call (909) 780-0715.

For Sale: HEATING ELEMENTS: Flexwatt "New" 4" 2.50/ft.; 11"-3.75/ft. Insulator clip sets 1.25. Non-light emitting Pearlco infrared heating—60 watt, 100 watt, 150 watt and 250 watt. 24.95 2/ \$48. Proportional thermostats with night time drop LCD display, very expandable, starting as mentioned \$115 and up. Also available, books, hooks, probes, vitamins, frozen rodents, captive bred and select cherry picked farm raised imported reptiles, amphibians etc. Wholesale and quantity pricing available! "Your satisfaction is our goal". Hours E.S.T. M-F 12:00 pm to 7:30pm; Sat. 12pm to 3pm. Serpent's Den, PO Box 952 Rt. 6 and 209, Milford, PA 18337-0952. Tel. (717) 296-5877. Fax (717) 296-4614.

For Sale: QUALITY REPTILE PRODUCTS through the mail. We are a research based distributor of heating, lighting, health, hooks, probes and books. Wholesale/bulk prices available. Write or call for a complete catalog of dry goods. The Bean Farm, 32514 NE 77th, Carnation, WA 98014-6701, (206) 861-7964 voice, (206) 333-4205 fax.

GIFTS & CLOTHING

For Sale: "DINOSAUR GALLERY," selling paintings, sculptures, jewelry, fossils, etc. is looking for reptile and dinosaur artists or related items. Mail info to: 2205 E. Valley Parkway, Escondido, CA 92027, tel# (619) 741-3260.

For Sale: Beautiful TURTLE & TORTOISE ART—Fine art cards & prints. For free brochure, contact Lightrein Productions, 1441 Everview Road, San Diego, CA 92110-1528; (619) 276-3501

For Sale: When in the Bay Area, come see THE BONE ROOM, the largest selection of natural history items in the West. We have bones, insects, fossils, jewelry and animal remnants. 1569 Solano Ave., Berkeley, CA 94707 (510) 526-5252. Ron Cauble, owner.

RODENTS, ETC.

THE MOUSE FACTORY: Quality feeder mice and rats for sale. All orders are properly processed to insure quality control. Price: Pinkies \$25/100, Fuzzies \$30/100, and weanlings \$35/100. Ray Queen, P.O. Box 85, Alpine, TX 79831, (915) 837-7100.

THE GOURMET RODENT: Rats and mice-pinkies, fuzzies and adults. For info, contact: Bill Brant, 6115 S.W. 137th Ave., Archer, FL 32618. Phone (904) 495-9024. We now accept Visa and Mastercard.

SUWANNEE MOUSE FARM: Quality frozen mice & rats at reasonable prices. Pinkies and fuzzies—.35, hoppers and weaners—.40, adults—.45. discount 600 and up. PO Box 14, Suwannee, FL 32692. (904) 542-2247. Next day air.

For Sale: Pinkies, fuzzies, juveniles, and mature mice and rats. Also, live mice and rats. Will contract in quantities. SUPERIOR RODENTS, PO Box 284, Wetumka, OK 74883. Tel. (405) 452-3170.

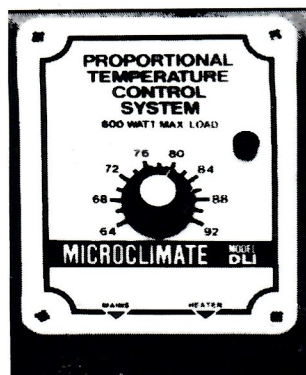
For Sale: RODENTS ON THE ROAD: For all your special feeding needs. Live or frozen rats and mice, all sizes available. Mealworms and chicks also available. Discount prices on quantity orders. All orders are shipped next day air. Call or write for prices. Rodents On The Road, PO Box 935, Anthony, Florida 32617-0935.

WANTED

Wanted: Boa, python and colubrid snake husbandry and captive breeding articles for *THE VI-*

MICROCLIMATE ELECTRONIX

AT LAST A FULL RANGE OF AUTO-DIMMING THERMOSTATS DESIGNED FOR HERPETOLOGICAL USE

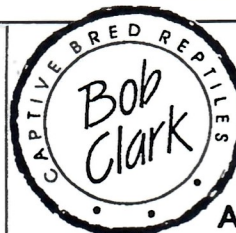


- No stress from flashing lights.
- Accurate temperature scale.
- Heat source gives constant dependable warmth.
- Field tested for over 4 years.
- Remote sensor allows for outside mounting of thermostat.
- Indicator on front panel dims and brightens with heat output.
- Optional capability of maintaining lower night temperature automatically.

The Microclimate continuous feedback circuitry constantly makes minute adjustments in the power output and effectively eliminates the differential caused by the on/off cycle of conventional thermostats. While other thermostats turn the heat on as the temperature falls and off again as the temperature rises the Microclimate thermostat is always on but only at the level needed to maintain the set temperature.

BOB CLARK
12316 VAL VERDE DR.
OKLAHOMA CITY, OK 73142

Fax# (405) 749-0798
Tel# (405) 722-5017



**ALL
AVAILABLE
PYTHON
COLOR
AND PATTERN
MORPHS**

Consistently first producing new varieties for the market

- Albino Burmese Pythons 1986
- Labyrinth Burmese Pythons 1990
- Albino Ball Pythons 1991
- True Striped Ball Pythons
- Hypomelanistic Burmese Pythons
- Leucistic Burmese Pythons

Other python species also available

**SPECIALIZING IN THE CAPTIVE
PROPAGATION OF PYTHON**

12316 Val Verde Drive
Oklahoma City, OK 73142
U.S.A. (405) 722-5017
FAX (405) 749-0798



VARIUM magazine. Also desired are frog and salamander articles. Gratis copies of that issue and compensation available in exchange for articles. Writer's Guidelines are available from *THE VIVARIUM* Editor.

Wanted: AUTHORS for *THE VIVARIUM*: For guidelines, write to *THE VIVARIUM* Editor, AFH, P.O. Box 300067, Escondido, CA 92030-0067.

Attention: Foreign Experienced Wildlife Writers. High quality reptile or amphibian articles written in proper English and with a Macintosh or IBM compatible software disk wanted. Write to: *THE VIVARIUM* Editor, AFH, P.O. Box 300067, Escondido, CA 92030-0067 for current Writer's Guidelines and compensation info. Yearly memberships are available in exchange for an article.

Wanted: Quality captive bred non-venomous and venomous reptiles, amphibians and arachnids. Contact Serpent's Den, P.O. Box 952, Rt. 6 and 209, Milford, PA 18337-0952. Tel. (717) 296-5877. Fax (717) 296-4614.

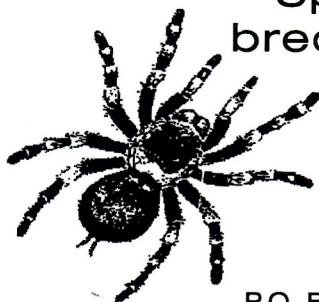
Wanted:PHOTOS OF BOA CONSTRICTOR WANTED FOR BOOK. Many photos of each subspecies and nationality are desired for publication in an upcoming book on this species. Shots of *B. constrictor* in its natural habitat are especially needed. No photos will be published without explicit permission. See address below.

SE SOLICITAN FOTOGRAFÍAS DE *BOA CONSTRICTOR*. Hacen falta varias fotos de cada subespecie y población para publicarse en un libro próximo sobre esta especie. En especial se buscan imágenes de *B. constrictor* en su ambiente natural. No se publicará nada sin permiso. William D. Joy, P.O. Box 300703, Arlington, TX 76007-0703, USA.



WEST COAST ZOOLOGICAL

Specializing in Captive
bred Tarantulas & Reptiles

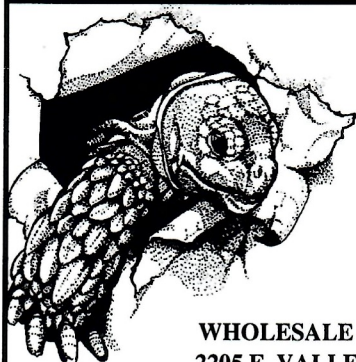


(619) 672-3143
FAX (619) 672-6235



Call or Fax
for FREE Price List

P.O. Box 720849 San Diego, CA 92172-0849



REPTILE HAVEN

1,000's IN STOCK

Captive-bred & Imported:

- Boas & Pythons
- Turtles & Tortoises
- Lizards
- Frogs

WHOLESALE • RETAIL • BUY • SELL • TRADE
2205 E. VALLEY PKWY, ESCONDIDO, CA 92027

Wholesale price list available (sorry we do not send retail price lists)

TEL# (619) 741-0127

FAX# (619) 489-6778

SAN ESTEBAN CHUCKWALLAS

Sauromalus varius

AN ARIZONA-SONORA DESERT MUSEUM DELIGHT

by
Randall L. Gray

We're driving through the Sonoran Desert and it's hot, but, like a lizard, that's the way I like it. I spent three years with the Tohono O'odham Indians just 50 miles (80 km) west of here and never minded the hot days because the desert always entertained me with its biological diversity. With the summer heat eventually comes the rains which renew life on the desert. Those wet summer evenings are full of the cries of Couch's spadefoot (*Scaphiopus couchii*) and Sonoran green toads (*Bufo retiformis*) and the low-pitched call of the northern casque-headed frog (*Pternohyla fodiens*).

My friend Marty Cordano is complaining about the heat and argues that we should return to the cooler White Mountains where we just spent the last week trying to photograph black bears and red squirrels for *Arizona Highways* magazine. I ignore his complaints because he worked me hard climbing those mountains, trying to locate a photogenic bear. Now it's my turn to bask in my preferred habitat.

We are almost to our destination, and I am ready to talk lizards and who better to do it with than Howard Lawler, Curator of Herpetology and Ichthyology at the Arizona-Sonora Desert Museum (ASDM) just west of Tucson. The museum is a world-class facility located within the Sonoran Desert. The museum displays the biology and geology of this diverse and biologically rich desert which extends from southern Arizona into northern Mexico. Sometimes it is hard to tell which animals are on display and which just crawl in for a visit. Many years ago my wife and I watched a wild western diamondback rattlesnake devour a desert cotton tail rabbit on one of the paths that winds through the museum.

When we arrive, I find Howard as I remembered him, a dedicated scientist, articulate, and full of energy and enthusiasm for what he loves, the animals and plants of the Sonoran desert. Like most of us who enjoy the company of herps, Howard began keeping snakes and other herps as a small

child. This early predilection, followed by continued interest, led him to his first job as keeper and lecturer at the Kentucky Reptile Garden near Mammoth Cave National Park. He later pursued a bachelor's degree in biology and education at Belmont University, Tennessee and for a while taught biology in Florida and Kentucky.

In 1970 Howard left teaching to become Assistant Curator of Herpetology and then Curator of Education at the Zoo Atlanta. After nine years with Zoo Atlanta, he left to become the Curator of Herpetology at



Howard Lawler proudly holds one of the San Esteban Island chuckwallas (*Sauromalus varius*) at the ASDM. Photo by Randall L. Gray.

the Knoxville Zoological Gardens in Knoxville, Tennessee. He worked for Knoxville for nearly three years before moving to his present position as Curator of Small Animals at the ASDM.

As we sit in his air-conditioned office (I will not admit to Marty that it feels good!), Howard begins to unveil an ambitious plan. Over the next decade or two, the ASDM plans to incorporate its reptile and amphibian exhibits into holistic ecological displays of the major biogeographic subdivisions of the Sonoran desert. The

idea is not to show herps as an entity unto themselves, but as part of the larger plant and animal communities of which they are a member. As part of this vision, the Museum is finalizing a desert grassland exhibit which embodies the biological community concept and which will contain a number of species of reptiles.

Soon the conversation turns to herpetoculture. We learn that one of the main goals of the museum is the long-term propagation of species endemic to the Sonoran desert. So far the museum has successfully bred thirty-two species and subspecies of reptiles and amphibians. Howard credits his staff's coordinated efforts as the reason for this success.

Howard believes that captive propagation is, in many cases, more of an ecosystem/biodiversity educational tool than a major conservation tool as such. Many of the animals propagated in captivity are often unsuitable for reintroduction to the wild and could even transmit or carry diseases to native populations. Perhaps the most important and effective conservation strategies center around the preservation of habitat and controlled harvest of wild populations. Captive propagation can relieve the harvest pressure on some species. In addition, some high profile, genetically managed species, for instance, the Jamaican Iguana (*Cyclura collei*), can benefit from well conceived interagency propagation and reintroduction programs.

Howard was recently elected President of the International Herpetological Symposium (IHS) for 1994-1995. This annual meeting has historically focused on the captive propagation and husbandry of reptiles and amphibians. Howard eagerly talks about the new direction for IHS. He feels that there are now a number of outlets for captive propagation information, therefore IHS needs to expand its niche. Presently there is a lack of publication outlets on the natural history of reptiles and amphibians. Howard envisions more IHS focus on this topic and its relationship to the successful husbandry of reptiles and amphibians in captivity. He quickly points out that future conferences will continue to include papers on veterinary medicine and captive propa-

gation in addition to natural history presentations. He ends the discussion with the assertion that natural history is the driving force in herpetoculture.

I first met Howard at an IHS conference in 1985 where he presented a paper on the captive propagation of the San Esteban chuckwalla (*Sauromalus varius*). This large chuckwalla species lives only on a small desert island in the Gulf of California. This lizard has been subject to past human exploitation and has been listed for some time as endangered under the Endangered Species Act of Mexico. It is also on Appendix 1 of the Convention on International Trade in Endangered Species (CITES).

I ask Howard if the private sector can contribute to conservation-oriented breeding programs for the San Esteban chuckwalla and other species because zoos have limited resources and housing facilities. He points out that many zoos and similar institutions, including the ASDM, have begun cooperative efforts with private breeders and he expects this trend to continue. He quickly adds that the museum has established housing and nutritional criteria that the private cooperator must adhere to when they receive an animal on loan. In addition, animals loaned or given away by the museum must not enter the commercial trade.

Howard explains that he does not object to the commercialization of some species, but he firmly believes that conservation must come first. He worries that if San Esteban chuckwallas were readily available in the pet trade, the wild population of only 4,500 animals could be easily exploited and masqueraded as captive born. He is obviously concerned about the security of this endangered lizard in the wild and has personally been involved with extensive field research on San Esteban with the support of the Mexican government.

After several hours of discussion I ask if we can visit the museum's colony of San Esteban chuckwallas. On our way out of the office we pass through a holding room where several dozen two-year-old captive-bred San Esteban chuckwallas are housed in indoor enclosures.

Behind Howard's office are several large outdoor ar-

reas surrounded by a 3-ft (1 m) high concrete block wall skirted with sheet metal on the upper 18 in (46 cm) to prevent lizards from climbing out. In the center is what appears externally to be a gradually sloping 6-ft (2 m) high hill covered by rocks. Inside this man-made hill is a small room into which the San Esteban chuckwallas can retreat through horizontal PVC pipes. Each pipe extends into a chamber, of which there is one for each lizard. Inside this night house, the temperature is thermostatically controlled during the late fall, winter, and early spring. The enclosures are planted with species of edible desert plants including desert ironwood trees, the leaves and flowers of which are an important part of the diet for San Esteban chuckwallas. It's obvious that an understanding of the ecology of the San Esteban Island chuckwalla from Howard's field work was used in designing all aspects of this outdoor/indoor breeding enclosure.

San Esteban chuckwallas are the largest living species of chuckwalla. They may live as long as 40 years, reach 2 ft (0.6 m) in total length, and weigh as much as 4 lb (1.8 kg). Studies indicate that they do not reach sexual maturity until 8 to 12 years of age and,



A San Esteban Island chuckwalla (*S. varius*) prepares to make a dash into the artificial burrow system. Photo by Randall L. Gray.

even then, they do not reproduce every year. Reproduction in San Esteban chuckwallas in the wild is at least partially dependent upon the infrequent rains on the island which stimulate vegetation growth. Feeding on the resulting rain-generated vegetation allows the females to store sufficient fats for egg development.

The museum placed 8 male and 13 female captive San Esteban chuckwallas into their large, off-display, naturalistic enclosure in 1981. The females dig nest burrows near the enclosure's outer walls and typically deposit their eggs from mid-June to early July. Each female defends her nest for four to six weeks to prevent other females from using the same site. Since 1981



The San Esteban Island chuckwalla (*Sauromalus varius*) is the largest member of its genus. Photo by Sean McKeown.



Howard Lawler removes a San Esteban Island chuckwalla (*S. varius*) from one of the temperature-controlled artificial burrows. Photo by Randall L. Gray.



Hatchling *s. varius* at 14 days. The juvenile pattern is variable depending on temperature. When warm, the color is light gray to beige with numerous small black spots. At cooler temperatures, the ground color is dark gray with reddish-brown bars across the middorsum. Photo by Howard E. Lawler.

the colony has produced 205 progeny representing 10 maternal blood lines.

Unfortunately, the museum has not had similar success with breeding the spiny (Angel Island) chuckwalla (*Sauromalus hispidus*). This large insular Gulf of California species is similar in many ways to *S. varius*. However, the ecological requirements must be significantly different as the spiny chuckwallas at the ASDM have not bred there since 1987, even though they have been kept under very similar conditions to the San Esteban chuckwallas. The Ft. Worth Zoo, one of the first to captive breed spiny chuckwallas, also has not had reproductive success since 1977. Fortunately, several private breeders, such as Mike Luhrs, have reproduced this species in recent years. This underscores Howard's belief that more natural history information

is required to help identify the combination of environmental conditions needed to ensure the successful propagation of this species.

The desert sun is hanging low in the western sky and I realize that we have spent most of the afternoon visiting with Howard. We say our goodbyes because I promised Marty a good dinner in Tucson before he drops me off at the airport. As we drive east I see smoke hanging over the Catalina and Rincon Mountains where wild fires have been burning for several weeks. Everyone is waiting for the summer rains, which are now several weeks late, to put out the fires, cool the desert, and awaken the sleeping desert toads.

The thought of rain causes me to wonder if it rained on Isla San Esteban this year and whether the chuckwallas are digging



Off display breeding enclosure for San Esteban Island Chuckwallas (*S. varius*). Photo by Randall L. Gray.



A San Esteban Island chuckwalla (*S. varius*) basks in the outdoor enclosure at the Arizona-Sonora Desert Museum. Photo by Randall L. Gray.



Juvenile *S. varius* at 17 months. The piebald pattern is increasingly evident as the juveniles grow, usually first appearing at about six months. The pattern will continue to change over a three-period. Photo by Steven J. Prchal.



S. varius eggs are unusually large, ranging from .46 - .63 ounces (13 to almost 18 grams) in weight. Clutch size ranges from 18 to 30 depending on the size of the female. Photo by Howard E. Lawler.

their burrows as they have done for tens of thousands of years. Whether the rains come or not, the Sonoran desert and nearby islands in the Gulf of California will continue and hopefully, with Howard's help, so will the unique San Esteban chuckwalla.



SERVED IN
FINER TERRARIUMS
EVERYWHERE.



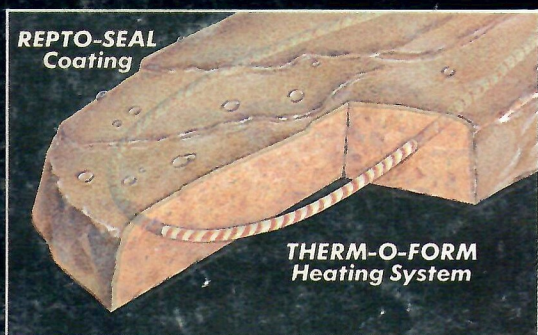
ZuPreem is proud to introduce an exciting new line of reptile diets. Nutritionally complete and made from the finest ingredients, ZuPreem is the best option for feeding your reptile. To serve ZuPreem yourself, just go to your favorite pet food retailer. Or call 1-800-345-4767 for more information.

ZuPreem



NEW!

Tetra Terrafauna SizzleStones™... Look how they've improved!



A successful terrarium starts with healthy reptiles. Most reptiles need "belly heat" for proper food digestion and comfort. For years, this warmth has been provided by Tetra Terrafauna's patented Sizzle Stones. And now there's great news... Sizzle Stones just got better—a lot better. Here's how.

Regular and Super Sizzle Stones now feature a new heating system—THERM-O-FORM™—a temperature controlled heating conduit, formed into an oval shaped insulated coil embedded inside the Sizzle Stone. Heat is disseminated over the entire surface area of the stone at a pre-regulated temperature range to ensure safety, creature comfort, and increased body temperature for proper food digestion. And there's more... all Sizzle Stones are now coated with REPTO-SEAL™ to protect the stone surface, reduce bacteria build up, and make cleaning easy and quick.

Sizzle Stones are now available in three natural colors... Eastern Bluestone, Western Redstone, and Desert Sandstone... to create an authentic landscape, and duplicate a reptile's natural habitat!

Tetra Terrafauna Sizzle Stones—pioneers in successful terrariums... in the past, the present, and for the future.

Tetra   **Terrafauna®**

If reptiles could talk, they'd ask for Tetra Terrafauna.

Tetra Sales (U.S.A.), 201 Tabor Road, Morris Plains, NJ-07950,
Canadian Rep: R.C. Hagen, Ltd., Montreal, Quebec