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<http://www.cnah.org/khs>

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Front Cover: An adult Crawfish Frog (Lithobates areolatus) from Bourbon County, Kansas. Photograph by Suzanne L. Collins, Lawrence, Kansas.

Journal of Kansas Herpetology

NUMBER 33 — MARCH 2010

TABLE OF CONTENTS

KHS BUSINESS

Kansas Herpetological Society Spring Field Trip..... 2
 Kansas Herpetological Society Executive Council Meeting, by Suzanne L. Collins..... 4
 Kansas Herpetological Society Annual Financial Report 2009,
 by Mary Kate Baldwin & Eric Kessler 5
 Pay Your 2010 Dues..... 5
 KHS 2010 Fall Field Trip..... 5

GEOGRAPHIC DISTRIBUTION

Ambystoma mavortium Kansas, by Brian Hubbs & Curtis J. Schmidt..... 6
Lampropeltis triangulum Kansas, by Brian Hubbs & Chad Whitney..... 6
Lampropeltis triangulum Nebraska, by Brian Hubbs & Chad Whitney..... 6
Tantilla nigriceps Kansas, by Brian Hubbs & Chad Whitney 6
Heterodon nasicus Nebraska, by Brian Hubbs & Chad Whitney 6
Tropidoclonion lineatum Kansas, by Suzanne L. Collins & Joseph T. Collins 6
Tropidoclonion lineatum Kansas, by Brian Hubbs & Chad Whitney 6
Graptemys pseudogeographica Kansas, by Dan Krull 6

OF INTEREST

Smooth Earth Snake and Redbelly Snake Population Survey,
 by George R. Pisani & William Busby 7
 Book Announcement: *Timber Rattlesnakes in Vermont and New York*..... 7
 Common Kingsnake Carved Up..... 8
 Reptilian Repast Reprehensible..... 8

IN MEMORIAM

Henry S. Fitch — A Tribute,
 by Dwight R. Platt..... 9

ARTICLES

Effect of Education Programs on the Knowledge and Attitudes
 about Snakes in San Isidro de Upala, Costa Rica
 by Ashley Gramza & Stanley Temple.....12

KHS BUSINESS

KANSAS HERPETOLOGICAL SOCIETY SPRING FIELD TRIP

The 2010 Spring KHS Field Trip will be held at Fall River State Park in Greenwood County, Kansas. KHS members will gather as early as Friday evening (23 April 2010) at Gobbler's Knob Campground in the Fredonia Bay Area at the location displaying a large KHS sign. To familiarize yourself with Fall River State Park, consult the map on the facing page.

Restaurants and motels are available in nearby Eureka and Fredonia (see the KHS web site for a list). Maps and other information will be available at the campsite each day at 9:00 am.

Facilities at Fall River State Park consist of camping areas, restrooms and showers.

KHS herpetofaunal counts will officially take place from 9:00 am to 5:00 pm on Saturday (24 April) and on Sunday (25 April) from 9:00 am to noon. Individuals wishing to participate should meet at the KHS sign at Fall River State Park on both dates at 9:00 am.

Herpetofaunal opportunities abound at Fall River State Park and in the surrounding vicinity. The area is largely unexplored, herpetologically, and offers the chance to produce several significant additions to our understanding of amphibian, reptilian, and chelonian distributions and natural history in this area of Kansas.

Dan Murrow has several activities planned, and will be directing us to several sites that offer prime herping habitat. Several turtle traps will be set at strategic locations and participants will assist in setting them up.

KHS Field Trips are an excellent opportunity for both students and adults to observe and learn field techniques by watching experienced herpetologists actively search for amphibians, turtles, and reptiles. Dan Murrow, Mary Kate Baldwin, Kathy and Mark Ellis, Dan Johnson, Eric Kessler, Dan Carpenter, Derek Schmidt, Larry L. Miller, Curtis J. Schmidt, Travis W. Taggart, Joseph T. Collins and many others have engaged in herpetological field work in Kansas for decades; most of them will be present at these KHS field trips to assist people. In addition, well-known herpetological photographers such as Larry L. Miller and Suzanne L. Collins are usually present at KHS field trips; they can supply you with tips and advice on how to photograph many of the creatures discovered on a KHS field foray.

If you plan to attend the KHS Spring Field Trip, be prepared. You should minimally have heavy gloves, hiking boots, and a flashlight. In addition, it is useful to have a field notebook and pen or pencil. Field

notes are very important and provide much additional information about your field activities, information that you might need to resource in the future. Other field items that will improve your KHS experience are bottled water and snacks; remember, you are often not near any grocery stores or fast-food outlets. Maps, such as the one accompanying this article are an important adjunct to any field trip. If you don't want to bring this issue of the *Journal of Kansas Herpetology* with you, make a copy of these pages and don't forget them.

A list follows of amphibians, reptiles, and turtles already recorded from Greenwood County based on data in the *Kansas Herpetofaunal Atlas*.

AMPHIBIANS

American Toad
Woodhouse's Toad
Blanchard's Cricket Frog
Gray Treefrog complex
Spotted Chorus Frog
Boreal Chorus Frog
Great Plains Narrowmouth Toad
Crawfish Frog
Plains Leopard Frog
Bullfrog
Southern Leopard Frog
Barred Tiger Salamander
Smallmouth Salamander
Red River Mudpuppy

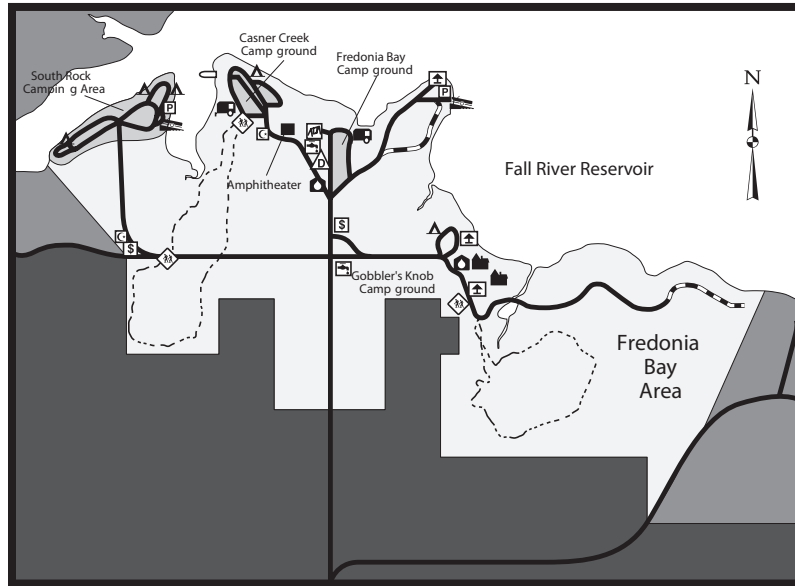
TURTLES

Common Snapping Turtle
Northern Painted Turtle
False Map Turtle complex
Eastern River Cooter
Eastern Box Turtle
Ornate Box Turtle
Slider
Yellow Mud Turtle
Common Musk Turtle
Spiny Softshell

REPTILES

Western Slender Glass Lizard
Eastern Collared Lizard
Lesser Earless Lizard
Texas Horned Lizard
Five-lined Skink
Great Plains Skink
Northern Prairie Skink
Ground Skink
Six-lined Racerunner

A map of Fall River State Park, site of the KHS 2010 Spring Field Trip. The Society will gather at Gobbler's Knob Campground in the Fredonia Bay Area. Campground includes a showerhouse and camping.



KANSAS STATE PARK LEGEND			
Park Area		Parking Area	
Camping Area		Pay Stations	
Other Public Lands		Potable Water	
Dam or levee		Shower/Toilet	
Private Lands		Vault Toilet	
Paved Roads		Trailer Dump Station	
Gravel Roads		Boat Ramps	
Park Entrance		Dock/Pier	
		Swimming Area	
		Playground	
		Shelter	
		Cabin Modern	
		Camping Improved	
		Camping Primitive	
		Trail/Trailhead Hike/Bike	

- Eastern Racer
- Prairie Kingsnake
- Speckled Kingsnake
- Milk Snake
- Coachwhip
- Rough Green Snake
- Great Plains Rat Snake
- Gopher Snake (aka Bullsake)
- Western Rat Snake
- Ground Snake
- Flathead Snake
- Copperhead
- Massasauga
- Western Worm Snake
- Ringneck Snake
- Western Hognose Snake
- Eastern Hognose Snake
- Plainbelly Water Snake
- Diamondback Water Snake
- Northern Water Snake
- Graham's Crayfish Snake
- Brown Snake
- Western Ribbon Snake
- Plains Garter Snake
- Common Garter Snake
- Lined Snake

Daniel Murrow, KHS Field Trip Chairperson

FALL RIVER STATE PARK INFORMATION

Fees

Daily Vehicle Permit: \$4.20
 Daily Camping Permit: \$8.50
 One Utility: \$7.00
 Two Utilities: \$9.00
 Three Utilities: \$10.00

Fall River State Park Address

144 Highway 105
 Toronto, Kansas 66777

Coordinates

County: Greenwood
 GPS: N37 39.368, W096 03.208

Contact Information

(620) 637-2213 (Area Office)
 (620) 431-0380 (Regional Office)

KANSAS HERPETOLOGICAL SOCIETY
EXECUTIVE COUNCIL MEETING
1502 Medinah Circle, Lawrence, Kansas
21 February 2010

The KHS Executive Council Meeting was called to order by KHS President Kathy Ellis at ca. 1:15 pm. Present: Kathy Ellis, Joseph Collins (proxy for Mary Kate Baldwin), Suzanne Collins, Mark Ellis (proxy for Curtis Schmidt), Dan Johnson. A quorum being present, President Kathy Ellis presided.

Financial Report for Calendar 2009

KHS Secretary Mary Kate Baldwin emailed the 2009 Annual Financial Report. The Executive Council reviewed the report. They suggested that Mary Kate and Kathy Ellis investigate the possibility of investing in multi-year CDs that offer a higher *annual* payout. A long-term interest rate would help in protecting the endowments.

Meeting Income and Expense Summary for 2009

The Council congratulated KHS Past-President Dan Johnson on holding an excellent annual meeting. They also recognized Mid-America Nazarene University for their support of the meeting and their outstanding facilities.

Report and Plans for the 2010 Annual Meeting

President Ellis has arranged to use a party barn for the KHS Friday night social. The Society will provide a keg of beer, soft drinks, and snacks. Mark will contact Larry Miller for help in setting up computers so folks can bring CDs to show their best herpetological shots.

Kathy and Joe Collins will contact the Holiday Inn near the Topeka Zoo to get the best room rates and discuss the possibility of using a room for the Saturday night auction. Joe has talked with Edwina Ditmore at the Topeka Zoo and confirmed our reservations for the KHS Annual Meeting on 6-7 November 2010. Joe will contact Gary Clarke, former director of the Topeka Zoo, and ask him to serve as a Moderator at the annual meeting. President Ellis also requested that Joe identify possible keynote speakers for her. Dan Johnson invited the family of George Toland to attend. Kathy and Mark Ellis will make arrangements to have a T-shirt designed and printed for the annual meeting.

The Council received a request of \$1,000.00 for meeting expenses and \$400.00 for production of a T-shirt to be offered at a price that will recover the costs and make a profit for the Society. The \$250.00 needed to help defray expenses of the keynote speaker must come out of the original \$1000.00 requested.

Budget for 2010 for Journal of Kansas Herpetology

Joe Collins presented the 2010 JKH budget request. It was the same as last year's request, \$2,000.00 for printing four issues of the Journal of Kansas Herpetology and \$500.00 for annual postage.

Budget Request for 2010 Field Trips

There was discussion of the importance of finding appropriate areas for field trips. The Council agreed that this might be difficult in some areas but that special effort should be made to find good areas. They suggested contacting the local Chamber of Commerce and KHS members who live in the area. Dan Murrow, KHS Field Trip Chairperson, re-

quested the following reimbursement budget for 2010:

Spring trip to Greenwood County	\$138.00
Fall trip to Norton County.....	\$253.00

The KHS Executive Council recommended \$400 for field trip reimbursement for 2010.

Report of the KHS Historian

Suzanne Collins reported that some additions were made to the KHS web site. A history of field trips was added. A copy of programs for past annual meetings was added. She is working on adding photographs by linking group photos to the annual meetings and field trips.

Critique of 2009 KHS Awards Ceremony

It was suggested that an experienced photographer, to be chosen by the KHS Awards Committee Chairperson, be added to the KHS Awards Committee, but only during odd-numbered years when the photography competition is held.

It was moved and seconded (Ellis/J.Collins) to drop the KHS award for second place in the photo contest. Motion approved unanimously.

After discussion, the Council approved changing the KHS Award Ceremony for 2010 from Saturday night to immediately before the KHS business meeting on Saturday afternoon. This change will give the ceremony added prestige and importance, a bigger audience, and would be a more formal presentation.

Report of Media and Publicity for 2009

Robin continues to write exciting news releases. She and Joe send them to various news agencies.

Report of Nominating Committee

The Committee is composed of Eva Horne, David Oldham, and Joe Collins (Chairperson). They will be in contact during the summer to prepare a slate of officers for 2011.

Approval of KHS Budget for 2010

The KHS Executive Council approved (S. Collins/ Johnson) the following budget for 2010:

Print <i>Journal of Kansas Herpetology</i>	\$2000.00
Postage <i>Journal of Kansas Herpetology</i>	\$500.00
Field Trip Chairperson Expense Allocation.....	\$400.00
KHS Annual Meeting Expenses	\$1000.00
KHS Annual Meeting T-Shirts	\$400.00
Total	\$4400.00

Anticipated 2010 Income..... \$5250.00

Motion approved unanimously.

New Business

Creation of the Fitch/Platt Award in Field Herpetology

Joe presented a proposal on behalf of himself and Curtis Schmidt to establish the *Henry S. Fitch & Dwight R. Platt Award for Excellence in Field Herpetology*, to be given to a KHS member who has accomplished something significant in the area of field herpetology (i.e., finding a new species in a state or county, organizing an exceptional field trip, conducting an outstanding herpetofaunal count, publishing a paper that emphasized field herpetology as a technique, etc.).

The award would be monetary and might include a plaque or statuette such as the *Bronze Salamander Award*. President Ellis appointed an *ad hoc* committee of Curtis Schmidt, Dan Johnson, and Joe Collins to set specific guidelines for the award as well as to raise funds to establish and endow it.

The Bronze Salamander Award for 2010

It was moved and seconded (S. Collins/Ellis) to present a *Bronze Salamander Award for Distinguished Service* in

2010. A recipient was identified and endorsed by the KHS Executive Council. Motion approved unanimously.

Meeting was adjourned at 4:00 pm.

Respectfully submitted

Suzanne Collins
KHS Historian

KANSAS HERPETOLOGICAL SOCIETY
Annual Financial Report 2009

Bank Statement 1 January 2009 \$4,436.09

Expenses

Income

Membership Dues

Regular\$1,750.00
Contributing\$800.00
Total\$2,550.00

Annual Meeting

Registration.....\$1,265.00
Auction.....\$1,422.00
Sale of KHS T-Shirts.....\$789.00
Sponsors.....\$200.00
Sale of KHS Snake Bags.....\$185.00
Total\$3,861.00

Journal of Kansas Herpetology Page Charges\$600.00
Donations\$85.00

Interest from Endowed Funds\$460.45

Total Income\$7,556.45

Annual Meeting.....\$3,295.01
The Alan H. Kamb Grant.....\$300.00
The Gloyd/Taylor Scholarship.....\$300.00
KHS Photography Award.....\$100.00
Office of the Secretary/Treasurer\$200.00
Journal of Kansas Herpetology (4 issues).....\$2,099.20
Journal of Kansas Herpetology Postage\$700.00
Field Trip Chairperson\$450.00
Additions to The Kamb Grant\$150.00
Additions to The G/T Scholarship.....\$100.00

Total Expenses\$7,694.21

Bank Statement 31 December 2009\$4,298.33

Endowed Funds

Alan H. Kamb Grant\$7,750.00
Gloyd/Taylor Scholarship.....\$7,300.00

Total in Endowed Funds\$15,050.00

Total Assets\$19,348.33

Respectfully submitted,
Mary Kate Baldwin, Secretary
Eric Kessler, Treasurer

PAY YOUR 2010 DUES

If you have not already done so, send your calendar 2010 dues (\$15.00 regular, \$20.00 contributing) to:

Mary Kate Baldwin
KHS Secretary
5438 SW 12th Terrace Apt. 4
Topeka, Kansas 66604

Your attention to this matter will ensure that delivery of the *Journal of Kansas Herpetology* will be uninterrupted.

KHS 2010 SPRING FIELD TRIP

The KHS 2010 spring field trip will be to Greenwood County. For information as it is posted, be sure to check the KHS web site regularly at:

www.cnah.org/khs/FieldTripSpringInfo.html

For immediate information, contact:

Daniel G. Murrow
KHS Field Trip Chairperson

(see inside front cover of this issue)



GEOGRAPHIC DISTRIBUTION

AMBYSTOMA MAVORTIUM (Barred Tiger Salamander). KANSAS: Lincoln Co: 38.92943°N, 98.19250°W. 1 October 2009. Brian Hubbs and Curtis J. Schmidt. MHP 14711. Verified by Travis W. Taggart. New county record (Collins and Collins. 1993. *Amphibians and Reptiles in Kansas*. Third Edition. Univ. Press Kansas, Lawrence. xx + 397 pp; Taggart, Travis W., Joseph T. Collins, and Curtis J. Schmidt. 2009. *Kansas Herpetofaunal Atlas: An On-line Reference*). Electronic Database accessible at

<http://webcat.fhsu.edu/ksfauna/herps>

Submitted by **BRIAN HUBBS**, P. O. Box 24811, Tempe, Arizona 85285 and **CURTIS J. SCHMIDT**, Sternberg Museum of Natural History, Fort Hays State University, Hays, Kansas 67601.

LAMPROPELTIS TRIANGULUM (Milk Snake). KANSAS: Ottawa Co: 39.26375°N, 97.92035°W; 39.26395°N, 97.86153°W. 4 May 2008. Brian Hubbs and Chad Whitney. MHP 13844-5. Verified by Curtis J. Schmidt. First records for county (Collins and Collins. 1993. *Amphibians and Reptiles in Kansas*. Third Edition. Univ. Press Kansas, Lawrence. xx + 397 pp; Taggart, Travis W., Joseph T. Collins, and Curtis J. Schmidt. 2009. *Kansas Herpetofaunal Atlas: An On-line Reference*). Electronic Database accessible at

<http://webcat.fhsu.edu/ksfauna/herps>

Submitted by **BRIAN HUBBS**, P. O. Box 24811, Tempe, Arizona 85285 and **CHAD WHITNEY**, Fort Hays State University, Hays, Kansas 67601.

LAMPROPELTIS TRIANGULUM (Milk Snake). NEBRASKA: Brown Co: 42.724783°N, 99.863133°W. 20 May 2008. Brian Hubbs and Matt Ingrassci. Photo voucher: MHP 14726. Verified by Curtis J. Schmidt. New county record, verified by Dan Fogell.

Submitted by **BRIAN HUBBS**, P. O. Box 24811, Tempe, Arizona 85285 and **CHAD WHITNEY**, Fort Hays State University, Hays, Kansas 67601.

TANTILLA NIGRICEPS (Plains Blackhead Snake). KANSAS: Pawnee Co: 38.407989°N, 99.325261°W. 6 May 2008. Brian Hubbs and Chad Whitney. MHP 14727. Verified by Curtis J. Schmidt. New county record (Collins and Collins. 1993. *Amphibians and Reptiles in Kansas*. Third Edition. Univ. Press Kansas, Lawrence. xx + 397 pp; Taggart, Travis W., Joseph T. Collins, and Curtis J. Schmidt. 2009. *Kansas Herpetofaunal Atlas: An On-line Reference*). Electronic Database accessible at

<http://webcat.fhsu.edu/ksfauna/herps>

Submitted by **BRIAN HUBBS**, P. O. Box 24811, Tempe, Arizona 85285 and **CHAD WHITNEY**, Fort Hays State University, Hays, Kansas 67601.

HETERODON NASICUS (Western Hognose Snake). NEBRASKA: Rock Co: 42.666069°N, 99.33511°W. 16 May 2008. Brian Hubbs. Photo voucher: MHP 14725. Verified by Curtis J. Schmidt. New county record, verified by Dan Fogell.

Submitted by **BRIAN HUBBS**, P. O. Box 24811, Tempe, Arizona 85285 and **CHAD WHITNEY**, Fort Hays State University, Hays, Kansas 67601.

TROPIDOCOLONIA LINEATUM (Lined Snake). KANSAS: Ottawa Co: 39.10309°N, 97.63875°W. 2 October 2009. Suzanne L. Collins and Joseph T. Collins. MHP 14547. Verified by Curtis J. Schmidt. New county record (Collins and Collins. 1993. *Amphibians and Reptiles in Kansas*. Third Edition. Univ. Press Kansas, Lawrence. xx + 397 pp; Taggart, Travis W., Joseph T. Collins, and Curtis J. Schmidt. 2009. *Kansas Herpetofaunal Atlas: An On-line Reference*). Electronic Database accessible at

<http://webcat.fhsu.edu/ksfauna/herps>

Submitted by **SUZANNE L. COLLINS**, The Center for North American Herpetology, 1502 Medinah Circle, Lawrence, Kansas 66047 and **JOSEPH T. COLLINS**, Kansas Biological Survey, University of Kansas, 2101 Constant Avenue, Lawrence, Kansas 66047.

TROPIDOCOLONIA LINEATUM (Lined Snake). KANSAS: Ottawa Co: 39.25783°N, 97.87291°W. 4 May 2008. Brian Hubbs and Chad Whitney. MHP 13843. Verified by Curtis J. Schmidt. New county record (Collins and Collins. 1993. *Amphibians and Reptiles in Kansas*. Third Edition. Univ. Press Kansas, Lawrence. xx + 397 pp; Taggart, Travis W., Joseph T. Collins, and Curtis J. Schmidt. 2009. *Kansas Herpetofaunal Atlas: An On-line Reference*). Electronic Database accessible at

<http://webcat.fhsu.edu/ksfauna/herps>

Submitted by **BRIAN HUBBS**, P. O. Box 24811, Tempe, Arizona 85285 and **CHAD WHITNEY**, Fort Hays State University, Hays, Kansas 67601.

GRAPTEMYS PSEUDOGEOGRAPHICA (False Map Turtle). KANSAS: Johnson Co: 39.042086°N, 94.804538°W. 26 May 2009. Dan Krull, Phil Bellaci, and Daniel Burdette. MHP 14724. Verified by Curtis J. Schmidt. New county record (Collins and Collins. 1993. *Amphibians and Reptiles in Kansas*. Third Edition. Univ. Press Kansas, Lawrence. xx + 397 pp; Taggart, Travis W., Joseph T. Collins, and Curtis J. Schmidt. 2009. *Kansas Herpetofaunal Atlas: An On-line Reference*). Electronic Database accessible at

<http://webcat.fhsu.edu/ksfauna/herps>

Submitted by **DAN KRULL**, 21910 West 49th Terrace, Shawnee, Kansas 66226.

OF INTEREST

SMOOTH EARTH SNAKE AND REDBELLY SNAKE POPULATION SURVEY

The Kansas Biological Survey (KBS) is conducting a survey of these two Kansas snakes recognized as Threatened in the State. We are looking for new populations and ask that KHS members in the eastern counties of Kansas be on the lookout for these species in your area, and report sightings to us using the report form available at

<http://people.ku.edu/~gpisani/SWGform.html>

Sightings must be confirmed by us, either by a live specimen (which may be released at capture point after we confirm identification) or high-quality photograph. We also need detailed documentation of habitat in which you may find them! If you find either species, note the area well and contact us asap. We especially need people to help us in Linn and Anderson counties; email us if you can help.

Both species are cool-weather snakes, and are among the very earliest to emerge from hibernation. Look for them under cover objects (tin, rocks, wood) from early March on (depending upon temperature). A great way to locate these snakes is to distribute 2ft x 4ft pieces of salvaged barn tin (the corrugated kind) in likely habitat, especially edge zones between woods and unmowed grass areas. Part of this effort is to determine just what sorts of habitat both species prefer, so don't overlook pastures, woods, or whatever habitat is in your area. Spread some tin [with landowner permission]; see what comes in. And don't forget to remove the tin when done sampling an area.

For an overview of current Kansas records of these species, visit the Kansas Herpetofaunal Atlas pages at

<http://webcat.fhsu.edu/ksfauna/herps/>

To add incentive, we will award publications to people with the most confirmed sightings during 2010 as follows:

Most new localities reported: A copy of the second printing (1980) of *Autecology of the Copperhead 1960* by Henry S. Fitch and a copy of the second printing (1991) of *Reproductive Cycles in Lizards and Snakes 1970* by Henry S. Fitch.

Second place, most new localities reported: Choice of one of the following: a copy of the second printing (1980) the *Autecology of the Copperhead 1960* by Henry S. Fitch or a copy of the second printing (1991) of *Reproductive Cycles in Lizards and Snakes 1970* by Henry S. Fitch.

Third place, most new localities reported: A copy of *Biology, status and management of the Timber Rattlesnake (Crotalus horridus): A guide for conservation (1993)* by William S. Brown.

George R. Pisani
gpisani@ku.edu
William Busby
wbusby@ku.edu

BOOK ANNOUNCEMENT

Timber Rattlesnakes in Vermont and New York Biology, History, and the Fate of an Endangered Species
by Jon Furman

October 2007 \$24.95
207 pp. Paperback, 12 color illustrations, 8 halftones

Available from:

University Press of New England
One Court Street, Suite 250
Lebanon, New Hampshire 03766
<http://www.upne.com/1-58465-656-5.html>

First announced by CNAH in 2008, this authoritative and well-illustrated book is an important acquisition for all of us who work to advance the conservation of *Crotalus horridus* throughout the wide range of the species. JKH readers may well wonder why I feel that a book grounded in the biology of this impressive species in two northeastern US states is so relevant elsewhere. Simply put, conservation—especially of venomous snakes—is a delicate balance of science, sociology and politics. Furman has carefully researched and thoroughly documented the interplay of these three elements as they relate to the sundry (and increasing) anthropogenic threats faced by Timber Rattlesnake populations in two eastern states which only in relatively recent times have recognized the species as Endangered and moved to try to reverse declines (or even extirpations) resulting from earlier flawed management practices.

A talented writer, Furman explores the troubling decline of the northeastern populations caused by bounty hunting between the 1890s and the early 1970s. His friendships with contemporary researchers such as Randy Stechert, William Brown and others— whose individual and combined research and conservation work with *Crotalus horridus* have been crucial to reversing historical trends of persecution of the species— adds much to the book. Vignettes of the legal battles waged on behalf of these snakes, along with Furman's observations on the personalities involved and their varied approaches to preventing further human damage to dens and birthing areas offers models of how to interact in such circumstances.

An unusual aspect of the book is the time Furman invested interviewing the most noted *Crotalus horridus* bounty hunters of the area. Despite the great toll these people took on the snakes, few were motivated by animosity towards them. Rather, they were people eking out a living in a largely agricultural area during difficult economic times, and saw the [poorly-conceived] state bounties on rattlesnakes as another way to earn income. One or two of the hunters went so far as to study wild and captive *Crotalus horridus* behavior, ecology (though not using that term) and physiology, the better to locate snakes and ply their trade in them. Even the interviews involving preparation of rattlesnake oil as an anti-inflammatory, a topic that initially brought a smirk

to my face, proved valuable in understanding another aspect of why the hunters pursued their quarry. So, delving into pharmacological literature in December 2009, I found that certain snake oils are higher in eicosapentaenoic acid (Omega-3) than many fish oils (Kunin 1989, Graber 2007)!

Overall, the book is solidly anchored in biology, sociology, and history of science. Though parts of Furman's oral history interviews with old-time bounty hunters often are unpleasant for herpetologists to read, they are important reading for understanding the sociological things that historically have hampered conservation of any of the rattlesnake species. If herpetologists are to successfully work to change public attitudes about rattlesnakes, such understanding is crucial (Pisani and Fitch 1993).

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COMMON KINGSSNAKE CARVED UP

Systematics of the Common Kingsnake (*Lampropeltis getula*: Serpentes: Colubridae) and the Burden of Heritage in Taxonomy

R. Alexander Pyron & Frank T. Burbrink

2009. Zootaxa 2241: 22-32

Abstract: We present a systematic revision of the *Lampropeltis getula* group, based on a recent range-wide phylogeographic analysis. We define our theoretical and operational concepts of species delimitation, and provide diagnoses based on mitochondrial DNA evidence, ecological niche modeling, morphology, and historical precedence. We find support for the recognition of five distinct species, which bear the name of the nominate subspecies found primarily within the range of each phylogeographic lineage: the Eastern lineage (*Lampropeltis getula*, Eastern Kingsnake), the Mississippi lineage (*L. nigra*, Black Kingsnake), the Central lineage (*L. holbrooki*, Speckled Kingsnake), the Desert lineage (*L. splendida*, Desert Kingsnake), and the Western lineage (*L. californiae*, California Kingsnake). Interestingly, all of these taxa had originally been described as distinct species and recognized as such for up to 101 years (in the case of *L. californiae*) before being demoted to subspecies. We discuss the impact that increasingly detailed genetic information from phylogeographic analyses may have on traditional taxonomy.

A pdf of this article is available from the CNAH PDF Library at

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REPTILIAN REPAST REPREHENSIBLE

State of Kansas

Session Laws, 1903

Passed at the Thirtieth Regular Session – The Same Being the Thirtieth Biennial Session of the Legislature of the State of Kansas

Date of Publication of this Volume

June 1, 1903

Topeka

W. Y. Morgan, State Printer

Crimes and Punishment

Page 380

Chapter 224

TO PROHIBIT SNAKE-EATING EXHIBITIONS

An Act to prevent the public exhibition of the eating or pretending to eat of snakes and other reptiles, and providing penalties for the violation of the provisions of this act.

Be it enacted by the Legislature of the State of Kansas:

Section 1. It shall be unlawful for any persons to exhibit in a public way, within the state of Kansas, any sort of an exhibition that consists of the eating or pretending to eat of snakes, lizards, scorpions, centipedes, tarantulas, or other reptiles.

Sec. 2. Any person who shall establish, maintain or take part in an exhibition such as is referred to in section 1 of this act shall be guilty of a misdemeanor, or on conviction shall be confined in the county jail not less than thirty days nor more than nine months, or be fined not less than twenty-five nor more than one hundred dollars.

Sec. 3. Any person who shall employ or cause to be employed, or license or cause to be licensed, any other person to set up and maintain such an exhibition as is referred to in section 1 of this act, at any place within the state of Kansas shall be guilty of a misdemeanor, and on conviction thereof shall be fined in a sum not less than twenty-five nor more than one hundred dollars.

Sec. 5. This act shall take effect and be in force from and after its publication in the statute-book.

Approved February 21, 1903.



IN MEMORIAM

HENRY S. FITCH — A TRIBUTE

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In the Foreword to A Sand County Almanac, Aldo Leopold wrote, "There are some who can live without wild things, and some who cannot. These essays are the delights and dilemmas of one who cannot." Henry Sheldon Fitch was another person who had a need for wild things, a passionate curiosity about the natural world. Just weeks before his death, when he was essentially bedridden, Henry asked his daughter, Alice, if they couldn't find a local site where they could initiate a mark-recapture study of *Nerodia*.

Henry said that his interest in natural history was innate, although he also said that his parents encouraged him. He grew up on an apple/pear ranch northwest of Medford, Oregon. He attended a one-room school with eight grades and one teacher. But his education also took place when he wandered over the surrounding wild country in the foothills of the Siskiyou Mountains. He had a particular interest in reptiles, and was catching snakes by the age of five. His interest in nature continued as he entered his teens and went to Medford High School. After graduation, he enrolled at the University of Oregon. He majored in zoology but was disappointed in his courses because the Zoology Department at that time was focused on preparing for medical professions. He said later that there was no professor in the department who had any interest in the native fauna or who could identify a toad, a mouse, or a snake.

But that experience could not stop young Henry Fitch. He enrolled at the University of California at Berkeley and was accepted as a graduate student by Joseph Grinnell at the Museum of Vertebrate Zoology. There he found students with interests similar to his own. The summer after his first year at Berkeley, his interest in fieldwork was strengthened by a field course studying the vertebrate fauna of Nevada led by a young mammalogist, E. Raymond Hall. Henry received his PhD in 1937 and in early 1938 went to work with the U.S. Biological Survey, later the Fish & Wildlife Service, on the San Joaquin Experimental Range studying the ecology of rodents on western ranges, and surreptitiously also studying reptiles. From 1941 to 1945, he served in the U.S. Army Medical Corps, receiving training as a pharmacist. He spent time overseas in Europe during World War II.

After discharge from the army, he returned to his job at the San Joaquin Range. He married Virginia Preston on September 6, 1946 and soon thereafter he was transferred to Leesville, Louisiana, where he spent a year studying quail, mourning doves, armadillos, cotton rats, and deer. In 1948, Raymond Hall brought him to Kansas University to teach Ecology and be Superintendent of the new KU

Natural History Reservation, later named the Fitch Natural History Reservation. Four years later in 1952, I came to KU as a naïve graduate student with a goal of studying ecology but not knowing much about it. I do not remember much about my first meeting with Henry. He was not immediately impressive in that first meeting discussing my course of study. I completed my master's degree with his help in 1954 with a thesis on crows.

This afternoon I want to pay tribute to Henry Fitch for his enormous productivity in natural history research and the legacy of knowledge he has left us. Henry was passionate about natural history research. Although he belonged to a number of professional organizations, he avoided being an officer or on the Board. His daughter, Alice, wrote to me in this regard, "He didn't like to be involved in anything that seemed even vaguely political, and he definitely would have been frustrated by such responsibilities that would have taken his time away from research."

In his first years at KU, he spent much time initiating studies of small mammals on the Reservation. But he could not ignore his real interest in reptiles, especially snakes. No one was doing systematic ecological research on snakes. So he had to design a methodology. He designed a funnel trap for capturing snakes. From 1949 to 1956 he used these traps in the fall along rock outcrops where snakes came to hibernate. In 1957, he began trapping snakes in the summer using drift fences with these same traps. In November 1958, I received a letter from Henry asking if I would be interested in working on a project expanding the study of snakes to other sites in Kansas. He suggested I could get data for a dissertation from this project. I jumped at the opportunity and spent the next five years managing the snake study in Harvey and Chase counties — my initiation into herpetology. Later he also developed the method of using shelters or covers from under which to capture snakes.

Henry also developed the protocols for taking data on captured snakes and marking them by clipping subcaudal scales for individual recognition. These mark-recapture methods that he continued for season after season on the Reservation provided the massive amounts of data for which Henry was well known and for which he has been called the "father of snake ecology."

The legacy of knowledge in Henry Fitch's often-cited publications has had an impact on natural history and biology. He was the author or coauthor of 201 publications and, for more than half of these, he was the sole author. He had more than 50 publications on snakes, including a major paper from his dissertation on western Garter Snakes. It

was a biogeographic and systematic study but his interest in natural history can be seen from the information on behavior, food habits and habitat included in the study. From his work on the Fitch Reservation, there are major papers on long-term studies of the natural history or ecology of seven species of snakes. In 1997, he published a book on the snake community of 18 species that he had recorded on the Fitch Reservation summarizing 50 years of research and 32,160 capture records.

But Henry Fitch's interest was not limited to snakes. The breadth of his interests and studies and of his knowledge was legendary. He published 15 papers on the lizards found on the Fitch Reservation, including some long-term studies, and 13 papers on lizards from the western states. From 1967 for about 20 years he made annual trips to the tropics in Mexico, Central America, Ecuador or the Dominican Republic and published 37 papers on lizards of the American tropics. He authored 15 papers on birds, 22 papers on mammals and five papers on spiders.

Collecting data rather than theorizing was Henry's forte, but he wrote a number of review papers summarizing information for reptiles and some other vertebrates on the Reservation — movements, temperature relationships, reproductive strategies and food resources. And he wrote papers summarizing information for various groups of reptiles on reproductive cycles, sexual size differences and ecological patterns of relative clutch mass and litter size. These are mines of useful information. Henry's documentation of ecological succession on the Reservation is another important contribution. All of these studies and the large datasets he collected are an invaluable legacy that will become more and more valuable with time.

But Henry's legacy of research was not his alone. He had a family team that supported him and we need to at least mention their contributions. Virginia Fitch was not only a gracious hostess and supporter in the home but was sincerely interested in Henry's research, his friends and students. She often accompanied him in the field and recorded data, and was a coauthor of some papers. She typed and edited most of his manuscripts.

All three Fitch children developed an interest in natural history and helped Henry with his research while they were growing up. The eldest son, John, has followed in his father's footsteps, becoming an academic biologist and making contributions in ecology, ornithology, and conservation. His daughter, Alice, and her husband, Tony Echelle, are in the Zoology Department at Oklahoma State University. They have been coauthors of some of his Central American papers and his more recent papers. Their family has assisted Henry as he became frailer so that he could continue his studies and report on them. They have brought him to a number of KHS meetings. When he was having difficulty taking care of himself in 2006, Alice took him into her home and cared for him in his last years. Chester did not go into academic biology but has maintained an interest in natural history. He and his wife Dea live one-half mile from the Fitch Reservation and he continued to help his parents as long as they lived on the Reservation. Chester has an interest in snake photography and he provided a number of the photographs in Henry's book.

I also want to pay tribute this afternoon to Henry Fitch

as a teacher. He was not known as a dynamic lecturer, but his lectures were full of information. Looking back at my lecture notes from his ecology course in 1953, it is obvious that he had a wide knowledge of the ecological literature and this is what he lectured from. When you were in the field with Henry, his enthusiasm for natural history studies was contagious. He was a man of few words but he was always willing to talk with students. He had a word of encouragement for your efforts but you must pay attention to his questions. They alerted you to things you had missed. He stayed out of the pettiness and politics of university departments and that made it easier for his students. Henry was a friend for his graduate students, rejoicing over accomplishments and sympathizing when problems arose. After I had completed my degree and left KU, he continued to be interested in and helpful with my research projects. We received Christmas cards from Henry and Virginia Fitch each year and they were always interested in what our children were doing.

But I also want to pay tribute to Henry Fitch as a person. He was a tough man. He survived five bites by venomous snakes, in many cases with minimal treatment. Read the account in *Autecology of the Copperhead*. He suffered from diabetes for more than 30 years but did not let it discourage him from field studies, often in rather primitive situations. At the age of 89 he became disoriented and spent a cold March night in a ravine on the Reservation into which he had fallen but was little the worse in the morning. Five years ago at the age of 94, he traveled to Oregon with his daughter and went up in an ultralight with a cousin to fly over the country where he had grown up.

Henry was a devoted family man. His daughter, Alice, wrote in the last few weeks: "One of the really remarkable things about Dad was what a wonderful father he was, even when he was also doing so many other things. He told us stories, he played games with us, he sometimes made us toys, and he fascinated us with information about the amazing natural world that surrounded us, and that was all in a normal day!"

In the last few weeks, many have written remembrances of Henry Fitch. In reading through some of these, I have noted a consensus in describing the qualities of this man:

- Quiet and reserved—a man of few words but wide knowledge;
- Energetic and enthusiastic about field studies and natural history—almost universal mention of the difficulty younger students had in keeping up with the old man in the field;
- Gracious, gentle and kind—the gentle encourager of students and patient explainer to children and adults and yet he had high standards of excellence;
- Parsimonious—completing field studies with a minimum of expense;
- Modest and unassuming—not fighting to create his own "academic empire" but very competitive in basketball;
- A stubborn confidence and determination, and I would add perseverance, and focus to learn as much as he could about the life on one square mile.

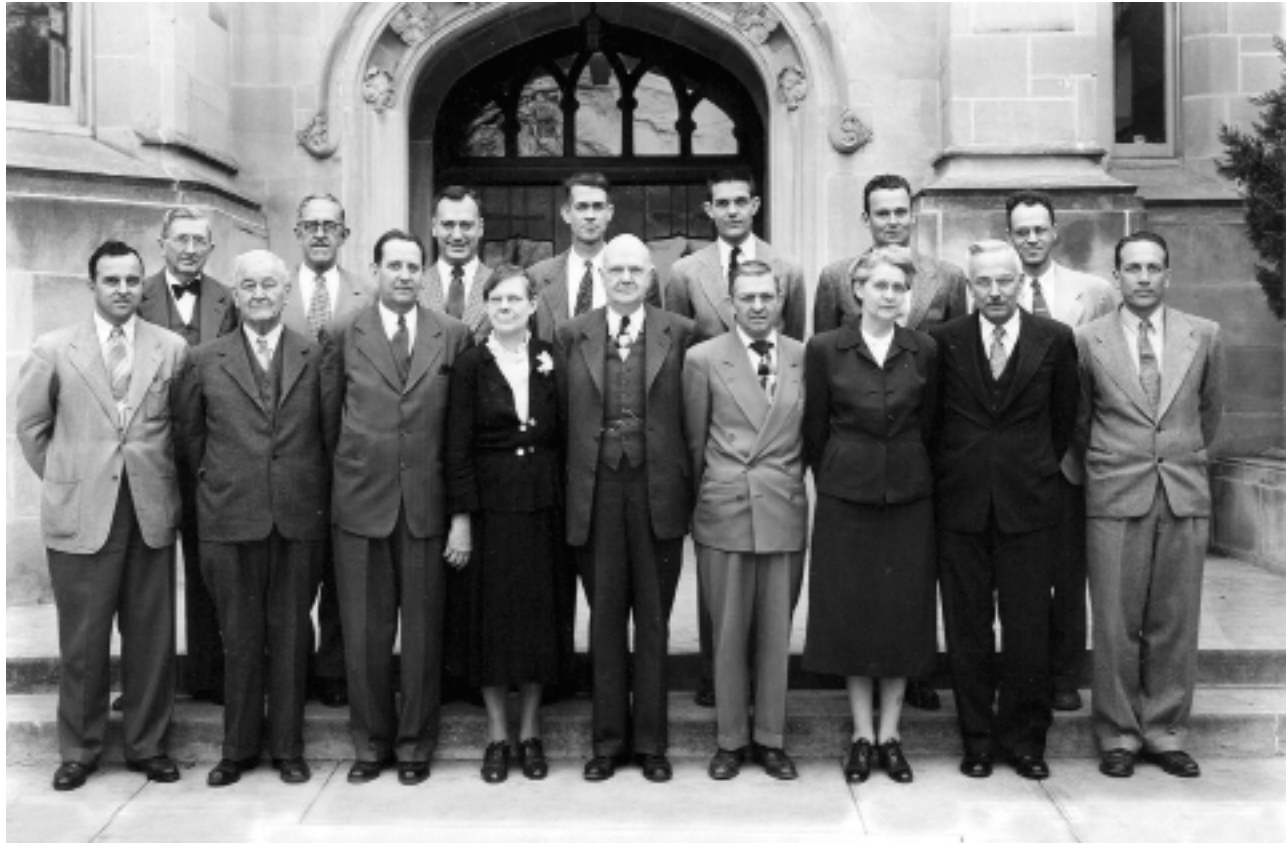
How much poorer we would be today if Henry Fitch had spent only a few years on the Fitch Reservation and then gone on to jobs with more prestige and higher pay.

There is sadness as we think about Henry and Virginia. We will miss them. We will miss their friendship. We will miss the papers Henry continued to give at KHS meetings. We will miss his questions and continued encouragement about our projects.

But it is also a time for celebration. In 1995 Henry Fitch wrote to his daughter, Alice: “. . . if, when I was Lena’s age I could have had a Martin Luther King type dream about my future and the world I would like to see, it would have been about the same as the life I have actually had. Getting a Ph.D. (nearly 60 years ago), having a loving and supportive wife, children like you and John and Chester, and grandchildren like Tyson, Lena and Ben, living on the Reservation, teaching natural history and doing research on reptiles, including anoles and pit vipers and making two

dozen trips to nine countries in the tropics for herpetological research have all been great experiences.” A life only a few months short of 100 years with such satisfaction deserves celebration. So let us celebrate the long productive life of Henry Fitch, a person who has touched almost everyone in this room in many ways, a student of natural history whose contributions include long term studies of many species on a square mile in northeastern Kansas and studies of tropical anoles and other lizards, a teacher of students many of whom continue the tradition of excellent ecological studies and a model for living and learning that we all could well emulate. Let us give a last standing ovation to Henry Fitch.

Editor’s Note: This address was presented by Dwight R. Platt on the occasion of the 36th Annual Meeting of the Kansas Herpetological Society in Olathe, Kansas, on 7 November 2009.



Assembled in February 1951 for a group photograph were the faculty members of the University of Kansas Department of Zoology, all colleagues of the late Henry S. Fitch. Back row (L–R): Professors Lane, Taylor, Leone, Wilson, Tordoff, Baker, and Weir. Front row (L–R): Professors Peabody, Baumgartner, Nelson, Larson, Lawson, Leonard, McNair, Hall, and Fitch. University of Kansas Natural History Museum file photograph, courtesy of Robert M. Timm.



ARTICLES

EFFECT OF EDUCATION PROGRAMS ON THE KNOWLEDGE AND ATTITUDES ABOUT SNAKES IN SAN ISIDRO DE UPALA, COSTA RICA

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Abstract: We interviewed 30 people in San Isidro de Upala, Costa Rica, to reveal their knowledge and attitudes about snakes. We found that many people hated and feared snakes because they assumed incorrectly that many or all snakes in the area were venomous. We then administered an education program designed to improve people's knowledge and attitudes about snakes. The program included information on the biology, identification, and ecological importance of snakes. We also explained how to safely respond to snake encounters. Before-and-after comparisons of responses to questionnaires measuring knowledge and attitudes showed that education programs made people more knowledgeable about snakes. Increased knowledge has been linked to positive attitudes. If people have positive attitudes towards snakes, they will be less likely to kill them; therefore helping to preserve the biodiversity of Costa Rica.

Introduction

Snakes are important in many ecosystems. They are not only top predators, but also prey. They are also important for medicinal purposes, rodent control, and protein sources in some regions (Christoffel 2007). Despite their importance, snake populations are declining globally in response to habitat degradation, intentional killing, biocides, and trade (Dodd 1987).

There is a great need for snake conservation and research, especially in areas with high biodiversity. One such area is Costa Rica, which is one of the most biologically diverse countries for its size (Vaughan 2003). Many areas with high levels of biodiversity are often developing countries whose people fear snakes. If we are to save snakes and biodiversity, we must learn to change attitudes so that snakes and other wildlife are viewed as important. (Morgan and Gramann 1989).

One of the goals of environmental education (EE) is to change attitudes and increase knowledge about wildlife. Environmental education has been successful in rural Costa Rica with other groups of animals. Vaughan et al. (2003) found that after a one-month scarlet macaw EE program, elementary students did 71% better on post-program knowledge surveys and had more positive attitudes towards macaws. They also passed on some of their "macaw knowledge" to their parents.

It is challenging to educate people about snakes because many fear them. Snakes were the fifth most disliked group of animals in one study (Kellert and Berry 1979). Because of this fear, many people know little about snakes and often perpetuate inaccurate myths. This lack of knowledge is dangerous for both people and snakes because frightened people make irrational decisions that often result in snake death and/or an increased risk of a snake bite (Christoffel

2007). Irrational snake persecution confounds conservation efforts. Even in some relatively undisturbed natural areas snake numbers and diversity may be depressed because local people kill snakes.

A number of social scientists have sought to explain the fear of snakes, or ophidiophobia (Christoffel 2007). It has been hypothesized that the fear of snakes is learned more easily than the fear of other things (Ohman and Mineka 2003). Others have linked the fear of snakes to negative stories from the media and to the fears passed on from parents (Murray and Foote 1979). Ophidiophobia has also been linked to folklore and religion, which commonly vilify snakes (Nissenson and Jonas 1995).

The few EE studies with snakes have found that the more experience people have with snakes, the less they fear them (Murray and Foote 1979). Morgan and Gramann (1989) evaluated different methods of snake EE and found that informational slide shows significantly improved snake knowledge. Rebecca Christoffel (2007) studied attitudes about venomous and non-venomous snakes in Michigan (MI) and Minnesota (MN). She found that an individual's sex and knowledge of snakes explained much of the observed variation in attitudes toward snakes. She also found that people knew little about local snakes. After exposure to EE programs, participants had more knowledge and positive attitudes towards snakes than non-participants.

Despite Costa Rica's high diversity of snakes and great need for snake conservation, we could not find a single EE program that focused on snakes in that country. Therefore, we developed and administered a snake EE program in rural Costa Rica. The goals of this study were to describe people's attitudes and knowledge about snakes and to determine if an EE program could improve knowledge, understanding, and tolerance in a small rural community in Costa Rica.

Methods

We performed our study in the town of San Isidro de Upala, Costa Rica. San Isidro is located in the northwest corner of the Alajuela province, in a valley formerly composed of tropical rainforest. It is now a mixture of agriculture land interspersed with secondary rainforest. The population is about 150 people, and the area is rural. One of us (AG) spent 3.5 months with a family in the area while completing research in 2008.

Because of the coherence of Rebecca Christoffel's methodology (Christoffel 2007) and her helpfulness and cooperation, we decided to use the same general format for this study. We used semi-structured oral interviews to learn the baseline knowledge and attitudes of community members. Based on what we learned from those interviews, we created a snake EE program aimed at increasing knowledge and positive attitudes towards snakes.

We performed 30 oral interviews to gather baseline data. Interviewees included six subjects in the 5–15 age group (2 female and 4 male), four in the 16–29 age group (3 female and 1 male), and 20 in the 30+ age group (6 female and 14 male). Because 93% of our subjects were between the ages of 18 and 40, we chose not to analyze the results according to age group.

The oral interviews consisted of open-ended questions designed to reveal people's attitudes about snakes as well as experiences they have had. For the first part of the interview, we asked questions about overall attitudes and experiences with snakes (a complete list of the oral interview questions is listed in Table 1).

We showed subjects photographs of common snakes of the region and asked them to identify the snakes as well as whether the snakes were venomous or not. We also asked questions about the importance of snakes in the environment and if they had encountered snakes in the media. Media is defined as newspapers, books, television, movies, or magazines.

In the final part of the interviews, we used an eleven-point scales (on a scale of 0–10) to assess responses to photographs of certain snake species. On the fear scale a zero meant that the interviewee would be terrified seeing a picture of the snake. A ten meant they had no fear and would touch a snake. On the preference scale, zero meant despising snakes (having "the only good one is a dead one" philosophy) while a ten meant liking a snake enough to have it as a pet. Fives on either scale meant having neutral attitudes. We noted snake anecdotes and myths interviewees volunteered during the interviews. At the end of each interview, we asked if any subjects were interested in attending an education program about snakes.

Each interview was translated and interpreted for subjects by Jose Emilio Oporta Morales. At the beginning of each interview, we explained that participation in the study was voluntary and that the identities of interviewees would remain confidential. We also explained the objectives of the study as well as how we would use and disseminate results. Before the interview, each subject was required to sign a consent form signifying that they agreed to participate and allowed us to use resulting data.

We performed the interviews in either our host family's

home, our subject's home, or at school for our subjects in the 5–15 age-group. We offered no monetary compensation to participants; however, we did give them candies as a thank you gesture. We tried to complete each oral interview in isolation. We did this to eliminate bias due to non-participants voicing their opinions or subjects changing their answers in the presence of non-participants. We realized early that isolation was not possible in many places because we were entering a family's home and could not enforce our rules in their household. Sometimes, we had to perform multiple interviews at the same time due to time constraints and the need to interview key demographic groups. For example, we did this when we went to the elementary school to interview 5–15 year olds. In this multiple interview setting, it was necessary to omit the snake identification data.

After analyzing the results of the oral interviews, we then devised an education program catered to the needs of the community. The education program was held as a seminar at our host family's home and lasted about an hour. Jose Emilio Oporta Morales once again served as our translator.

At the start of the program, we administered a 15-minute initial questionnaire consisting of 17 objective, multiple choice, and translated questions that would be covered in the program (Table 4). The subjects signed a consent form before starting the program. For subjects under 18, we required a parental signature as well. If subjects could not read, we read the questionnaire aloud. To measure the impact of the program through retention rates, we re-administered the same 15-minute pre-program questionnaire immediately after the education program.

In the program, we focused on debunking prevalent myths about snakes. We also spent a significant amount of time teaching local snake identification as well as natural history information. Additionally, we explained the benefits of having snakes around as well as their role in the environment. We informed subjects how to react to snake bites and encounters and created an informational handout reiterating this information. At the end of our time in Costa Rica, we donated a bi-lingual field guide of the snakes of Costa Rica by Alejandro Solórzano (Solórzano 2005) and a snake hook to the San Isidro community center.

Other environmental education studies (Eagles and Demare 1999, Vaughan et. al 2003) have shown the importance of running programs over a long period of time and incorporating them into formal education. However, given our brief time in Costa Rica and lack of access to the school system, we were unable to run the education program over a long time period.

We analyzed the interview data by categorizing open-ended answers as either positive or negative and then looked for patterns across demographic groups. We also categorized the preference and fear scale questions as positive, neutral, or negative based on the numerical answer (0–3 being negative, 4–6 being neutral, and 7–10 being positive). For the identification questions, we looked for trends in correct answers. Additionally, we used the chi squared test to determine if there were differences in correct answers between men and women. Expected values were calculated by creating a 2x2 contingency table with sex of interviewee defining the rows and "correctness" defining the columns. The expected value for each cell was

Table 1. Oral interview questions asked during this study.

Question
1. How old are you?
2. Where do you live?
3. How long have you lived there, and/or where did you spend most of your childhood?
4. What is your highest level of education?
5. What is your name?
6. What do you think the name of this snake is (for each picture); Used: a) Boa Constrictor (<i>Boa constrictor</i>), b) Stripebelly False Coral (<i>Erythrolamprus mimus</i>), c) Common Cat-eyed Snake (<i>Leptodeira annulata</i>), d) Brown Vine Snake (<i>Oxybelis aeneus</i>), e) Common Snail Eater (<i>Sibon nebulatus</i>), f) Tiger Rat Snake (<i>Spilotes pullatus</i>), g) Allen's Coral Snake (<i>Micrurus alleni</i>), h) Fer-de-lance (<i>Bothrops asper</i>), i) Bushmaster (<i>Lachesis stenophrys</i>)
7. Is this snake venomous (for each picture: a-h)?
8. Have you ever touched a snake? If so what type?
9. What are the most common snakes you see?
10. Where are snakes when you see them?
11. What are snakes doing when you see them?
12. How do you feel about snakes in general?
13. Have you ever killed a snake; if so, why?
14. Have you ever read or seen any books, magazine articles, newspaper articles, movies, or television shows about snakes?
15. Do you remember what the media was like; were snakes portrayed as good or bad?
16. Do you think the portrayal was accurate?
17. Do you think that snakes are important to you; to the environment?
18. Describe the pros and cons of having snakes on your property; w/in 5 km of your property but not on it?
19. Would you rate these snake pictures (Boa, Common Cat-eyed, Brown Vine Snake, Tiger Rat Snake, and Fer-de-lance) on a like/dislike scale of 0-10?
20. Would you rate these snake pictures (same species as above) on a fear scale of 0-10?
21. Would you be willing to attend an education program about snakes?

calculated by multiplying the cell row total by its column total and then dividing that product by the grand total of the contingency table. We considered a chi square statistic significant if it yielded a p -value of 0.05 or less and denoted each significant p -value with a "*" in the resulting tables. Chi square and p -values for each identification question are reported in Table 2. We included answers of "I don't know" and "do not recognize" in the incorrect category.

We also analyzed the pre- and post-program questionnaires using the chi squared test to determine if there were any significant differences in correct answers between men and women and between pre- and post-program questionnaires. The expected values were calculated the same way they were calculated in Table 2. Again, questions with p -values less than 0.05 were considered significant. Chi square and p -values for each questionnaire question are reported in Table 4. We also categorized questions based on the proportions answered correctly. Mostly correct consisted of questions with greater than 65% of subjects answering correctly, intermediate consisted of questions with 35–64% correct, and mostly incorrect consisted of questions with less than 35% correct. We also compared pre- and post-program answers per individual to determine if they answered better or worse as well as collectively to see how many subjects answered better or worse. For each question with a numerical answer, we noted whether the subjects overestimated or underestimated the correct answer.

Results

Oral Interviews

Thirty subjects completed oral interviews before the education program.

Questions 1–5: Questions 1–5 were simply demographic questions. Interviewees included six subjects in the 5–15 age group (2 female and 4 male), four in the 16–29 age group (3 female and 1 male), 20 in the 30+ age group (6 female and 14 male). None of the interviewees had finished high school, five had some high school education, eleven finished primary school, ten had some primary school education, and four had no education at all.

Question 6 and 7: For these identification questions, only 26 interviewees responded. The four interviewees that did not respond were children that we interviewed at the elementary school. We considered an answer correct if the interviewee answered with a name that either our translator or we recognized. We considered an answer to be incorrect if neither our translator nor we recognized the name or they didn't know the name. The responses can be seen in Table 2. Answers are only analyzed as a whole and by sex because there were no significant differences in answers from other demographic groups. The most commonly misidentified snakes (by both common name and whether or not the species is considered venomous) were the False Coral Snake, Common Cat-eyed Snake, and Common Snail Eater. Most subjects knew the Boa Constrictor and Allen's Coral Snake (by name and venom). They also knew that the Fer-de-lance and Bushmaster were venomous. There was a significant difference in correct answers to the Fer-de-lance identification question with males answering more correctly than females. There was also a significant difference between males and females in correct responses to the question of whether or not the Bushmaster is venomous with males answering more correctly than females.

Table 2. Analysis of answers by interviewees to oral interview questions 6 and 7.

Snake to be identified	Proportion Answering Correctly to Common Name					Proportion Answering Correctly if Snake Was Venomous				
	Total	M	F	Chi ² Value	P-Value	Total	M	F	Chi ² Value	P-Value
a) Boa Constrictor	21/26	15/17	6/9	1.762	0.184	20/26	15/17	5/9	3.540	0.060
b) Stripebelly False Coral	0/26	0/17	0/9	0.000	1.000	2/26	2/17	0/9	1.147	0.284
c) Cat-eyed Snake	0/26	0/17	0/9	0.000	1.000	7/26	4/17	3/9	0.287	0.592
d) Brown Vine Snake	13/26	9/17	4/9	0.064	0.800	13/26	11/17	5/9	0.197	0.657
e) Common Snail Eater	0/26	0/17	0/9	0.000	1.000	5/26	4/17	1/9	0.584	0.445
f) Tiger Rat Snake	15/26	9/17	6/9	0.454	0.500	17/26	13/17	4/9	2.667	0.102
g) Allen's Coral snake	24/26	16/17	8/9	0.227	0.634	23/26	14/17	9/9	1.795	0.180
h) Fer-de-lance	14/26	11/17	3/9	4.406	0.036*	20/26	14/17	6/9	0.816	0.366
i) Bushmaster	5/26	5/17	0/9	3.277	0.070	19/26	16/17	3/9	11.051	0.001*

* denotes significance at the alpha = 0.05 level

Question 8: Fourteen interviewees said that they had touched a snake (some reported touching multiple species), 15 said that they had not, and one did not answer. Of the interviewees that had touched a non-venomous snake, most people touched Boa Constrictors (7 people), Vine Snakes (2 people), and Tiger Rat Snakes (2 people). Four interviewees also said that they had touched a venomous Fer-de-lance.

Question 9-11: The most common snakes that interviewees reported seeing were Fer-de-lances (21 people), Boa Constrictors (16 people), Parrot Snakes of the genus *Leptophis* (9 people), and Tiger Rat Snakes (9 people). For those that had seen snakes, most interviewees reported seeing snakes on the farm (11 people), on the road (10 people), in the house (10 people), and in the forest (9 people). When interviewees saw snakes, the snakes were usually sitting still (8 people), biting or in strike position (5 people), or simply moving away from the interviewee (4 people).

Question 12-13: Approximately two-thirds of interviewees, 21 people, stated that they felt afraid of snakes. Of these, two said that their fear depended on whether or not the snake was venomous, and one said fear depended on the size of the snake. Twenty three interviewees stated that they had killed snakes and six said they had not. Of the interviewees that had killed snakes, six stated that they only killed venomous snakes; one said he only killed little snakes, and one said he only killed big ones. Most people reported killing snakes to avoid bites (10 people) or because they were scared (6 people).

Question 14-16: Ten people reported watching snake programs on television, nine reported never seeing any media coverage about snakes, eight reported seeing movies about

snakes, and two read snake books. The snake programs seen on television were on the National Geographic Channel and Discovery Channel. The programs were about Fer-de-lances, Cobras, and Rattlesnakes. Of the snake movies, six interviewees reported seeing the movie "Anaconda" while one saw a western movie featuring a snake. Nine interviewees said that the snakes were portrayed negatively in the media, eight said that they were neutral, and only one said that snakes were portrayed in a positive manner. Thirteen interviewees (45%) stated that they believed the media portrayed the snakes accurately.

Question 17: Nineteen interviewees said that snakes were important to them personally, while seven said that they were not. Nineteen people also said that snakes were important to the environment, four said they were not important, and three people were unsure. The top reasons why snakes were considered personally important to interviewees included pest control (10 people), medicinal purposes (4 people), or to keep the food chain in balance (4 people). The main reason snakes were not important to people is that they bite and kill people (4 people). Similarly, the top reasons why snakes were considered important to the environment included pest control (8 people) and to keep the food chain in balance (8 people), even if snakes were not personally important to interviewees. Snakes were considered unimportant to the environment because they bite and kill people (1 person), have absolutely no place on Earth (1 person), and because they reproduce rapidly (1 person).

Question 18: The most commonly stated advantage for having snakes on interviewee's property was pest control (12 people). The most common disadvantages for snakes on interviewee's property included snakes being dangerous to people (16 people) and snakes being dangerous to

Table 3. Analysis of answers by interviewees to oral interview questions 19 and 20.

Snake	Positive Feeling		Neutral Feeling		Negative Feeling	
	Fear Scale	Preference Scale	Fear Scale	Preference Scale	Fear Scale	Preference Scale
Boa Constrictor	17/30	13/30	5/30	10/30	8/30	7/30
Cat-eyed Snake	10/29	8/29	8/29	7/29	11/29	14/29
Brown Vine Snake	14/29	11/29	8/29	6/29	7/29	12/29
Tiger Rat Snake	15/30	14/30	3/30	7/30	12/30	9/30
Fer-de-lance	7/30	8/30	5/30	3/30	18/30	19/30

farm animals (5 people). The most common advantage for tolerating snakes within 5 kilometers of interviewee's property included pest control (7 people). The most common disadvantages for tolerating snakes within 5 kilometers of interviewee's property included snakes being dangerous to people (15 people), and snakes being dangerous to farm animals (6 people).

Question 19 and 20: The number of responses in each category can be seen in Table 3. Many interviewees felt unfamiliar towards Boa Constrictors (57%) and Tiger Rat Snakes (50%), while 60% of interviewees felt fearful towards the Fer-de-lance. In the preference scale, many interviewees liked Tiger Rat Snakes and Boa Constrictors (47% and 43%, respectively), while many disliked the Fer-de-lance (63%) and Common Cat-eyed Snake (47%).

Question 21: Most interviewees, 28/29, said that they would be willing to attend an education program about snakes.

Pre- and Post-Program Questionnaires

Overall, 15 subjects completed the pre-program survey, and 12 subjects completed the post-program survey. Of the subjects who completed the pre-program questionnaire four were female, and 11 were male. In the post-program survey, three subjects were female, and nine were male. It was necessary to list the results as percentages so that we could compare the answers between pre- and post-education programs due to different numbers of subjects completing each questionnaire. We removed non-answers from the equation because subjects could have forgotten to answer questions

In the pre-program questionnaire, answers to questions 5, 7, 10, 13, 14, 15, and 17 were mostly correct. Answers to questions 2 and 16 were intermediate. Answers to questions 1, 3, 4, 6, 9, and 11 were mostly incorrect, and answers to question 8 were all incorrect (Table 4). Greater than 50% of subjects underestimated the correct answer in questions 1, 2, 3 and 8.

In the post-program questionnaire, answers to questions 5 and 14 were all correct. Answers to questions 7, 9, 10, 15, 16, and 17 were mostly correct. Answers to questions 1, 2, 3, 6, 11, and 13 were intermediate, and answers to question 4 were mostly incorrect. In the post-program questionnaire, all twelve subjects still answered question 8 incorrectly (Table 4). More than 50% of subjects underestimated the correct answer in questions 1, 2, 3 and 8. More than 50% of subjects overestimated the correct answer in question 4.

Question 12 was a qualitative question without a correct answer. This question was aimed at gauging people's attitudes before and after the education program. In the pre-program questionnaire, 27% of subjects answered that they feared snakes, 8% were neutral, 47% reported no fear whatsoever, and 20% did not respond. In the post-program questionnaire, 33% of subjects were afraid, 8% were neutral, 42% had no fear, and 17% did not answer. Subjects improved their answers in all post-program questions except 7, 8, 10, 13, and 15. There were no significant differences in correct answers between the sexes. However, the difference between pre- and post-program answers in questions 5, 9, and 11 was statistically significant (Table 4).

Discussion

Oral Interviews

The data from the oral interviews indicate that interviewees only had moderate knowledge of both local snake identification and venomosity, with the majority (over 50%) of interviewees knowing the correct identification and venomosity of four and five (out of nine) species respectively. All of the interviewees misidentified the False Coral Snake, Common Cat-eyed Snake, and Common Snail Eater. Interviewees also misidentified whether or not these species' were venomous more than other species. This is unfortunate because they are all non-venomous snakes. Therefore, they are probably killed more than others because the majority of people who said they killed snakes tried to only kill venomous ones.

There were significant differences between male and females in the answers to two identification questions. Males were better than females at identifying the Fer-de-lance and knowing whether or not Bushmasters were venomous (Table 2). Perhaps this difference occurred because women do not work in snake habitats as much as men do in Costa Rica, and therefore do not encounter snakes as much. Women were also proportionately more scared than men for all five snake species shown on the fear scale. Women may not be able to identify these snakes as well as men because they are more scared of them. However, the opposite may be true as well: women may be more fearful of these snakes than men because they cannot identify them (either by species or venomosity).

Most people (21/26) were afraid of snakes in general, but some said that it depended on their size and if they were venomous. Of all the snakes shown, the greatest number of people felt negatively and fearful towards the venomous Fer-de-lance. Interviewees also said that the Fer-de-lance was the most commonly seen snake in the area.

Of people who have seen snakes in the media, half said that snakes were portrayed negatively. Of the remaining people who saw snakes in the media, most said the snakes were portrayed as neutral and the program was educational. However, the educational or neutral programs that interviewees saw were about venomous or dangerous snakes.

Although most people are afraid of snakes in San Isidro de Upala, it is difficult to determine the cause of this fear from this study alone. However, the oral interviews give valuable insights into the cause of snake fear in this community. Snakes may be feared in this region because venomous snakes are the most commonly seen snakes. However, people may simply believe that they see venomous snakes more than others because they are scared. Because snakes are commonly maligned in the media, and dangerous and venomous snakes are often shown in educational programs, people may develop the fear of snakes due to the media. Further research must be done to reach a conclusion.

Fear aside, the vast majority of people said that snakes were important to them personally and to the environment. They felt this way due to snakes' importance for pest control and because of their intrinsic value in the environment. Additionally, all but one interviewee expressed interest in attending an education program.

Table 4: Analysis of responses by interviewees to pre- and post-program questionnaires. M = male; F = female.

Question	Proportion Responding		Proportion Answering Correctly				Pre-Program Proportion Answering Correctly				Post-Program Proportion Answering Correctly			
	Pre	Post	Pre	Post	Chi ² Value	P-Value	M	F	Chi ² Value	P-Value	M	F	Chi ² Value	P-Value
1. How many snake species are in Costa Rica?	15/15	11/12	4/15	6/11	2.084	0.145	2/11	2/4	1.519	0.218	3/8	3/3	3.438	0.06
2. How many venomous snake species occur in Costa Rica?	15/15	12/12	6/15	5/12	0.008	0.929	3/11	3/4	2.784	0.095	3/9	2/3	1.029	0.310
3. How many snake species occur around Upala?	15/15	12/12	3/15	5/12	1.501	0.221	3/11	0/4	1.364	0.243	3/9	2/3	1.029	0.310
4. How many venomous (can kill people) snake species occur near Upala?	15/15	12/12	2/15	4/12	1.543	0.214	2/11	0/4	0.839	0.360	3/9	1/3	0.000	1.000
5. When are Boa Constrictors venomous?	15/15	12/12	10/15	12/12	4.909	0.027*	6/11	4/4	2.727	0.099	9/9	3/3	0.000	1.000
6. What are some large threats to snake populations in Costa Rica?	13/15	12/12	5/13	7/12	0.987	0.320	3/9	2/4	0.325	0.569	4/9	3/3	2.857	0.091
7. When are most snakes in this area active?	15/15	12/12	12/15	9/12	0.096	0.757	9/11	3/4	0.085	0.771	7/9	2/3	0.148	0.700
8. On average, how many people are bitten by venomous snakes each year?	15/15	12/12	0/15	0/12	0.000	1.000	0/11	0/4	0.000	1.000	0/9	0/3	0.000	1.000
9. Of the people that are bitten, how many of these people, on average, die each year?	15/15	12/12	4/15	9/12	6.238	0.013*	3/11	1/4	0.008	0.929	7/9	2/3	0.148	0.700
10. What type of people are most commonly bitten by venomous snakes?	15/15	12/12	14/15	10/12	0.675	0.411	10/11	4/4	0.390	0.532	7/9	3/3	0.800	0.371
11. If you are bitten by a venomous snake, the most important thing to do is?	14/15	12/12	1/14	7/12	7.949	0.005	0/10	1/4	2.692	0.101	4/9	3/3	2.857	0.091
12. On a scale of 1–5 (1 being phobic and 5 being no fear whatsoever) how scared are you of snakes as a group?	12/15	10/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13. As a whole, snake populations in Costa Rica are declining? (True or False)	12/15	11/12	11/12	7/11	2.650	0.104	8/9	3/3	1.010	0.315	6/8	1/3	1.637	0.201
14. Snakes always live together? (True or False)	15/15	12/12	14/15	12/12	0.831	0.362	10/11	4/4	0.390	0.532	9/9	3/3	0.000	1.000
15. Rattlesnakes occur in the region? (True or False)	15/15	12/12	13/15	10/12	0.059	0.808	9/11	4/4	0.839	0.360	7/9	3/3	0.800	0.371
16. Snakes with triangular shaped heads and slit pupils are always venomous? (True or False)	15/15	12/12	9/15	10/12	1.741	0.187	7/11	2/4	0.227	0.634	7/9	3/3	0.800	0.371
17. Bushmasters like to live near people and commonly consume livestock? (True or False)	14/15	11/12	10/14	9/11	0.365	0.546	8/11	2/3	0.042	0.838	7/8	2/3	0.637	0.425

* denotes significance at the alpha = 0.05 level

There were a few problems in the oral interview question content and format. Using a picture of a snake may not have provided a fair representation of baseline knowledge. Judging snake knowledge by common name is problematic as well, due to our limited knowledge of the Spanish language as well as multiple common names for snakes.

There was also a potential problem in the administration of the interview. Although we tried to keep each interview private, we performed many interviews in homes where other family members liked to express their opinions during the interview. We also had to perform some group interviews in the interest of time. Having others commenting during interviews may have biased our interviewees' answers.

Education Program and Pre- and Post-Program Questionnaires

Overall, the proportion of subjects with correct answers increased in 11 questions from pre- to post-program questionnaires. Subjects also performed significantly better on questions 5, 9, and 11 (Table 4). Therefore, the subjects did learn and retain some knowledge from the education program. Given the information, it is difficult to predict why subjects answered these three questions better than others. Two of these question's answers are non numeric, and therefore easier to remember, but question 9 does have a numeric answer.

Subjects did worse on four questions in the post-program questionnaire, and remained unchanged for one question. The question that remained the same was question 8, and everyone answered this question incorrectly. Again it is difficult to say why no one answered this question correctly because it is a straightforward question with a numeric answer. We may have poorly presented the answer to that question in our education program.

We used question 12 to gauge subject's attitudes before and after the program. In this case, we used fear to measure the attitude change. From these results, it would appear that people became more fearful of snakes with the percentage of people reporting ophidiophobia increasing by 5%. However 5% does not represent a significant change. Therefore, attitudes, as measured in this questionnaire, did not seem to change much over the course of the education program. This was also the question with the most non-responses. Subjects may not have understood what the question was asking of them. It should be noted that only one question of the survey is directly aimed at discovering attitudes. It may not be valid to analyze a change in attitudes with only one question dedicated to this purpose.

A general problem with our education program was that fewer people attended the program than said they would in the oral interviews. Additionally, fewer women attended than men. It is difficult for the results to truly represent the community at large with such a small sample size. Fewer people completed the post-program questionnaire than the pre-program questionnaire. We are unsure whether people simply did not want to fill out the questionnaire again, or they did not stay for the whole program.

Conclusions

Although we gained many insights from this study, there is still much to learn. It would be useful to go back in six months and measure retention rates using the same questionnaire without a refresher program. It would also be interesting to do pre- and post-education program censuses of snakes around San Isidro de Upala. This study could determine if education programs not only improve knowledge and attitudes, but also translate into an increase in snake numbers. However, the post-program censuses would have to be done over years to take into account lag time in snake reproduction.

With Costa Rica becoming such a technologically modern country, television and movies are important parts of family life. The media might consider changing their portrayal of snakes, especially in programs on "scientific" television channels. Instead of focusing on dangerous and venomous snakes (that represent a small fraction of the total snakes), they should instead focus on common snakes and ones with interesting traits.

Although most interviewees had some education (at least up to 6th grade), no interviewee said they learned about snakes in school. Schools, especially those in rural areas, need to teach their students not to fear the natural world around them. They also need to teach them to respect snakes as well as all plants and animals, especially in a fragile and diverse tropical rainforest ecosystem like Costa Rica.

Fortunately, this change in the school system is already

beginning in richer areas and cities, but not in poor rural areas where the need is greatest. For students to gain knowledge about snakes and the natural world, they must attend school as well. Areas like San Isidro are trying to increase attendance in rural areas by offering secondary school at night so that students are able to help their family by working during the day and going to school at night.

With much of this community's snake knowledge coming from media, religion (Catholicism), and myths learned over their entire lives, it is difficult to change their viewpoints with one education program. This study shows a glimpse of the snake knowledge and attitudes of the small Costa Rican town of San Isidro de Upala. It also shows that an education program based on the specific needs of a community can foster an increase in knowledge about snakes. However, there is still a significant amount of snake human dimensions and education research to do, not only in San Isidro, but also in Costa Rica and the rest of the world. Factual snake information needs to be presented at an early age and from all angles (religion, school, media, and family to name a few) if it is to have a positive, lasting effect on individuals and communities.

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About the Kansas Herpetological Society

The KHS is a non-profit organization established in 1974 and designed to encourage education and dissemination of scientific information through the facilities of the Society; to encourage conservation of wildlife in general and of the herpetofauna of Kansas in particular; and to achieve closer cooperation and understanding between herpetologists, so that they may work together in common cause. All interested persons are invited to become members in the Society. Membership dues per calendar year are \$15.00 (U.S., Regular), \$20.00 (outside North America, Regular), and \$20.00 (Contributing) payable to the KHS. Send all dues to: KHS Secretary, 5438 SW 12th Terrace Apt. 4, Topeka, Kansas 66604.

KHS Meetings

The KHS holds an annual meeting in the fall of each year. The meeting is, minimally, a two day event with lectures and presentations by herpetologists. All interested individuals are invited to make presentations. The annual meeting is also the time of the Saturday night social and fund-raising auction.

Field Trips

The KHS hosts two or more field trips each year, one in the spring and one in the fall. Field trips are an enjoyable educational experience for everyone, and also serve to broaden our collective understanding of the distribution and abundance the amphibians, reptiles, and turtles in Kansas. All interested persons are invited to attend.

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The Journal of Kansas Herpetology, currently issued quarterly (March, June, September, and December), publishes all society business.

Submission of Manuscripts

As space allows, *JKH* publishes all manner of news, notes, and articles. Priority of publishing is given to submissions of Kansas herpetological subjects and by KHS members; however all submissions are welcome. The ultimate decision concerning the publication of a manuscript is at the discretion of the Editor. Manuscripts should be submitted to the Editor in an electronic format whenever possible. Those manuscripts submitted in hard copy may be delayed in date of publication. All manuscripts become the sole possession of the Society, and will not be returned unless arrangements are made with the Editor. *JKH* does not publish book reviews, but will publish relevant book announcements. In the interest of consistency and comprehension, the KHS Executive Council voted that the common names used in *JKH* will follow the latest edition of standardized common names as organized by CNAH (www.cnah.org; Collins and Taggart, 2009), which were also used in the prior and current editions of *Amphibians and Reptiles in Kansas* (currently Collins and Collins, 1993) and the *Peterson Field Guide* (Conant and Collins, 1991, 1998).

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Bronze Salamander Award

Established in 1987, this Award is presented to those individuals whose efforts and dedication to the Kansas Herpetological Society go far beyond the normal bounds. The recipients of this Award have given exemplary service to the KHS, and are presented with an elegant bronze sculpture of a Barred Tiger Salamander.

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KHS members only are eligible to apply for *The Alan H. Kamb Grant for Research on Kansas Snakes*. The recipient of the grant will be selected by the KHS Awards Committee. A minimum award of \$300 is given annually.

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This CNAH Award was established in recognition of the scientific career of George Fredrick Toland, whose life-long interest in amphibians, reptiles, and turtles was passed on to so many of his students. The recipient of this award will be selected by the KHS Awards Committee. A minimum award of \$200 is given annually at the end of the KHS meeting.

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This CNAH Award was established in recognition of the scientific and photographic achievements of Suzanne L. Collins and Joseph T. Collins, whose life-long study and conservation of the native amphibians, reptiles, and turtles of Kansas is amply demonstrated in their extensive and excellent writings and photography, both academic and popular, about these animals. In even-numbered years, the Award is bestowed upon an individual who, in the preceding two calendar years, had published a paper of academic excellence on the native species of Kansas amphibian, reptile, and/or turtle and in odd-numbered years, the Award is bestowed upon an individual who was chosen the best in a juried competition featuring the art of photography in portraying amphibians, reptiles, and/or turtles. *The Collins Award* is minimally \$1,000.00, and is neither a grant nor a scholarship. No nominations or applications can be made for it.

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