KANSAS HERPETOLOGICAL SOCIETY

NEWSLETTER No. 121

SEPTEMBER 2000

ANNOUNCEMENTS

Kansas Herpetological Society
27th Annual Meeting
21–22 October 2000

Theme of the Meeting

Conservation and Natural History of Amphibians, Turtles, and Reptiles

The entire program for the *Kansas Herpetological Society's* 27th Annual Meeting will be held at the Adam's Mark Hotel, Blue Ridge Cut-off at I-70 (right across from the Truman Sports Complex), in Kansas City, Missouri, on 21-22 October 2000. The KHS meeting will be held jointly with the *Missouri Herpetological Association* and the *Kansas City Herpetological Society*. Lodging arrangements will not be made by the KHS, but a special rate of $70.00 per room per night for four individuals at Adam's Mark Hotel has been secured for all participants; please contact the Adam's Mark Hotel directly (1-800-444-2326) to make your reservations. To secure this special rate, reservations must be made by 20 September; be sure to mention the KHS. Registration: Students $10.00 per person; all others $25.00 per person. Banquet: $23.50 per person. The banquet and annual KHS auction will be held at Quincy's, an upscale bar within the Adam's Mark Hotel. There will be an after-banquet speaker followed by the KHS auction. Beer will be free. A live exhibit of native Kansas and Missouri amphibians,turtles, and reptiles (venomous snakes are not permitted) will be assembled by Richard Daniel (Missouri) and Travis W. Taggart (Kansas), and will be featured and available for viewing and photography. The exhibit will be housed at the Adam's Mark Hotel. Times for members to conduct herpetological photography on Saturday and Sunday will be listed in the program.

Saturday, 21 October 2000

8:00 am Registration & Purchase of Banquet Tickets: *Karen Toepfer* (KHS Treasurer) at Adam's Mark Hotel, Kansas City, Missouri. Coffee will be available.

8:00 am to 5:00 pm Live Exhibit at Adam's Mark Hotel in Room TBA.

Scientific Paper Session 1 at Adam's Mark Hotel
Moderator: *Henry S. Fitch,* KHS Distinguished Life Member, Fitch Natural History Reservation, University of Kansas, Lawrence

8:20 am Welcome by *Robert Powell,* KHS President, *Robert Wilkinson,* MHA, and *Phil Dickens,* KCHS president).

8:30 am Keynote Speaker: *Robert Wilkinson,* Southwest Missouri State University, Springfield. Topic: The Hellbender, *Cryptobranchus alleganiensis:* Then and Now.

9:00 am Speaker: *Megan Kearney* and *Lynnette Sievert,* Emporia State University, Kansas. Topic: Digestive Parameters of Great Plains Skinks *(Eumeces obsoletus)* in Kansas.**

9:15 am Speaker: *Paul Frese,* Natural Resources Conservation Service, Albany, Missouri. Topic: The Natural History of the Northern Prairie Skink (*Eumeces septentrionalis*) in a Heavily Disturbed Landscape.

9:30 am Speaker: *Joe Hackler* and *J. Daren Riedle,* Department of Zoology, Oklahoma State University, Stillwater. Topic: Amphibians and Reptiles of Sequoyah National Wildlife Refuge.

9:45 am Speaker: *Tom R. Johnson,* Jefferson City, Missouri. Topic: Highlights in the Career of a State Herpetologist.

Editors Note: This program contains a list of speakers and activities as of 7 September 2000. Additional speakers can be added to the program up to the deadline of 10 October 2000.

Break 10:00 am

Scientific Paper Session 2 at Adam's Mark Hotel
Moderator: *David Nieves,* Kansas City Herpetological Society, Kansas City, Missouri

10:15 am Keynote Speaker: *Joseph Slowinski,* California Academy of Sciences, San Francisco. Topic: Snake Phylogeny Based on a Mitochondrial and Nuclear Gene.

10:30 am Speaker: *Walter E. Meshaka,* State Museum of Pennsylvania, Harrisburg. Topic: The Knight Anole (*Anolis equestris*) in Southern Florida: Life's Never Been So Good.

10:45 am Speaker: *Henry S. Fitch,* Fitch Natural History Reservation, University of Kansas, Lawrence. Topic: Aggregations of Female Copperheads (*Agkistrodon contortrix*) in Northeastern Kansas.**

11:00 am Speaker: *Ben Russell,* Southeast Missouri State University, Cape Girardeau. Topic: Natural History of the Mole Salamander, *Ambystoma talpoideum,* in Southeastern Missouri.

11:15 am Speaker: *Robert Aldridge,* Saint Louis University, St. Louis, Missouri. Topic: The Evolution of the Mating Season in North American Pitvipers.

11:45 am to noon KHS Group Photograph taken by *Larry L. Miller* (Kansas Heritage Photography, Wakarusa)

LUNCH: Noon to 1:00 pm

Scientific Paper Session 3 at Adam's Mark Hotel
Moderator: *Robert Wilkinson,* Missouri Herpetological Association

1:00 pm Keynote Speaker: *Ronald Goellner,* St. Louis Zoo, St. Louis. Topic: The Role of Zoos in Conservation of Amphibians and Reptiles.

1:30 pm Speaker: *Kevin Zippel,* Detroit Zoo. Topic: Amphibian Conservation at the Detroit Zoo.

1:45 pm Speaker: *Karen Graham,* Sedgwick County Zoo, Wichita. Topic: Conservation of Amphibians and Reptiles at the Sedgwick County Zoo.

2:00 pm Speaker: *Larry L. Miller,* Kansas Heritage Photography, Wakarusa. Topic: Amphibians, Turtles, and Reptiles of the Smoky Hill Ranch, Logan County, Kansas.**

2:15 pm Speaker: *Travis W. Taggart,* Sternberg Museum of Natural History, Fort Hays State University. Topic: The Herpetofauna of Kisatchie, Louisiana.

2:30 pm Speaker: *TBA*
2:45 pm Speaker: *TBA*

Break 3:00 pm

3:15 pm KHS General Business Meeting with KHS President *Robert Powell* presiding

Introduction of current KHS officers by *Robert Powell*
KHS Treasurer's Report for 2000 by *Karen Toepfer*
KHS Secretary's Report for 2000 by *Daren Riedle*
KHS Editor's Report for 2000 by *Travis W. Taggart*

Report on Plans for the 28th Annual KHS Meeting at Wakarusa, Kansas in 2001 by KHS President-Elect *Mark Ellis* (Wakarusa, Kansas).

Election of KHS Officers for 2001. The 2000 KHS Nominating Committee is composed of *Joseph T. Collins* (Kansas Biological Survey), *Lynnette Sievert* (Emporia State University) and *Karen Toepfer* (Olathe), and offers the following slate of candidates:

For President
Mark Ellis, Wakarusa, Kansas
Serving as president-elect during 2000, and will automatically assume the KHS presidency on 1 January 2001.

For President-Elect
Suzanne L. Collins, The Center for North American Amphibians and Reptiles, Lawrence
Jill Reimer, McCollom Elementary School, Wichita

For Treasurer (unopposed)
Eric Kessler, Blue Valley North High School, Overland Park.

For Secretary (unopposed)
Mary Kate Baldwin, Topeka Collegiate School.

Presentation of the *Howard Kay Gloyd-Edward Harrison Taylor Scholarship* for 2000 by *Robert Powell* (KHS President).

Presentation of the 2000 *Bronze Salamander Award* for distinguished service to the Kansas Herpetological Society, by *Kelly J. Irwin,* former KHS President and recipient of a BSA in 1998.

4:30 pm to 5:00 pm Missouri Herpetological Association General Business Meeting with *Robert F. Wilkinson* presiding

5:00 pm to 6:30 pm Banquet at Quincy's. KHS president *Robert Powell* encourages the assembled membership to dine at Quincy's, because the KHS auction will start there at 7:45 pm.

6:30 pm to 7:15 pm Banquet Speaker: *L. Lee Grismer,* La Sierra University, Riverside, California. Topic: Herpetofauna of the Gulf Islands: From Baja to China.

Approx 7:15 pm Presentation of the Missouri Herpetological Association Distinguished Career Award to *Tom R. Johnson* by *Robert F. Wilkinson* (Missouri Herpetological Association)

Approx 7:30 pm Presentation of *The Suzanne L. & Joseph T. Collins Award for Excellence in Kansas Herpetology* by *Robert Powell* (KHS President) and *Travis W. Taggart* (The Center for North American Amphibians and Reptiles). The recipient of *The Collins Award* receives a commemorative plaque and a check for $1000.00.

Approx. 7:45 pm The KHS Auction will be conducted by *Joseph T. Collins,* ably assisted by KHS Treasurer *Karen Toepfer* (Olathe), *Suzanne L. Collins* (The Center for North American Amphibians and Reptiles, Lawrence), and *Mary Kate Baldwin* (Topeka Collegiate School), and featuring many excellent books and other items (of questionable value). KHS Treasurer *Karen Toepfer* takes cash, credit cards, and checks. Be sure and get a bidding number from her before the auction commences. Bid vigorously, and support the KHS.

Sunday, 22 October 2000

8:00 am Registration: *Karen Toepfer* (KHS Treasurer) at Adam's Mark Hotel. Coffee will be available.

8:00 am to noon. Live Exhibit at Adam's Mark Hotel in Room TBA.

Scientific Paper Session 4 at Adam's Mark Hotel
Moderator: *John S. Parmerlee,* Johnson County Community College & Avila College.

8:15 am Keynote Speaker: *Robert W. Henderson,* Milwaukee Public Museum. Topic: Neotropical Boas: From the Sublime to the Enormous.

8:45 am Speaker: *Dwight R. Platt,* Bethel College, North Newton, Kansas. Topic: Food Habits of Snakes on a Sand Prairie in South-Central Kansas.**

9:00 am Speaker: *J. Daren Riedle, Stanley F. Fox,* and *Paul A. Shipman,* Department of Zoology, Oklahoma State University, Stillwater. Topic: Ecology of the Alligator Snapping Turtle, *Macrochelys temminckii,* at Sequoyah National Wildlife Refuge.

9:15 am Speaker: *Angelo Bufalino,* Saint Louis University, St. Louis, Missouri. Topic: Distribution and Habitat Availability for the Plainbelly Water Snake, *Nerodia erythrogaster,* in the Lower Cumberland River Basin.

9:30 am Speaker: *Kelly J. Irwin,* Arkansas Game & Fish Commission, Benton. Topic: Problems in Arkansas Herpetology.

9:45 am Speaker: TBA

Break 10:00 am

Scientific Paper Session 5 at Adam's Mark Hotel
Moderator: *Dwight R. Platt,* KHS Distinguished Life Member, Bethel College, North Newton

10:20 am to noon Speaker: *Joseph T. Collins.* Topic: The Second Annual Kansas Amphibian Monitoring Program (KAMP) Conference: More Comments, Criticisms, and Discussions, plus a Summation of Progress Made.

About 11:30 am Presentation by *Linda Weir,* Coordinator, North American Amphibian Monitoring Program, Laurel, Maryland, and *Ken Brunson,* Kansas Department of Wildlife & Parks, Pratt, of the *KAMP Big Croaker Awards* for 2000 (two awards of $100.00 each will be given to the most diligent KAMP volunteers during the 2000 season).

Noon: Have a safe trip home. See you in 2001 in Wakarusa, Kansas.

27th Annual Meeting Committee
Robert Powell, Chairperson

Joseph T. Collins will serve as Master of Ceremonies for the meeting

Note: The *Suzanne L. & Joseph T. Collins Award for Excellence in Kansas Herpetology,* to be given for the best published paper or presentation during 1998 and 1999 on a Kansas amphibian and/or reptile, will be presented at this KHS Annual Meeting. In 2001, *The Collins Award* will be given at the KHS 28th Annual Meeting in Wakarusa, Kansas, to the KHS member judged to have taken a photograph of exceptional merit of an amphibian(s) and/or reptile(s) native to Kansas. KHS members, warm up your cameras.

Nominations for the *Howard Kay Gloyd-Edward Harrison Taylor Scholarship* for 2000 are still being accepted. Submit your nominees to the KHS Awards Committee Chairperson (see the inside front cover of this KHS Newsletter) no later than 15 October 2000.

*** indicates that the presentation listed in this program is eligible for The Collins Award in 2002.*

KHS BUSINESS

On 12 April 2000, the Executive Board o the KHS (officers nd committee chairs) met in Lawrence to discuss a number of issues that affect the future of the Society. Following is a brief summary of decisions made at that meeting first printed in Newsletter 120:

1. Beginning with this synopsis, summaries of decisions made at board meetings and at the annual business meeting will be published in the KHS Newsletter.
2. The Newsletter will not be placed on the KHS webpage, although a list of feature articles will be included beginning with the June 2000 issue.
3. The KHS declined an invitation to participate in the Southwest Kansas Reptile Expo in Liberal this summer. The decision was based on a policy established at an Annual Business Meeting some time ago. That policy states that the KHS will not affiliate with any organization involved in the sale or trade of amphibians and reptiles. This decision, of course, does not preclude participation by individual KHS members in this or any similar event.
4. Beginning in 2001, the KHS Secretary will have available for distribution at the Annual Meeting a list of members and addresses (postal and email). Membership renewal forms shall include an option to indicate that the member does not wish to be listed.
5. Beginning in 2001, the KHS Secretary will maintain, in addition to the membership list, a "gratis list" for Newsletter distribution. This list will include 25 major divisions of herpetology (universities and museums) in addition to all other recipients of gratis copies. This list will not be distributed to the general membership.
6. The KHS will not at this time investigate the possibility of bonding the Society's funds or financial officers.
7. The KHS will establish an endowment for the Gloyd-Taylor Award by depositing $100 into a new savings account. As soon as funds accumulate by means of designated donations or other sources, the principal will be converted into a certificate of deposit. The intent of establishing this endowment is so a portion of the accrued interest eventually will be used for the Award. Until then, the Award will be continue to be payable from the Society's non-designated funds.
8. The following proposed changes in the KHS By-laws will be presented to the membership at the 2000 Annual Business Meeting in Kansas City. If approved, the changes will go into effect in 2001.

PROPOSED KHS BYLAWS CHANGES
(existing text in regular type, proposed changes in bold type, rationale in italics)

Article II. Officers of the Society

Section 1. The officers of the Society shall be of two kinds, elective and appointive.

(b) The appointed officer shall be Editor of the Society.

(b) The appointed officers shall be Editor of the Society and Historian.

Rationale below in Section 5.

Section 4. The duties of the elective officers shall be as follows:

(c) The Secretary shall maintain the records of the Society and officers; notify the membership of pertinent business and be responsible for all general correspondence of the Society.

(c) The Secretary shall maintain the records of the Society and officers, including all moneys received, collect the annual dues and deposit fund into the Society's designated account(s), maintain the membership roster, provide mailing labels to the Editor of the Society, and notify the membership of pertinent business.

(d) The Treasurer shall keep records and accounts of the Society including all moneys received and disbursed; collect the annual dues and maintain the membership roster; and be responsible for all financial reports required by the business of the Society. The Treasurer shall make a financial report to the membership at the general meeting.

(d) The Treasurer shall keep financial records and accounts of the Society, be responsible for all moneys disbursed, and prepare and submit all financial reports required by the business of the Society. The Treasurer shall make a financial report to the membership at the general meeting; this report is to be published in the first issue of the

Newsletter during the year following the general meeting.

Rationale: Separating receipts and disbursements protects both officers from charges of impropriety by providing an internal control of funds received and spent by the Society.

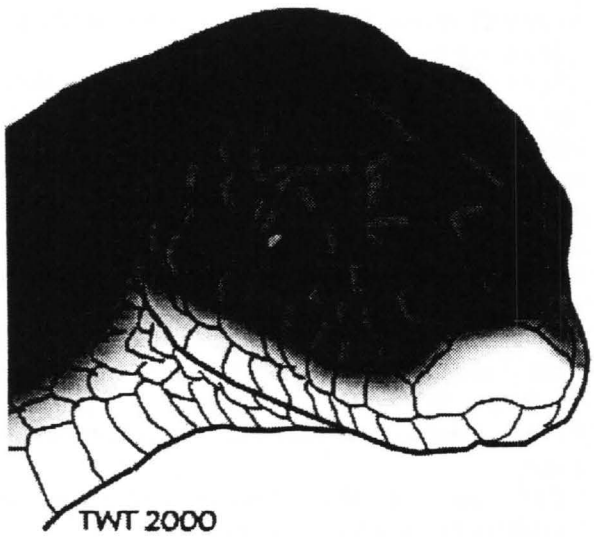
Section 5. The duties of the Editor of the Society shall be as follows: The Editor shall be responsible for all phases of Society publications. The Editor may appoint staff members for assistance as needed. Inasmuch as the newsletter is the principal mechanism for written communication to the membership, the Editor is obligated to publish all communications of the Society and its officers on a first priority basis and to include, as space permits, other items consonant with the stated objectives of the Society. The Editor shall report annually to the officers of the Society.

Section 5. The duties of the appointed officers shall be as follows:

(a) **The duties of the Editor of the Society shall be as follows: The Editor shall be responsible for all phases of Society publications. The Editor may appoint staff members for assistance as needed. Inasmuch as the Newsletter is the principal mechanism for written communication to the membership, the Editor is obligated to publish all communications of the Society and its officers on a first priority basis and to include, as space permits, other items consonant with the stated objectives of the Society. The Editor shall report annually to the officers of the Society.**

(b) **The Historian of the Society shall compile all Society publications and other pertinent records and make provisions for permanent archival storage of those records. The Historian shall report annually to the officers of the Society.**

Rationale: No current mechanism exists for the archival preservation of Society records.



KHS BRINGS YOU NEWS OF THE WORLD

TEXAS HERPETOLOGICAL SOCIETY
FALL 2000 SYMPOSIUM

Theme: Educational Issues in Herpetology
28 October 2000, University of Texas at Tyler
Peliminary list of speakers:

- J. Whitfield Gibbons, Savannah River Ecology Laboratory, Aiken, South Carolina. *Banquet speaker.*
- Lee Ann Linan, Texas Parks and Wildlife. *Texas Nature Trackers—Using citizen volunteers to collect data on Texas herps.*
- K. C. Rudy, Children Zoo Education Coordinator, Dallas Zoo.
- Larry Chambers, Tyler. *Story telling with reptiles as an educational tool.*
- Jesus Rivas, University of Tennessee. *Ecotourism and Herps.*
- Bill Love. *Writing about reptiles and amphibians for the public.*
- Robert A. Thomas, Loyola Chair in Environmental Communications and Director Center for Environmental Communications. *Herpetology education at various academic levels.*
- Terri Cox, Waco Zoo. *Zoo educational displays.*
- Jim Dunlop, Bill M. Holifield Science Learning Center. *Teaching with herps in the classroom.*
- Craig Rudolph, U. S. Fish and Wildlife. *Conservation issues.*
- Carl Gans, University of Texas at Austin. *Functional morphology as an educational tool.*
- Sharon Phenix, Canyon of the Eagles Nature Park. *Conservation vs. Recreation.*
- Charles Swift, Vernon Dye and Christel Snedson, Lubbock ISD.

There will also be a student poster sessions.

NEW PUBLICATIONS OF POSSIBLE INTEREST

The Biology of Plethodontid Salamanders by Richard C. Bruce, Robert G. Jaeger, Lynne D. Houck (Editors). Hardcover—488 pages (March 2000). Kluwer Academic Publishers. ISBN: 0306463040. $225.00.

This volume offers a state-of-the-art overview of plethodontid salamanders. The reader will find the best current understanding of many aspects of the evolution, systematics, development, morphology, life history, ecology, and field methodology of these animals. The book is divided into three sections.

The first one features papers presented in honor of Richard Highton, a specialist in molecular systematics and speciation in plethodontids and names new species of plethodontid salamanders from the Appalachians.

A Field Guide to the Amphibians and Reptiles of the Maya World : The Lowlands of Mexico, Northern Guatemala, and Belize, by Julian C. Lee. Hardcover—448 pages (July 2000). Cornell Univ Press. ISBN: 0801436249. $59.95.

The Yucatan Peninsula is today divided among Belize, Guatemala, and Mexico. Travelers to this region discover both astonishing archaeological sites and a stunning array of wildlife, including crocodiles, turtles, lizards, snakes, frogs, toads, and salamanders. This book—written by the world's leading authority on the herpetology of the lowland Maya area—is the only comprehensive field guide to all the species of amphibians, turtles, and reptiles found there.

Texas Snakes: Identification, Distribution, and Natural History, by John E. Werler and James Ray Dixon. Hardcover—544 pages (July 15, 2000) University of Texas Press. ISBN: 0292791305. $39.96.

I can't think of two better persons to take on the daunting task of preparing a book on the snakes of Texas. This book was obviously a labor of love and the culmination of many years of effort by both authors.

—Jonathan A. Campbell, Professor of Biology, University of Texas at Arlington.

From the legendary, fear-inspiring Western Diamondback Rattlesnake to the tiny, harmless Plains Blackhead Snake, Texas has a greater diversity of snake species than any other state in the country. Recognizing the public's need for a complete guide to identifying and understanding Texas' snakes, two of the state's most respected herpetologists have joined forces to create this definitive reference.

Well-written species accounts describe each snake's appearance, lookalikes, size, habitat, behavior, feeding, and reproduction. The authors also include color photos and finely detailed line drawings to aid field identification, along with accurate range maps, a checklist of Texas snakes, a key to the species, and a brief discussion of classification and taxonomy. The authors round out this volume with essays on snake myths and misinformation, snakebite and its prevention, conservation, Texas biotic provinces, and a brief history of Texas herpetology.

FEATURE ARTICLES

BIOGEOGRAPHIC ANALYSIS OF THE REPTILES (SQUAMATA), IN ELLIS COUNTY, KANSAS

TRAVIS W. TAGGART

STERNBERG MUSEUM OF NATURAL HISTORY, FORT HAYS STATE UNIVERSITY, HAYS, KANSAS 67601

ABSTRACT: The distribution of many species of the Ellis County Squamata are highly associated to exposed geologic formations. Collection and observation locality data were plotted and examined against a previously published geologic map to determine which geologic formation the locality was in. The results illustrated that a particular geologic formation may 1) support a species only during certain times of the year, 2) harbor all individuals of a species in the county, 3) contain only transient individuals, 5) exclude a species entirely, and 6) that generally, species densities increase in the same order older rock strata are exposed, northwest to southeast. This investigation has led to a better understanding of the localized distribution and habitat preferences of the lizards and snakes in Ellis County, Kansas.

INTRODUCTION

Biogeography is the study of the geologic distribution of plants and animals. This paper focuses on the distributions of lizards and snakes in Ellis County, Kansas with respect to surface geology.

Since Simpson (1964), geographical variation in species density of vertebrates has received increasing attention. Huheey (1965), Kiester (1971) and Rogers (1976) divided their study areas into either quadrats or geographical units and then by determining the number of species within each unit, constructed contour maps showing species densities and then tested for correlations against various components of the physical environment (i.e., small mammal species densities, precipitation, and temperature).

Similar studies have been done in Kansas by Fisher (1968) examining mammals, amphibians, reptiles, and turtles by county, and more recently by Fitch (1993) with the relative abundance of snakes among physiographic provinces. The objective was to determine if the lizards and snakes in Ellis County are associated with the surface geology at previously collected sites. Information would then aid in interpolating the distributions of the lizards and snakes in Ellis County.

METHODS

Museum specimens, literature records, field notes and personal observations were utilized to compile a list of the recorded specimens of Ellis County Squamata (available on request). The geologic unit that each specimen was located in was determined by checking the locality against Neuhauser and Pool (1989, Figure 1). The total number of species per unit was determined and used to compute the similarity coefficient of Simpson (1960, Table 1). The percentage of a species population within a particular geologic unit was found by dividing the number of specimens found in that unit by the sum of the number of specimens of the same species found throughout the remaining units (Table 2). For comparative purposes, species with 50% or more of the specimens from any one formation are assumed to have a high association to that formation. Species with 25%–50% of the specimens from any one formation are assumed to have a moderate association to that formation.

Table 1. A similarity matrix comparing the herpetofauna of the six geologic units of Ellis County using the similarity coefficient of Simpson (1960). The number of species in each unit is also given. The number of shared species between regions is given in the upper triangular matrix, and Simpson's similarity coefficients are given in the lower triangular matrix.

Geologic Unit	No. of Species	Geologic Unit					
		Qt-Qal	*Ql*	*To*	*Kns-Knf*	*Kcb-Kcf*	*Kgh*
Qt-Qal	26		22	14	21	23	18
Ql	22	1.00		14	20	22	17
To	14	1.00	1.00		14	14	11
Kns-Knf	22	0.95	0.91	1.00		20	28
Kcb-Kcf	23	1.00	1.00	1.00	0.91	18	
KgA	19	0.95	0.89	0.79	0.95	0.95	

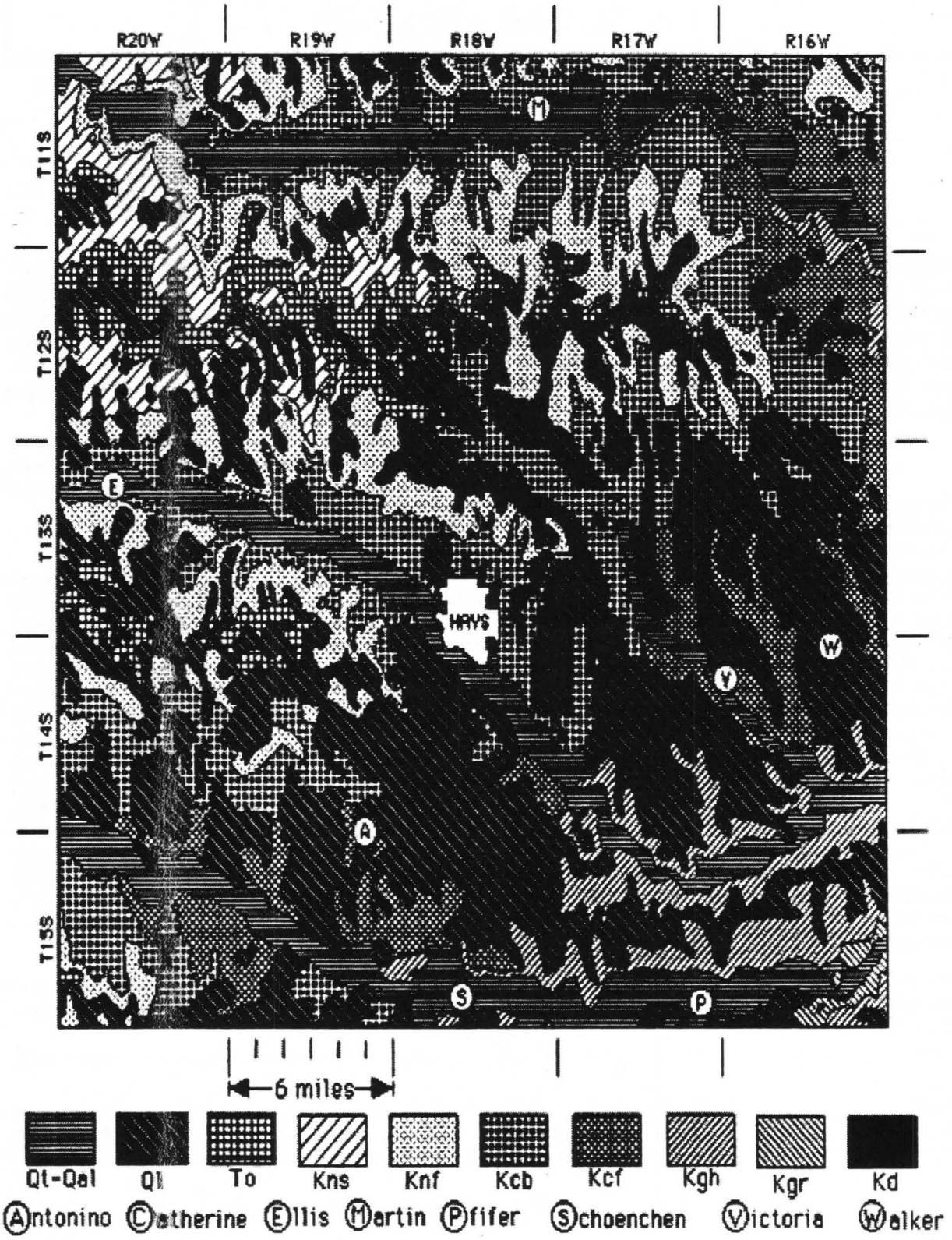


Figure 1. Geologic map of Ellis County, Kansas, after Neuhauser and Pool (1989). Towns listed in collection localities are shown.

RESULTS

Geologic Accounts

Quarternary
Pleistocene
Alluvium and Terrace Deposits

Qt-Qal—The stream deposits comprise approximately 110 square miles of Ellis County and consist of deposited sand, gravel, clay and silt from stream bed to terraced positions along major valleys. All streams in Ellis County are intermittent and periodically go dry.

All but one of the twenty-seven species of Ellis county squamates have been recorded in association with this riparian formation. Many eastern species such as the *Ophisaurus attenuatus, Heterodon platirhinos, Lampropeltis calligaster, Storeria dekayi, Thamnophis proximus, Thamnophis sirtalis, Nerodia sipedon* and *Sistrurus catenatus* are almost exclusively associated to this formation, due to the presence of water and trees or thick vegetation that exists in the moist, rockless sediment and level topography. Species such as *Heterodon nasicus, Heterodon platirhinos, Thamnophis radix, Thamnophis sirtalis, Thamnophis proximus, Cnemidophorus sexlineatus, Holbrookia maculata* and *Sceloporus undulatus* reach their peak abundance here and are also widespread throughout the rest of Ellis county. Other lizards such as *Crotaphytus collaris, Eumeces obsoletus,* and *Eumeces septentrionalis* cross this formation periodically where it lies adjacent to Kgh. *Sistrurus catenatus* is common in this formation but only in the northeastern quarter of the county.

Loess

Ql—Loess is wind-deposited, fine-grained sediments, dominantly silt-sized, and often rich in clay minerals. This geologic unit blankets ca. 420 square miles of Ellis County and is usually flat and expansive but breaks are present at erosional washes. Under natural conditions this deposition supports an association of prairie vegetation and the occasional tree. Only a few localities exist naturally and most Ql has been put under cultivation.

No species is strongly associated to Ql but *Phrynosoma cornutum, Coluber constrictor,* and *Pituophis catenifer* reach there maximum abundance here. *P. cornutum* are numerous due to the ample supply of small invertebrate food specifically ants and the presence of sediments instead of rocks. *C. constrictor* and *P. catenifer* are moderately associated to this habitat due to its high concentrations of small mammals, mammal burrows, and human farm inhabitations. *H. nasicus* is common throughout this formation, even in cultivated fields. *Crotalus viridis* and *T. radix* are also moderately common within this formation, the former during midsummer.

Tertiary
Pliocene
Ogallala Formation

To—The Ogallala Formation covers ca. 39 square miles of Ellis County and consists of limy sand, gravel, silt, and clay carried into Ellis county by swelling streams from the Rocky Mountains to the West. The formation is mostly unconsolidated, but is cemented to various degrees at some places. The Ogallala is exposed between the three major steams from the extreme southwest corner to the east north central portion of the county.

Little collecting has been done on this formation chiefly due to the absence of flat turnable rocks and therefore fewer records are available from To than most other geologic formations and no species reaches its maximum abundance in this formation. Fourteen species were recorded within the Ogallala formation. *Lampropeltis triangulum, P. catenifer,* and *C. constrictor* were recorded most often, but no species was associated to this habitat.

Cretaceous System
Upper Cretaceous
Niobrara Chalk

Kns-Knf—The Smoky Hill Chalk Member (Kns) and Fort Hays Limestone Member (Knf), comprise ca. 23 square miles & 94 square miles respectively, of Ellis County. Massive beds of chalk separated by thin beds of chalky shale that are exposed as massive cliffs ranging in height from six to sixty feet with numerous boulders scattered at the base and underlain in the northwest corner of the county by thin-bedded and platy chalky shale and chalk with bentonite beds throughout. The niobrara chalk contains limonitic concretions and is almost entirely composed of the remains of microscopic marine plants and animals that existed in the seas of the Cretaceous. Twenty-one species were recorded with *Phrynosoma cornutum, Tantilla nigriceps* and *Crotalus viridis* being most strongly correlated to this formation.

Carlile Shale

Kcb-Kcf—Ellis County contains 125 square miles of exposed Blue Hill Shale Member (Kcb) and a blanket of 125 square miles being the Fairport Chalk Member (Kcf). The formation is composed of blue-gray, clayey shale with zones of limy concretions and chalky shale with thin layers of chalky limestone and bentonite. Most of this area is composed of small flaky rocks and often the ground is sparsely vegetated.

Of the twenty-three species recorded within the carlile shale only *Sistrurus catenatus* was highly associated to it. Other common species found within this formation were *Phrynosoma cornutum, Heterodon nasicus, Tantilla*

Greenhorn Limestone and Graneros Shale

Kgh-Kgr—The Greenhorn Limestone Member blankets 36 square miles while the Graneros Shale Member covers 2 square miles. Interbedded chalky limestones and limy shale, capped by fence post limestone and dark-gray, very thinly bedded clay shale with numerous interbedded sandy shales, sandstones and thin bentonites. Greenhorn rocks are typically dispersed on grassy hillsides and range in thickness from 3 to 13 cm.

Tropidoclonion lineatum, Eumeces obsoletus, Eumeces septentrionalis, Diadophis punctatus, and *Crotaphytus collaris* are strongly associated to this formation. With the exception of *D. punctatus,* all of these species are seldom found outside of the Greenhorn Limestone. Species that are moderately associated to this formation are *Sceloporus undulatus, Elaphe emoryi, Lampropeltis getula,* and *Lampropeltis triangulum.* Three species that were not recorded from Kgh but are certain to exist there are *Ophisaurus attenuatus, Heterodon nasicus,* and *Heterodon platirhinos.*

Lower Cretaceous
Dakota Formation

Kd—The outcrops of Dakota Formation cover 0.1 square miles of Ellis County and consist of massive fine-grained quartz sandstone containing numerous limonite or pyrite concretions. No specimens examined in this study were determined to have been collected in this formation.

Table 2. The percentage of recorded specimens of each species in the six geologic units of Ellis County. An (*) denotes high association of a species to a geologic unit, a (^) denotes moderate association.

	Geologic Units					
Species	*Qt-Qal*	*Ql*	*To*	*Kns-Knf*	*Kcb-Kcf*	*Kgh-Kgr*
LACERTILIA						
Cnemidophorus sexlineatus	^43.7	17.7	0.9	16.5	10.0	9.1
Crotaphytus collaris	^41.5	0.4	0.4	1.5	4.9	*51.3
Eumeces obsoletus	4.8	7.1	—	9.5	2.4	*73.7
Eumeces septentrionalis	21.4	—	—	—	14.3	*64.3
Holbrookia maculata	*57.9	3.5	—	20.5	8.2	9.9
Ophisaurus attenuatus	*87.4	—	—	12.6	—	—
Phrynosoma cornutum	3.6	0.2	7.3	27.2	20.0	3.6
Sceloporus undulatus	^34.4	3.2	0.3	6.4	14.2	^30.2
SERPENTES						
Coluber constrictor	9.4	23.6	3.1	16.6	19.7	22.8
Crotalus viridis	3.6	23.2	1.8	^33.9	^30.4	3.6
Diadophis punctatus	9.2	1.1	—	^29.7	9.7	*52.1
Elaphe emoryi	1.5	5.3	2.3	27.8	11.3	^49.6
Heterodon nasicus	^36.8	21.1	10.5	10.5	21.1	—
Heterodon platirhinos	*57.9	2.6	7.9	21.0	10.5	—
Lampropeltis calligaster	*50.0	—	—	—	—	—
Lampropeltis getula	6.7	3.4	6.7	26.7	16.7	^50.0
Lampropeltis triangulum	0.7	0.7	10.8	^31.7	7.9	^48.2
Masticophis flagellum	12.9	6.5	—	^29.0	^38.7	12.9
Nerodia sipedon	*92.7	1.7	—	—	3.4	—
Pituophis catenifer	19.5	^35.4	3.7	18.3	11.0	9.8
Sistrurus catenatus	21.4	7.1	7.1	7.1	*50.0	7.1
Storeria dekayi	*100.0	—	—	—	—	—
Tantilla nigriceps	2.6	2.6	—	^38.5	^35.9	20.5
Thamnophis proximus	*72.3	5.6	—	5.6	11.2	5.6
Thamnophis radix	^40.4	27.8	3.5	15.8	14.0	—
Thamnophis sirtalis	*57.1	14.3	—	—	^29.6	—
Tropidoclonion lineatum	—	—	—	3.1	—	*96.9
% of all Ellis Co. squamates	96.3	81.5	51.8	81.5	85.2	70.4

Species Accounts

Common names are those standardized nationwide by Collins (1997).

Lacertilia

Family Phrynosomatidae

Holbrookia maculata—Lesser Earless Lizard

Brennan (1935) reported the first specimens from Ellis County. One-hundred seventy specimen observations have been made, upon which I base my report. Collins (1993) noted the distribution of this species as spotty because habitat for it is not continuous. In Ellis County, Werth (1972) reported this lizard as restricted to flat, sandy, clay, gravel, or cultivated areas with little or no vegetation and loose soil. Most of the localities for *Holbrookia maculata* were within the habitats listed by Werth (1972). My findings show the highest concentration in the sandiest area, *Qt-Qal*. The other geologic formations, especially *Kns*, all contain areas of exposed and sparsely vegetated clays and small pebbles that fulfill the habitat requirements of this lizard. The lack of records from *To* may represent few collecting efforts or the lizard avoids the limy and partially cemented components of this formation; I would favor the former. The similar geologic preferences of *Holbrookia maculata* and *Cnemidophorus sexlineatus* in Ellis County are notable.

Sceloporus undulatus—Prairie Lizard

Brennan (1935) reported the first specimens from Ellis County. Three-hundred twenty-five specimen observations have been made. In Ellis County, Werth (1972) reported this lizard as inhabiting low, sandy areas and is frequently found along outcrops. *Sceloporus undulatus* was observed to be active annually from March through June and then again in September. The Prairie Lizard was found in every geologic formation included in this report. The highest concentrations of this lizard were in *Qt-Qal* and *Kgh-Kgr*. The findings for *Kns* and *Kcb-Kcf* are similar as are the formations. The low number of specimens from *Ql* may reflect little collecting effort since noticeable numbers of rocks are not visible and therefore not hunted, and these lizards are not easily seen when driving through *Ql*. Only one specimen was taken from *To*, probably due to a combined lack of collecting effort and low Prairie Lizard populations.

Phrynosoma cornutum—Texas Horned Lizard

The first records for Ellis County were recorded by Brennan (1935). Forty-seven specimen observations have been made. Collins (1993) lists their habitat as dry, flat areas with a sandy, loamy, or rocky surface with little vegetation. Specimens are known to be active annually from April to September in Ellis County. The Texas Horned Lizard was found in each of the seven geologic groups used in this study, and appears to be evenly dispersed among them. The highest concentration was found in *Ql* and may reflect that *Ql* makes up nearly half of the county, and that *Phrynosoma cornutum* is often seen on roads and is easily collected. The population of this lizard is abundant and stable in Ellis County, with most records coming from he northeast corner.

Family Crotaphytidae

Crotaphytus collaris—Eastern Collared Lizard

Brennan (1935) recorded the first specimen of this lizard within the county. Two-hundred and seventy specimen observations have been made. Werth (1972) stated that this lizard was restricted to rocky outcrops in Ellis County. Observations indicated an annual activity period of April to July, but the Eastern Collared Lizard is active until early fall in Ellis County. This species reaches its peak abundance in *Kgh*. It should be noted that all localities in *Qt-Qal* are where that geologic group runs between exposed greenhorn limestone. Other records outside the immediate vicinity of *Kgh* are most likely either wanderings of individuals or possibly discarded pets.

Family Scincidae

Eumeces obsoletus—Great Plains Skink

The first recorded occurrence of this lizard in Ellis County consisted of a series of five specimens (KU 16889–93), taken at "Hays" in April 1932. Forty-one specimen observations have been made. In western Kansas, Collins (1993) listed the habitat as open rocky hillsides with low vegetation. The Great Plains Skink was observed to be active annually from April through July in Ellis County. This species is concentrated in *Kgh* where 76 % of all specimens were observed in the Greenhorn Limestone formation. Localities not in *Kgh* were all within close proximity to it; none were more than five miles distant.

Eumeces septentrionalis—Northern Prairie Skink

Fleharty and Ittner (1967) first recorded the occurrence of this species in Ellis County. Twenty-eight specimen observations have been taken. The Northern Prairie Skink was observed active annually from April through July in Ellis County. This species seems to be largely restricted to the greenhorn limestone formation, *Kgh*. The six specimens from *Qt-Qal* come from localities bordered on each side by *Kgh*. The remainder of the records are from the next younger strata, *Kcb-Kcf*. A single specimen (KU 218860) was taken by me from a locality in northeast Trego County, and is noteworthy because it is 30 m. WNW of the nearest *Kgh*.

Family Teiidae

Cnemidophorus sexlineatus—Six-lined Racerunner

The first records for Ellis County appeared in Brennan (1935). Two-hundred thirty specimen observations have been made. The Six-lined Racerunner was most numerous in the sandy habitat of *Qt-Qal*, least abundant in *Knf* and *To*, and equally distributed throughout the remainder of the formations. This species is the most widespread and abundant lizard in Ellis County.

Family Auguidae

Ophisaurus attenuatus—Western Slender Glass Lizard

Brennan (1935) first recorded this species from Ellis County, based on two specimens. One-hundred nineteen specimen observations have been made. Eighty-seven percent of all observations are from the floodplain habitat of *Qt-Qal*. It is noteworthy that the remainder of the records are all in *Knf*, a formation of high vertical fort hays limestone bluffs and associated boulders. These two habitats are quite contrasting in Ellis County, but lie adjacent throughout *Knf*. I would expect the Western Slender Glass Lizard to be found in *Kcb-Kcf*, *Kns*, and *Ql* in the northern half of the county.

Serpentes

Family Xenodontidae

Heterodon nasicus—Western Hognose Snake

The first record from Ellis County was in Brennan (1937). Twenty specimen observations have been made. The Western Hognose Snake is most abundant on the riparian stream deposits and floodplain of *Qt-Qal* where anurans (*Bufo*, *Spea*), its preferred food, are also abundant. This snake is common in association with cultivated fields in *Ql* and also is abundant on the chalky limestones and clay shales of *Kcb-Kcf*. Unlike its relative, *Heterodon platirhinos*, *H. nasicus* doesn't shelter beneath rocks. This is evident in Table 2, because there are no recorded observations of the species in the two rockiest habitats, *Kgh and Knf*.

Heterodon platirhinos—Eastern Hognose Snake

Brennan (1935) first recorded this species from Ellis County based on two specimens. Thirty-eight specimen observations have been made. The Eastern Hognose Snake has been recorded from every formation except one, *Kgh*, in Ellis County. It undoubtedly occurs there, because I have collected the species in the same formation in adjacent Russell County. This snake reaches its peak abundance in *Qt-Qal* where trees and toads are also most abundant. The Eastern Hognose Snake is commonly found under rocks, especially in late summer and early fall, but is most often encountered, as is *Heterodon nasicus*, crossing or attempting to cross a floodplain road.

Diadophis punctatus—Ringneck Snake

This species was first recorded from Ellis County by Brennan (1935). One-hundred and ninety-three specimen observations have been made. The Ringneck Snake reaches it peak abundance in the two formations with the largest surface rocks, *Kgh* and The species appears to be scarce in *Ql* and *Kns*, and is seemingly absent in *To*. The records for *Qt-Qal* are from localities bordered by *Kgh* or *Knf*.

Tantilla nigriceps—Plains Blackhead Snake

This species was first recorded from Ellis County by Brennan (1935). Thirty-seven specimen observations have been made. The Plains Blackhead Snake appears to be most abundant on the large boulder hillsides of *Knf*, the chalky shale and limestone of *Kcb-Kcf*, and the fence post rock of *Kgh*. The species is either absent or scarce in the remaining four formations.

Family Colubridae

Coluber constrictor—Eastern Racer

This species was first recorded from Ellis County by Brennan (1935). One-hundred and twenty-four specimen observations have been made. The Eastern Racer is found throughout the county and appears to be abundant in diverse habitats. Records show it to be most abundant in *Ql*, and in *Kgh* and *Kcb-Kcf*. Two very different habitats exist in these formations, and my findings exemplify the hardiness and adaptability of this serpent. The appearance of *Coluber constrictor* as less abundant in *Kns* and *To* may be due to lack of collecting efforts.

Masticophis flagellum—Coachwhip

This species was first recorded from Ellis County by Brennan (1935). Thirty-one specimen observations have been made. The Coachwhip appears to reach it maximum abundance in *Kcb-Kcf* and seems to be abundant throughout the rest of the county, except for a lack of records in *To*. Only two were caught on the loess uplands of *Ql*, even though it comprises almost half the county land surface area. The Coachwhip may avoid *Ql* because most of it is farmed and provides little cover for this diurnal serpent.

Elaphe emoryi—Great Plains Rat Snake

This species was first recorded from Ellis County by Brennan (1935). One-hundred and thirty-four specimen observations have bee made. Observations showed this snake reaching its highest concentrations in the flat rock habitat of *Kgh*. This is consistent with the preferred habitat mentioned in Brennan (1935, 1936, 1937) and Gish (1962).

The Great Plains Rat Snake is also very common on the fort hays limestone member *(Knf)* bluffs and boulders. In this habitat the serpent used the cracks in rocks as retreats during the day. Shining a flashlight into these cracks would reveal numerous specimens of this largely nocturnal snake. The Great Plains Rat Snake was observed in every formation; it was scarcest in *Qt-Qal* and *To.*

Pituophis catenifer—Gopher Snake

This species was first recorded from Ellis County by Brennan (1935). This account is based on eighty-two specimen observations made. Taggart (1992) list this species as the second most observed snake in Ellis County (after *Lampropeltis triangulum*) during 1990. This snake was considered by Brennan (1935) and Gish (1962) to be very wide ranging and common throughout the county. My data show the Gopher Snake to be most common on the loose loess soils of *Ql* and the sandy soils of *Qt-Qal.* Both of these formations allow this serpent to burrow, a habit of this snake well noted in the literature. Noticeably fewer observations came from *To* and *Kns,* but I believe this is because fewer collecting trips were made to those areas.

Lampropeltis calligaster—Prairie Kingsnake

The Prairie Kingsnake is probably the rarest snake in Ellis County. Burt (1933) recorded the first specimen, and Brennan (1935) stated that the species was known from two specimens in Ellis County. Werth (1972) stated this species was found in close association with the four lizard species he was studying in south-central Ellis County. All but one of the known occurrences of this snake are in *Qt-Qal.* This may represent a dispersal corridor from the east. The first record from the county was observed "5 miles south of Martin," a locality in the blue hill shale member, *Kcb.*

Lampropeltis getula—Common Kingsnake

This species was first recorded from Ellis County by Brennan (1935). This account is based on thirty specimen observations made. The annual activity period for this snake in Ellis County, as divulged from observational data, is from April to September. During the hotter parts of summer, the Common Kingsnake is more often encountered at dusk or dawn while actively searching for prey. This serpent was recorded from six of the seven geologic formations in Ellis County. It was most concentrated in *Kgh* and *Knf,* the two rockiest formations, but undoubtedly occurs throughout the county. The Common Kingsnake is most often collected under rocks towards the bottom of washes in Ellis County.

Lampropeltis triangulum—Milk Snake

This species was first recorded from Ellis County by Brennan (1935). One-hundred and forty-nine specimen observations have been made. Taggart (1992) reported this species as the most commonly observed serpent in Ellis County during 1990. Milk Snakes reach their peak abundance in the flat rock habitat of *Kgh,* and secondarily in the large boulder/cliff habitat of *Knf.* This fossorial species was recorded from all formations and members utilized in this study, and was least abundant in *Qt-Qal* and *Ql* with only one specimen recorded from each.

Family Natricidae

Thamnophis proximus—Western Ribbon Snake

This species was first recorded from Ellis County by Brennan (1935). Eighteen specimen observations have been made. As expected, this semiaquatic serpent is strongly associated with the stream bottoms of *Qt-Qal;* there are a few scattered reports throughout the rest of the county. This snake is commonly seen killed on roads along the Saline River and observedd alive along the banks of the Smoky Hill River when water is present.

Thamnophis radix—Plains Garter Snake

This species was first recorded from Ellis County by Brennan (1935). Fifty-four specimen observations have been made, on which I base my report. Like the Western Ribbon Snake, the semiaquatic Plains Garter Snake is chiefly associated with *Qt-Qal,* although records show this species is also the most wide ranging member of the genus in the county. It is commonly found in *Ql,* often several miles from any appreciable surface water. No records occur from *Kgh,* the greenhorn limestone formation. This snake is often confused with *Thamnophis sirtalis* because some Ellis County specimens have red coloration between their dorsal and lateral stripes.

Thamnophis sirtalis—Common Garter Snake

This species was first recorded from Ellis County by Brennan (1935). Seven specimen observations have been made. This is a rare snake in Ellis County, and is often confused with the Plains Garter Snake. *Thamnophis sirtalis* has been observed in three geologic formations in Ellis County, and is most common in *Qt-Qal* along stream and river borders. Two specimens are known from *Kcb-Kcf* in the immediate vicinity of streams.

Tropidoclonion lineatum—Lined Snake

This species was first recorded from Ellis County by Brennan (1935). One-hundred and twenty-eight specimen observations have been made. The lined snake is very locally abundant under the flat rocks of *Kgh,* where 98% of reported observations in Ellis County were made. Three specimens were reported in *Knf,* none since 1961. The fort hays limestone, *Knf,* probably represents the boundary of larger less isolated populations of this small snake.

Storeria dekayi—Brown Snake

This species was first recorded from Ellis County by Brennan (1935). Three specimen observations have been made. All three specimens were from *Qt-Qal* and within two miles of each other. This may indicate that the population in Ellis County is isolated along a forested five mile section of the Saline River. Further searching along the Smoky Hill River and Big Creek may turn up additional specimens. Ellis County is at the edge of the known range of *Storeria dekayi* (Collins, 1993).

Nerodia sipedon—Northern Water Snake

This species was first recorded from Ellis County by Brennan (1935). Fifty-nine specimen observations have been made. The Northern Water Snake is restricted to *Qt-Qal* and to localities in other formations that contain permanent ponds. This species must have dispersed through waterless areas to reach the ponds, but no recorded observations away from water have been made in Ellis County. It is possible that introductions into larger farm ponds took place during fish-stocking operations.

Family Viperidae

Sistrurus catenatus—Massasauga

This species was first recorded from Ellis County by Brennan (1935). Fourteen specimen observations have been made. This small rattlesnake is most commonly observed on roads from north and east of T13S, R17W in the hills of *Kcb-Kcf* and also in association with water, mostly in *Qt-Qal*. The Massasauga has been recorded from every formation except *Kns* where it is probably very rare, if present at all. This serpent is often encountered during late evenings while crossing roads after thunderstorms. Ellis County is at the edge of the known range of *Sistrurus catenatus* (Collins, 1993).

Crotalus viridis—Western Rattlesnake

This species was first recorded from Ellis county by Brennan (1935). Fifty-six specimen observations have been made. This is the most abundant venomous serpent and among the most common of all snakes in Ellis County. *Crotalus viridis* is most common on *Kcb-Kcf* and population observations on *Ql* and *Knf* are also abundant. The Western Rattlesnake appears to be least common on *Qt-Qal, Kgh,* and *To*. The latter of these three may represent a lack of collecting effort or the fact the formation provides little cover for this pitviper.

Discussion

This study suggests high to moderate associations among twenty-six lizards and snakes and the surface geology in Ellis County. An association between a species and a geologic unit in this study is not statistically correlated nor does it imply causation.

The only species that did not show an association to a geologic unit was *Coluber constrictor*. The application of a Geographic Information System (GIS) study may yield environmental associations for *C. constrictor,* as well as more insight on the rest of the species investigated in this study.

Ellis County offered an excellent opportunity for this research. Because of its relatively small size (900 square miles), environmental aspects such as temperature and precipitation are fairly uniform throughout the county. When averaged throughout the life-span of most lizard and snake species, these factors are considered invariant. Also, the previous work of geologists, to clearly define the geologic units within Ellis County, and biologists, to collect and assemble the relatively large number of specimens required for such a study, made this research possible. However, it is important to point out that collector bias must be taken into account in the interpretation of these data.

Similar geologic preferences throughout all of Ellis County are noted between six groupings of squamates, as follow:

1) *Holbrookia maculata, Cnemidophorus sexlineatus,* and *Heterodon platirhinos* are all strongly to moderately associated to *Qt-Qal* and become progressively less common southeasterly as older rocks are exposed. This observation on *H. platirhinos* is interesting in that the bulk of its entire known range is to the southeast.

2) *Crotalus viridis* and *Phrynosoma cornutum* are both moderately associated with *Ql, Kns-Knf,* and *Kcb-Kcf* and are less abundant or absent throughout *Qt-Qal* and *Kgh*. The range of these two species throughout the rest of Kansas is not sympatric, however.

3) *Ophisaurus attenuatus, Storeria dekayi, Nerodia sipedon,* and *Lampropeltis calligaster* all have an extremely strong association with *Qt-Qal* and are seldom found outside this formation.

4) *Elaphe emoryi* and *Lampropeltis triangulum* are the only two species that reach their peak abundance within the two rockiest formations, *Kns-Knf* and *Kgh,* while being found throughout all formations.

5) *Diadophis punctatus, Eumeces septentrionalis, Eumeces obsoletus,* and *Tropidoclonion lineatum* are all highly associated with *Kgh* and become progressively more scarce towards the northwest as younger formations are exposed.

6) *Lampropeltis getula* and *Lampropeltis triangulum* are both known to feed chiefly on lizards and reside under rocks (Collins, 1993). They show an association in that they each reach their maximum abundance in *Kgh* as do the three species of lizards most commonly found under rocks, *Crotaphytus collaris, Eumeces obsoletus,* and *Eumeces septentrionalis*.

The following are accounts of species that have appeared in the literature as occurring in Ellis County, and that need better documentation or have been previously discredited:

Phrynosoma douglassii—Short-Horned Lizard

Burt (1928), Brennan (1935), Smith (1946) and Smith (1956) all reported this lizard from Ellis county based on a single specimen supposedly deposited in the Sternberg Museum of Natural History; there is no record of such a specimen. Collins (1974) discredited the record due to the lack of that specimen, the lack of any recent records, and because of the poor documentation of other old Kansas records.

Eumeces anthracinus—Coal Skink

Fleharty and Ittner (1967) reported three specimens (MHP 2094, 2141–2) from Ellis County, due to all three having aberrant mental scales that resembled those of *Eumeces anthracinus*. These specimens are now cataloged in the MHP collection as *Eumeces septentrionalis*.

Sonora semiannulata—Ground Snake

This species was first recorded from Ellis County by Brennan (1935), and the only specimen currently known to exist (KU 16879), is dubious. The Ground Snake is locally common in northern Russell County from north of Bunker Hill to just northeast of Gorham in the *Kgh* bordering the Saline River. There is less than four square miles of *Kgh* along the Saline River in northeastern Ellis County, and it provides only marginally suitable habitat for this species. This locality has been searched sporadically since 1962 and extensively since 1989 with no additional observations of the this typically abundant serpent. These factors suggest that the Ground Snake is not a member of the Ellis County herpetofauna.

Thamnophis marcianus—Checkered Garter Snake

Cragin (1881) reported a specimen of this species (as *Eutaenia marciana*) from Ellis County that has since been lost. Fleharty and Ittner (1967) reported a specimen (MHP 1560) from "1 m. N and 1 m. E Liebenthal, Ellis Co." that was subsequently reidentified as *Thamnophis radix*.

Literature Cited

Adams, F. W. 1975. The distributional patterns of reptiles in the United States. Doctoral Dissertation, University S. Mississippi. 134 pp.

Bass, N. W. 1926. Geologic investigations in western Kansas. Kansas Geol. Survey Bull. II 27(8): 11–52.

Bock, C. E. and H. M. Smith 1982. Biogeography of North American amphibians: A numerical analysis. Trans. Kansas Acad. Sci. 85(4): 177–186.

Brennen, L. A. 1935. Notes on the distribution of amphibia and reptilia of Ellis County, Kansas. Masters Thesis, Fort Hays State Univ., Kansas. 105 pp.

Brennen, L. A. 1936. A check list of the amphibians and reptiles of Ellis County, Kansas. Trans. Kansas Acad. Sci. 37: 189–191.

Brennen, L. A. 1937. A study of the habitat of reptiles and amphibians of Ellis County, Kansas. Trans. Kansas Acad. Sci. 40: 341–347.

Buchanan, R. 1984. Kansas geology. xi + 208 pp.

Burt, C. E. 1928. The lizards of Kansas. Trans. Acad. Sci. St. Louis 26(1): 1–81

Burt, C. E. 1933. Some distributional and ecological records of Kansas reptiles. Trans. Kansas Acad. Sci. 38: 255–305.

Burt, C. E. and W. L. Hoyle. 1935. Additional records of the reptiles of the central prairie region of the United States. Trans. Kansas Acad. Sci. 37: 193–216.

Collins, J. T. 1982. Amphibians and reptiles in Kansas. Second Edition. Univ. Kansas Mus. Nat. Hist. Pub. Ed. Ser. 1: 1–356.

Collins, J. T. 1985. Natural Kansas. Univ. Press Kansas, Lawrence.

Collins, J. T. 1990b. Results of second Kansas herp count held during April–May 1990. Kansas Herp. Soc. Newsletter, 81: 10–12.

Collins, J. T. 1991a. New records of amphibians and reptiles in Kansas for 1990. Kansas Herp. Soc. Newsletter 83: 7–13.

Collins, J. T. 1991b. Results of third Kansas herp count held during April–May 1991. Kansas Herp. Soc. Newsletter 85: 9–13.

Collins, J. T. 1993. Amphibians and reptiles in Kansas. Third Edition. Univ. Press Kansas, Lawrence. xx + 397 pp.

Collins, J. T. 1997. Standard common and current scientific names for North American amphibians and reptiles. Fourth Edition. SSAR Herpetol. Circ. 19: 1–40.

Cragin, F. W. 1881. A preliminary catalogue of Kansas reptiles and batrachians. Trans. Kansas Acad. Sci. 7: 112–120.

Drees, R. H. 1974. The geology of the Fort Hays Limestone in Ellis County, Kansas. Unpubl. Thesis, Fort Hays State University. 53 pp.

Falls, O. 1933. An analysis of the habitat distribution of the vertebrate fauna of a streambank association in western Kansas. Masters Thesis, Fort Hays State Univ., Kansas. 150 pp.

Fisher, D. R. 1968. A study of faunal resemblance using numerical taxonomy and factor analyssi. Systematic Zoology 17(1): 48–63.

Fitch, H. S. 1993. Relative abundance of snakes in Kansas. Trans. Kansas Acad. Sci. 96(3–4): 213–224.

Fleharty, E. D. and G. K. Hulett. 1988. Fort Hays State University Natural Areas. Trans. Kansas Acad. Sci. 91(1–2): 55.

Fleharty, E. D. and D. R. Ittner. 1967. Additional locality records for some Kansas herptiles. Southwest Nat. 12(2): 199–200.

Gish, C. D. 1962. The herpetofauna of Ellis County, Kansas. Masters Thesis, Fort Hays State Univ., Kansas. 29 pp.

Glover, R. K., L. D. Zavesky, W. R. Swafford and Q. L. Markley. 1975. Soil survey of Ellis county, Kansas. United States Dept. of Ag. Soil Cons. Service and Kansas Ag. Experiment Station, Cartographic Division, Washington D. C. 86 pp.

Harksen, J. C. 1963. A bibliography and catalogue of the reptiles and birds of the Kansas Cretaceous with descriptions of new species. Masters Thesis, Fort Hays State Univ., Kansas. 81 pp.

Huheey, J. E. 1965. A mathematical method of analyzing biogeographical data. I. Herpetofauna of Illinois. American Midl. Nat. 73: 490–499.

Kiester, A. R. 1971. Species density of North American amphibians and reptiles. Syst. Zool. 20: 127–137.

Neuhauser, K. R. and J. C. Pool. 1989. Geologic map of Ellis County, Kansas. Kansas Geological Survery, University of Kansas, Map M-19.

Rogers, J. S. 1976. Species density and taxonomic diversity of Texas amphibians and reptiles. Syst. Zool. 107: 1–28.

Rush, M. S. and E. D. Fleharty. 1981. New county records of amphibians and reptiles in Kansas. Trans. Kansas Acad. Sci. 84(4): 1069–1088.

Shoewe, W. H. 1949. The geography of Kansas, Part 2—Physical geography. Trans. Kansas Acad. Sci. 52: 261–333.

Simpson, G. G. 1960. Notes on the measurement of faunal resemblance. American Journ. Sci., Bradley Volume, 258-A: 300–311.

Smith, H. M. 1950. Handbook of amphibians and reptiles of Kansas. First Edition. Misc. Publ. Univ. Kansas Mus. Nat. Hist. 2: 1–336.

Smith, H. M. 1956. Handbook of amphibibians and reptiles of Kansas. Second Edition. Misc. Publ. Univ. Kansas Mus. Nat. Hist. 9: 1-356.

Smith, J. L. 1961. An ecological study of the vertebrates of a streambank community in Ellis County, Kansas. Masters Thesis, Fort Hays State Univ., Kansas. 95 pp.

Taggart, T. W. 1991a. Geographic distribution: *Ophisaurus attenuatus attenuatus*. SSAR Herpetol. Rev. 22(2): 66.

Taggart, T. W. 1991b. Geographic distribution: *Lampropeltis calligaster calligaster*. SSAR Herpetol. Rev. 22(2): 66.

Taggart, T. W. 1992. Observations on Kansas amphibians and reptiles. Kansas Herp. Soc. Newsletter 88: 13–15.

Werth, R. J. 1969. Ecology of four sympatric lizards. Doctoral Thesis, University of Colorado. 103 pp.

Werth, R. J. 1972. Lizard Ecology: Evidence of competition. Trans. Kansas Acad. Sci. 75(4): 283–300.

NEW RECORDS FOR AQUATIC TURTLES IN BROWN COUNTY, KANSAS

CHRISTOPHER G. VITT
Biology Faculty
Hiawatha High School
Hiawatha, Kansas 00000

INTRODUCTION

The Common Snapping Turtle (*Chelydra serpentina*) and Ornate Box Turtle (*Terrapene ornata*) are the only chelonians previously reported from Brown County, Kansas (Collins, 1993). While fishing (primarily in ponds) in Brown County, I observed turtles in several bodies of water, either swimming or sunning themselves on logs. Because Painted Turtles (*Chrysemys picta*) had not been documented in Brown County, and because I was confidant that Softshells (genus *Apalone*) could be found in the county (I had previously caught one while fishing in the Wolf River), I decided to attempt to verify the presence of these species by trapping, photographing, and measuring an example of each from the county, and then depositing such documentation in an appropriate institutional collection. Through trapping, I hoped to capture as many different turtle species as possible, particularly those not yet documented from Brown County.

Brown County has two major drainage systems: the Missouri River and the Delaware River. I was also interested in determining if different turtle species inhabited these two drainage systems and if any differences in abundance or trapping success existed between them.

MATERIALS AND METHODS

In June and July of 1994, eight trap sites in the Missouri River drainage were selected in various tributaries in Brown County, Kansas. Trap sites were set with two to four hoop nets for one day and night. Each trap was set in 0.75 to 1.5 meters of water and was checked and re-baited daily. Traps were baited with a variety of baits, including dead Bullheads (*Ameiurus* sp.), cream corn or beanie weanies, and punctured plastic 35mm film canisters filled with mulberries, mussels, or sardines. Turtles captured in each trap were photographed, measured, and released.

In June and July of 2000, six trap sites were established in various tributaries of the Delaware River drainage system in Brown County, Kansas. An additional two trap sites were placed in the Missouri River drainage system. Mission Lake (near Horton) was also trapped. Trap nights ranged from two to six at each trap site. Traps were checked and re-baited daily. Traps were generally baited with cream corn, sardines or a combination of both. After turtles were captured in a particular trap at a given site, the trap was moved to a different location in the tributary and re-baited. Turtles captured in each trap were photographed, measured, and released.

CAPTURES

The specific locality of turtles trapped in June and July of 1994 are listed in the order of their capture. The first number in parentheses indicates the total of Spiny Softshells (*Apalone spinifera*) captured at this site; the second number indicates the total of Common Snapping Turtles (*Chelydra serpentina*) captured: 1.5 mi S & 3.0 mi E Robinson, NE 1/4 Sec. 14, T3S, R18E (1/0); 2.3 mi S & 3.8 mi E Robinson, NE 1/4 Sec. 24, T3S, R18E (1/0); 2.7 mi S & 2.0 mi W Hiawatha, SE 1/4 Sec. 1, T3S, R16 E (0/3); 0.1 mi N & 3.0 mi E Fairview, SW 1/4 Sec. 30, T2S, R16E (0/1); 0.5 mi N & 5.0 mi W Hiawatha, Sec. 21, T2S, R16E (0/1); 1.2 mi S & 0.2 mi E Robinson, SW 1/4 Sec. 9, T3S, R18E (2/1); Hiawatha Country Club on S 7 Street, Sec. 32, T2S, R17E, (*Chrysemys picta* captured by hand).

The following is a list of the specific localities where turtles were captured in June and July of 2000, in order of their capture: 2.3 mi S & 0.5 mi W Fairview NE 1/4 Sec. 9, T3S, R15E (7/2); 0.1 mi & 3.4 mi W Powhattan, EC Sec. 26, T3S, R15E (2/3); 2.8 mi N & 2.6 mi W Horton, NC 1/4 Sec. 13, T4S, R16E (0/3); 4.8 mi S & 7.0 mi W Powhattan, NW 1/4 Sec. 20, T4S, R15E (1/0); 0.1 mi N & 1.1 mi W Horton, Sec. 30, T4S, R17E (0/1); 4.1 mi N & 2.7 mi E Morrill, SE 1/4 Sec. 5, T1S, R16E (1/1).

SUMMARY

In creeks of the Missouri River drainage system that were sampled in Brown County, a total of five Spiny Softshells, seven Common Snapping turtles, and one Painted Turtle were captured (Table 1). In creeks of the Delaware River drainage system sampled in Brown County, a total of ten Spiny Softshells and nine Common Snapping turtles were captured (Table 2). A list of the individual creeks or rivers and the number of turtles captured in each follows. A list of specific trap sites where turtles were captured in each body of water can be obtained from the author.

Table 1. Turtle captures in the Missouri River drainage system in Brown County, Kansas, during this study.

Creek Name	No. of *Apalone spinifera*	No. of *Chelydra serpentina*	No. of *Chryemys picta*	No. of Trap Sites	No. of Trap Nights
Wolf R	2	3	1	3	9
Buttermilk Cr	2	1	0	1	2
Walnut Cr	0	1	0	1	4
Spring Cr	0	1	0	1	4
Pony Cr	1	1	0	1	3
Roys Cr	0	0	0	1	2

Table 2. Turtle captures in the Delaware River drainage system in Brown County, Kansas, during this study.

Creek Name	No. of *Apalone spinifera*	No. of *Chelydra serpentina*	No. of *Chryemys picta*	No. of Trap Sites	No. of Trap Nights
Delaware R	9	5	0	2	10
L Delaware R*	0	4	0	2	9
Craig Cr	1	0	0	1	7
Plum Cr	0	0	0	1	5
Mission Lake	0	0	0	1	4

*Grasshopper Creek

Conclusion

The results of my trapping efforts for the months of June and July of 1994 and 2000 suggest that there is no significant difference in the turtle species that inhabit the creeks, streams, and rivers of the two major drainage systems in Brown County, Kansas. The catch per unit of effort rate also suggests that the relative abundance of turtles in the Delaware River drainage system (0.61 turtles/trap night) might be slightly greater than the Missouri River drainage system (0.50 tutle/trap night).

Only Spiny Softshells and Common Snapping Turtles were captured using hoop traps in both drainage systems. (The one Painted Turtle was captured by hand, not with a trap). Both the Spiny Softshell (KU Color Slide 11778) and the Painted Turtle (KU Color side 11777) were county records for Brown County. The presence of other turtle species in aquatic ecosystems in the county cannot be ruled out based on the results of this study. Of the species that might occur (but which were not found during this field work), it is my opinion that Sliders (*Trachemys scripta*) are will most likely be discovered in the county in the future—they have been recorded to the east in Doniphan County (Collins, 1993).

In the Missouri River drainage system, a total of 12 turtles were captured in 24 trap nights for a rate of 0.50 turtles per trap night (Table 3). In the Delaware River drainage system, a total of 19 turtles were captured in 31 trap nights for a rate of 0.61 turtles per trap night (Table 4).

Table 3. Number of turtle captures per trap night in the Missouri River drainage system in Brown County, Kansas, during this study.

Year	Number of trap nights	Number of turtles captured	Number of turtles per trap night
1994	19	10	0.53
2000	5	2	0.40
Totals	24	12	0.50

Table 4. Number of turtle captures per trap night in the Delaware River drainage system in Brown County, Kansas, during this study.

Year	Number of trap nights	Number of turtles captured	Number of turtles per trap night
2000	31	19	0.61
Totals	31	19	0.61

Three traps were also set in a farm pond in June and July of 1994 and four traps were set in Mission Lake in June and July of 2000. No turtles were captured in either of these locations and that data is not included in the catch per unit effort calculations for the two drainage systems.

Additional field work for turtles needs to be conducted, possibly using different trapping techniques such as floating traps, to further determine if more aquatic turtle species lurk in the waters of Brown County, Kansas. Further research studies on aquatic turtle species are currently planned for Hiawatha High School Biology students. In addition, further field work is also needed on amphibians and reptiles, because new species remain to be discovered in Brown County and adjacent Doniphan County.

Acknowledgements

I gratefully acknowledge David Edds, Emporia State University, for his guidance of this research project. I also thank him for the use of his turtle traps, which permitted me to trap two sites simultaneously. I thank the following landowners for allowing turtle traps to be set in the creeks or streams on their property: J. Oltjen, J. Tryon, and B. Tryon of Robinson, L. Trentman and D. Kesler of Fairview, K. Krug and P. Leuske of Horton, H. Bailey of Sabetha, R. Lierz, Delaine Wenger and Dal Wenger of Powhattan and H. Elliot, S. Schuetz, D. Grimm, D. Kerl and J. Brunning of Hiawatha. I also thank the following people for their assistance in setting and checking the hoop traps: Gordon Gundersen, Nicholas James, Brian Severin, Heather Kerl, Wyatt Kerl, Bob Lisowski and my sons, Jeremy and Ryan Vitt. Finally, I thank my wife, Michelle, for her understanding and support as I finished yet another messy project. Common names are those standardized and adopted nationwide (Collins, 1997).

Literature Cited

Collins, Joseph T. 1993. *Amphibians and Reptiles in Kansas. Third Edition.* University Press of Kansas, Lawrence, Kansas. xx + 397 pp.

Collins, Joseph T. 1997. *Standard Common and Current Scientific Names for North American Amphibians and Reptiles. Fourth Edition.* SSAR Herpetological Circular 25: 1–40.

RETROSPECTIVE

This article begins the first in a KHS Newsletter series, to be published irregularly and as time and resources permit, of original descriptions of species of amphibians, turtles, and reptiles that are native to Kansas. Original descriptions are the first known published accounts of the discovery and recognition of a species in which they are assigned a scientific name. The editors wish to thank Katie Reitz for her assistance in preparing this account

BULLFROG
Rana catesbeiana Shaw, 1802

This large amphibian, common to eastern Kansas and well-adapted to the farm ponds in the western part of the state, was first described to science in following article: Shaw, George. 1802. General Zoology, or Systematic Natural History. Volume III. Part I. Amphibia. London Printed for G. Kearsley Fleet Street. Pages 106–108 + Plate 33.

Page 106

Bull Frog.

Rana Catesbeiana. R. fusco-olivacea maxima nigro maculata, auribus ocellatis, pedibus posticis palmatis. Very large olive-brown Frog, spotted with black, with large ocellated ear-spots, and palmated hind feet.
The Bull Frog. Catesb. Carol. 2. p. 72. pl. 72. Rana ocellata ? ? ? Lin. Syst. Nat. p. 356.

This remarkable species is not uncommon in many parts of North America, where it is known by the name of the Bull Frog, its voice resembling the distant lowing of that animal. It grows to a very large size, the individual represented by Mr. Catesby, in his Natural History of Carolina, and which he assures us was taken from a small rather than a large specimen, seeming to measure about eighteen inches from the nose to the end of the hind feet. Its colour, on the upper parts, is a dusky olive, or brownish, somewhat irregularly marked with numerous deep-brown spots; while

the under parts are of a pale or whitish cast, with a tincture of yellowish green, and marked

Page 107

with numerous spots, but much less vivid or distinct than those of the upper parts. The fore feet have only four toes, and are unwebbed, but the hind feet, which are large and long, have five toes, and are very widely webbed or palmated. The irides of the eyes are red, surrounded with a narrow border, or secondary iris, as it were, of yellow. The ears, or rather the external membranes of those organs, are large, round, of a brownish red colour, surrounded by a well-defined pale yellowish white margin.

Mr. Catesby tells us that the Bull Frog is less numerous in North America than any other kind; that it frequents springs only, which in Virginia abound in the sides of every little hill, where by the continual running of the water a small pond or hole is usually made before the mouth of the spring, which is rarely without a pair of these frogs, which are usually seen sitting on the verge of the hole, and when surprised, with a long leap or two, enter the mouth of the spring, where they are secure. He adds that it is the common belief of the people in Virginia that they keep the springs clean, and purify the water, and therefore the general prejudice is in their favour; though, on account of their being great devourers of young ducks and goslings, which they often swallow whole, they are sometimes destroyed.

It does not appear that Linnaeus has distinctly described this species, unless we suppose him to have really intended it by his Rana ocellata. If this is the case, we must admit, that by some very

Page 108

extraordinary inaccuracy, he has confounded two widely different species together, in which he appears to have been followed the by Count de Cepede. In the Gmelinian edition of the Systema Naturae the trivial name of ocellata is retained.

33