

KANSAS
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SOCIETY
NEWSLETTER



NUMBER 47

MARCH 1982

SCHEDULE OF KHS FIELD TRIPS & MEETINGS DURING 1982

- 14-16 May 1982 Joint meeting of the Kansas Herpetological Society and the Chikaskia River Wildlife Study. The theme of this meeting is "Keep the Chikaskia clean and free-flowing." The meeting will be held on private land owned by KHS member, Freeman Dillard and located along the banks of the Chikaskia. The camping area will be just to the north of the point where highway 81 crosses the Chikaskia between the towns of Caldwell and South Haven, in Sumner County. It will be on the west side of the river. Signs will be posted to direct members to the camping area. Those attending may arrive any-time after 5:00 PM on the evening of the 14th.
- 28-31 May 1982 The second spring field trip is a joint meeting with the Iowa Herpetological Society. The meeting place will be at the 248 acre Atchinson State Fishing Lake, located near Atchinson, Kansas. This is a good opportunity to explore the northeastern glaciated part of the state, with the possibility of finding a Fox snake (*Elaphe vulpina*). Everyone attending should plan to meet at the camping area near the lake between 8:00 AM and 11:00 AM on Saturday morning, the 29th, in order to plan for field work in the area.
- 17-19 September The fall field trip and campout is being planned for Butler County, Kansas. More on the fall meeting in the next newsletter.
- 13 November 1982 The KHS Annual Meeting will be held in Lawrence, Kansas. It is planned as a daylong event, with speakers, a business meeting, election of officers, and the annual auction. More on the annual meeting in a future newsletter.

Note: Please contact the program chairperson for more information about any of the KHS meetings. It is also requested that KHS members with CB radios monitor channel 4 at field trips to help locate and direct others to the meeting sites.

-----Larry Miller, Program Chairperson, 524 N. Osage Street, Caldwell, KS 67022
telephone: (316) 845-2680.

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SPECIAL KHS MEETING WITH HOBART SMITH AS GUEST SPEAKER

The Kansas Herpetological Society has the opportunity to meet with the eminent Dr. Hobart M. Smith at the Education Building of the Sedgwick County Zoo in Wichita on Thursday, March 25. There will be two lectures, one in the afternoon and one in the evening:

March 25, 2:30 PM - "A Herpetological Potpourri."
7:00 PM - "Waterproof and Mexican Leaf Frogs."

Dr. Hobart M. Smith (Professor in the Department of Environmental, Population and Organismic Biology at the University of Colorado) will be a Watkins Visiting Professor at Wichita State University hosted by the Department of Biological Sciences during the week of March 22-25. Dr. Smith received his B.A. from Kansas State University, and his M.A. and Ph.D. degrees from the University of Kansas. He held academic and professional appointments at the University of Illinois, Texas A&M University, University of Kansas, University of Rochester, The Smithsonian Institution, The Chicago Academy of Science and Field Museum of Natural History, and the University of Michigan before moving to his current position at the University of Colorado in 1968, where he was department chairman from 1970 to 1974 and cochairman in 1978. Dr. Smith holds memberships in at least 25 regional, national and international professional and scholarly societies and has served as president or vice president of the Herpetologists League, the American Society of Ichthyologists and Herpetologists, and the Society for Systematic Biology. Dr. Smith is currently serving on the editorial board of the Society for the Study of Amphibians and Reptiles.

Dr. Smith's activity in professional societies is a reflection of his international reputation as one of the leading contemporary herpetologists. He has over 768 publications ranging from articles appearing in journals, reviews, and encyclopedia entries to textbooks. Dr. Smith's wide ranging work on the biology of reptiles and amphibians has been supported continuously since 1971 by research grants from the National Institutes of Health and the National Science Foundation.

Other lectures are planned earlier in the week at Wichita State University:

Tuesday, March 23, 8 PM 209 Hubbard Hall - "The Perspectives of Reptilian Sensory Modalities and Mechanisms in Communication."

Wednesday, March 24, 3:30 PM 218 Hubbard Hall - "Categories of Biological Species and Subspecies."

Friday, March 26, 1:30 PM 218 Hubbard Hall - "The Significance of Viviparity as a Taxonomic Character."

This is a unique opportunity to hear one of the leading authorities in the field of herpetology, so all those who are able to attend should plan to be there.

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SPRING MEETINGS OF OTHER SOCIETIES

- 13 March 1982 Annual meeting of Kansans for Safe Pest Control will be held in Caldwell, Kansas. Contact Terry Shafer, Rt.#3, Lawrence, KS 66044 for more information.
- 16-18 April 1982 Kansas Association of Teachers of Science meeting at Rock Springs Ranch.
- 23 April 1982 Kansas Academy of Science meeting at Kansas State University in Manhattan, KS.
- 29 April 1982 Kansas Junior Academy of Science meeting at Bethany College in Lindsborg, KS.

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THE PACE OF DEATH: JOY RIDERS SNUFF TURTLE'S SLOW TRIP

If you accept the premise that the existence of every living creature somehow enhances our lives, then the loss of one somehow diminishes us. I believe box turtles figure into that equation. That's certainly true here in Wisconsin, where, after a cruel winter like the one we've just kissed good-by, the return of warm weather and all it implies is a particular cause for celebration. And the box turtle, you see, is one of those sure signs that the sun is once again upon us.

There is no better stretch in the state to observe nature's ways than along the winding path of highway 60, between Spring Green and Sauk City (Wisconsin). On a day earlier in the week, there were all manner of birds, bugs, squirrels, chipmunks and farm dogs out taking the sun together. Turtles were out too, in an inordinate number. Some paused at the roadside to catch their breath. Others, looking exhausted after covering six inches at sub-snail's pace, stopped in the middle of the road and pulled everything in under their built-in umbrellas to relax before moving on.

Just east of Spring Green, a box turtle was motoring across the highway. He was nothing special - he was never going to win any beauty contests and certainly was not out to break any existing land speed records. There were two guys in front of me riding around in one of those cars with the rear end jacked up in the air, like a great chrome skunk preparing to leave his calling card. Suddenly, the car swerved to the left. Then the two of them looked at each other and laughed maniacally.

I didn't know what they had swerved to avoid. It turned out, they hadn't tried to avoid anything, but had swerved to run over this big, old, nondescript box turtle. I pulled onto the shoulder of the road and got out. I thought for a moment about taking the license number, but well, where do you report that kind of crime?

The victim was still in the middle of the road. I reached down to pick him up. My grip applied a little pressure to the shell and the turtle half wheezed and half whined with the little bit of oxygen his crushed lungs could still expend. I had never heard any turtle make any semblance of sound before.

The tire apparently had passed over the front half of the turtle's shell. It was cracked in two places and collapsed on the beast's neck. The muscle and whatever else lay within was bloody. I carried him over (to the side of the road) and placed him in the tall grass. I figured he would die there in short order.

That disturbed me. Turtles are perpetually taking things slow and easy under the sun and we should do the same. There is no sport in running over turtles. They certainly aren't a nuisance. Why, I've never seen or heard of a turtle tossing a cigarette butt on a highway, or, trying to duck in front of somebody in line at the movies, or, even driving a snowmobile across somebody's front lawn.

So, if in the months ahead, you see a turtle shuffling along in the middle of the highway on his particular way to nowhere, pull over and give him a lift. If you don't, he may never get there.

-----Steve Hannah, reprinted from the Journal of the Wisconsin Herpetological Society, June, 1979.

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FOCUS OF 1982 KHS FIELD TRIPS

Since its inception in 1974, the Kansas Herpetological Society has been contributing to the knowledge of the Kansas herpetofauna by the activities of its members during field trips. Much information concerning the distribution of amphibians and reptiles throughout the state has been accumulated in the form of county records. As an organization interested in conservation, the KHS has increased our knowledge of the status of threatened and endangered species, and has spread the word to the people of Kansas by distributing a color brochure which features these unique animals. However, our organization is currently at a turning point. Many of the county records have been recorded, indicating that our knowledge of the distribution of most amphibians and reptiles in Kansas is beginning to stabilize. Of course, there is still much to be discovered concerning the distribution of secretive, rare, and fossorial species (see appendix for a complete list), and new county records should still be obtained.

Now that much of this basic information has been collected, we can make stronger efforts to discover more about the natural history of these animals. As a group, we are in a unique position to gather a lot of information in a short amount of time. For example, 10 to 20 members on a field trip can coordinate their activities to determine population densities in various habitats by marking off grids and systematically searching each grid. We could then measure each specimen, note its sex and possibly relate this information to temperature, prevailing weather conditions, time of day and season. This could be done in a few hours and would be very valuable and a lot of fun. It would require a minimum amount of preplanning, which would be done by the KHS executive council and other interested members. Another interesting project that would be fun to pursue on KHS field trips involves sampling turtle populations. A number of simple trapping techniques could be employed to trap the turtles, which could then be identified and measured. It would also be interesting to get an estimate of the sex ratio in the population, since recent studies have shown that the sex of individuals of many species is determined by egg incubation temperature. The possibilities are virtually limitless. Contact KHS officers with your ideas about this new program.

Appendix

central newt (Notophthalmus viridescens louisianensis)
 dark-sided salamander (Eurycea longicauda melanopleura)
 cave salamander (Eurycea lucifuga)
 graybelly salamander (Eurycea multiplicata griseogaster)
 grotto salamander (Typhlotriton spelaeus)
 western green toad (Bufo debilis insidiosus)
 red-spotted toad (Bufo punctatus)
 Strecker's chorus frog (Pseudacris s. streckeri)
 northern spring peeper (Hyla c. crucifer)
 northern crawfish frog (Rana areolata circulosa)
 green frog (Rana clamitans)
 pickerel frog (Rana palustris)
 eastern narrowmouth toad (Gastrophryne carolinensis)
 alligator snapping turtle (Macrochelys temminckii)
 map turtle (Graptemys geographica)
 Mississippi map turtle (Graptemys kohni)

false map turtle (Graptemys pseudogeographica)
Missouri cooter (Chrysemys floridana hoyi)
ground skink (Leiolopisma laterale)
southern coal skink (Eumeces anthracinus pluvialis)
broadhead skink (Eumeces laticeps)
prairie skink (Eumeces septentrionalis)
New Mexico blind snake (Leptotyphlops dulcis dissectus)
rough green snake (Opheodrys aestivus)
Kansas glossy snake (Arizona e. elegans)
Texas longnose snake (Rhinocheilus lecontei tessellatus)
Texas night snake (Hypsiglena torquata jani)
checkered garter snake (Thamnophis marcianus)
western ribbon snake (Thamnophis proximus)
rough earth snake (Virginia striatula)
northern redbelly snake (Storeria o. occipitomaculata)

-----Hank Guarisco, Peter Gray, Joseph T. Collins.

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SUMMER COURSE IN HERPETOLOGY

WICHITA STATE UNIVERSITY

#640E Biology of Amphibians and Reptiles; June 1-23; T TH; 8:00-1:00

The major goal of this course is to present biological information from the fields of comparative anatomy, physiology and ecology as it relates to the life history of amphibians and reptiles. Emphasis will be placed on adaptations to various adaptations to the environment. Each topic will be presented initially at an introductory level, followed by in depth analysis and examination in the laboratory or field sessions. Topics include: the evolution of amphibians and reptiles, herpetological systematics, ecology and ecological techniques, structure and function, and reproductive anatomy, physiology and ecology. Course includes 2 hr lecture and 3 hr lab or field session per meeting. For further information contact: Dr. Louis J. Guillette, Department of Biological Sciences, Wichita State University, Wichita, KS 67208.

ENDANGERED SPECIES ACT OVERSIGHT HEARINGS HELD BY SENATE

The Senate Committee on Environment and Public Works, Subcommittee on Environmental Pollution, held oversight hearings on the Endangered Species Act on 8 and 10 December 1981. The purpose of the hearings, as expressed by Subcommittee Chairman John Chafee, was to examine the Act and to determine whether any changes need to be made.

Robert Jantzen, Director, US Fish and Wildlife Service (FWS), addressed several major issues, including these questions:

1) Is it desirable to continue to designate critical habitats? Mr. Jantzen indicated that the public is confused in its perception of this concept. Because people do not understand whether the designation of a critical habitat forbids or curtails all human activities in the designated area, there is often a strong resistance to such designation. In addition, Mr. Jantzen believes that the requirement of a critical habitat designation adds significantly to the complexity of the listing process.

2) Should economic considerations be addressed in the listing of an endangered or threatened species? (Is there a test of balance between economic and biological needs which should be applied to the listing of species?)

3) Is the exemption process working? Or is it too time consuming and therefore just never used?

4) Should there be a procedure for listing a special category of experimental populations of fish, wildlife and plants? One of the most effective means for achieving recovery of a species is through reintroduction into its historical range. A review is presently underway for an "experimental category for reintroduction of listed species."

5) What is the effect of the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES) on state fish and wildlife management programs? Is the federal government interfering with the state's management prerogatives for resident species?

These questions and others are presently under review by the Fish and Wildlife Service. Mr. Jantzen indicated that the Administration expects to make recommendations to Congress by early next year.

Bill Stevenson, Deputy Assistant Administrator for Fisheries, National Marine Fisheries Service (NMFS), discussed the problems caused by the lack of regulations under Section 7. Section 7, which sets forth the consultation process, was amended by Congress in 1978 and again in 1979: but regulations have not yet been promulgated. When queried by Subcommittee members concerning the long-awaited regulations, Mr. Stevenson responded that they should be finished in the near future. At present, NMFS and FWS are using the draft regulations as their guidelines in the consultation process.

The statement given by Carol Dinkens, Assistant Attorney General, Department of Justice, centered on the Department's interest in effective enforcement procedures under the Endangered Species Act. The Department recommends that the criminal penalty provisions of the Endangered Species Act be consistent with those of the recently passed Lacey Act.

Michael Bean, Environmental Defense Fund, and Ken Berlin, National Audubon Society, testified on behalf of 12 organizations representing the environmental community which support the reauthorization of the Endangered Species Act. Mr. Bean and Mr. Berlin emphasized the importance of the Act; its goal is fundamental to conservation efforts. This group of organizations has established a list of objectives to be considered during the reauthorization process. The list includes the following:

- 1) The Act should offer protection throughout the range of animals and plants, not solely for the "higher forms of life."
- 2) Efforts should be made to expedite the listing of endangered or threatened species, and such listings should be based on biological data.
- 3) The role the states can play in the conservation of threatened and endangered species should be emphasized. States that have not done so already should develop long-term conservation programs.
- 4) The procedures and requirements of Section 7 on the exemption/consultation process should be maintained.
- 5) Exemptions under Section 7 should be authorized only after a good faith effort through the consultation process to avoid conflicts with the Endangered Species Act.
- 6) Opportunities for public participation in the Act should be continued; in particular, the rights of a citizen to petition for listing species and to initiate lawsuits against those who violate or fail to enforce the Act.

In addition, Mr. Berlin suggested that the listing process be separated into two functions: determination of whether a species is endangered and, if so, of how much protection we want to give the species. Mr. Berlin believes that these functions have been merged and that this merger may be partially responsible for long delays in the listing process.

Mr. Berlin then responded to a formal suggestion that the listing process require a formal hearing. Mr. Berlin does not believe that a formal hearing would add anything to the process except more paperwork. "A complete analysis is already performed anyway before a listing is done," he stated.

The only witnesses present who called for major revisions of the Act were representatives of the Western States Water Council. They have specific problems with the Act's "intervention in a state's right to allocate water," and are also

highly critical of the FWS's "no jeopardy" opinions, claiming that these lacked scientific and biological data. Nonetheless, they are in favor of the Act and feel that it fulfilled its original intent.

All who testified were in favor of the Act, Chairman Chafee believes the importance of the Act is beyond dispute and feels "no great urgency to change the Act." Any initiative for change, therefore, will have to come from the Administration or those in opposition.

A draft reauthorization bill will be available by the end of January.

-----written by K. Vehrs, AAZPA Newsl., 23(1):6-7, January 1982.

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VILLAS, VILLAGERS AND TORTOISES IN GREECE

The 1980 expedition arrived at Alyki exactly one year after the previous visit. The road from Pydna to Kitros had been metalled and the old fish taverna by the harbour had closed down. Everything else appeared the same, the holiday village was still only half-built, and, most important, the tortoise heaths remained undisturbed. On July 11 Adrian Hailey (AH) and David Stubbs (DS) made a tour of inspection. Their first source of concern was an apparent lack of certain bird species, in particular slender-billed gulls. However, gull-billed terns were still common and Mediterrean gulls were still abundant, although the colony had shifted. In the first hour they counted 34 Testudo hermanni along the path between the sluices and lighthouse, a good number by any standard. A new dyke was being constructed across the southern saltmarsh, but this was well away from the important bird colonies. More curious was the new road being built across the extensive rough grazing area, which, the workmen said, was for access to the beach; they were about a mile from their target.

On the evening of July 12, in conversation with people from Kitros and Katerini, it was learned for the first time that there were plans to build holiday homes on the heaths. Three days later AH and DS were approached by two men and a woman from Kitros. The woman, who lived in England, interpreted for the men, who were obviously important members of the village committee.

In the winter of 1979/80 they said the village had applied for planning permission to build holiday homes on the Alyki heaths. This had been refused on the grounds that the area was a valuable wildlife refuge. The evidence cited was from an unspecified report on the birdlife of Alyki. The villagers remembered "the four Englishmen" from the previous summer, and the reappearance of two more this year suggested that the expedition was in some way involved with that report. One of the Kitros men had visited the ministry and seen the report, but could not understand it, presumably because it was in English. Probably it was in fact an extract from the 1979 expedition account, forwarded to the Greek authorities.

On being assured that our expedition was not knowingly involved in these events and that no future reports would be submitted to the Greek authorities, the Kitros men gave AH and DS permission to continue camping on the heaths.

The land in question, the coastal strip between the lake and sea, belongs to the village of Kitros and until now has been unused apart from occasional cattle grazing. The villagers were particularly annoyed at the planning refusal for two main reasons. First, there had been no official objections to previous applications from German companies wishing to build factories along this coast. (Why these were not built is not clear.) Second, the salt works, which are government-owned, were undergoing a major expansion, with new salt pans being built at the southern end of the lake complex. The villagers realise, quite correctly, that when the new works are completed and the salinity builds up, all the birdlife will disappear. The ornithological importance of the area is mostly due to the lake, and although the heaths are also rich in birdlife, the original report, which caused all the controversy, was mainly referring to the wetland birds.

The government's hypocritical stance led the villagers to consider cashing in themselves on any potential development. As the second expedition was concentrating on the heaths, the villagers were worried that the authorities might be encouraged to save the tortoises as well. The new road was to provide access to the building site and the villagers had collectively paid the construction costs. Without planning permission they would have a good, expensive road going nowhere! So to ensure that their second application was successful they adopted a scorched earth policy. By deliberately destroying the wildlife value of the heaths they hoped to defy the authorities to find a valid excuse for refusing the plans.

On July 17, while exploring the southern heaths, AH noted that a bull-dozer had started work levelling the vegetation. After two days a strip of about 500m x 100m had been cleared. On July 19 a major fire was started deliberately, along the entire length of the southern heaths. Fortunately the wind direction prevented the fire spreading further than the lighthouse, but it was clear that there would be little time left to complete the tortoise study.

The predictable disaster happened on July 24 when the main study area was set alight. The wind was blowing off the sea, so the coastal heath vegetation was undamaged and two sampling areas also escaped. This fire was closely monitored by the expedition members; photographs were taken and many dead tortoises found. This was followed up by the bulldozer and a tractor and rotavator to finish off the destruction. Their progress was alarmingly rapid and large areas of habitat were soon laid to waste. A brief respite occurred when the workmen took a few days off, allowing further vital work to be carried out on the remaining tortoises. On August 2 another fire destroyed the grid sampling area and the coastal heath was the only remaining intact area. On this occasion one of the workmen was actually observed setting fire to the vegetation, using petrol-soaked rags.

By the end of the first week in August the blitz was over. Most of the former heaths had been totally levelled and there were several large mounds where scrub and small trees had been bulldozed together. The effect of the rotavator was horrific.

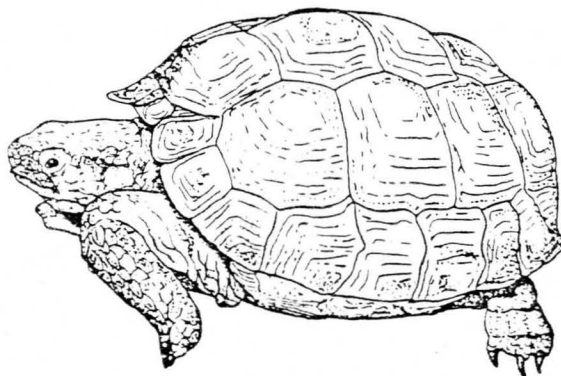
There was no chance of any tortoise surviving, and many critically maimed and chopped specimens had to be put out of their extreme pain by expedition members. It was a most distressing scene. Little change was noted during the brief return visit to Alyki in late August, and this was confirmed on September 5 by Mr. J. Walmsley who was inspecting the site.

Three weeks of senseless destruction reduced a complex and fascinating ecosystem to a desert. The loss of another valuable wildlife area on the Mediterranean coast has removed a breeding site for many species of rare birds and several thousand tortoises. Scientifically the tragedy lies in the loss of a site which held an extremely large tortoise population, so suitable for studying. The lack of ecological knowledge on Mediterranean tortoises makes rational conservation planning impossible, and the work on that population would have provided vital basic data.

According to the Expedition Report the fires killed up to 40 per cent of the tortoises in the affected areas, and the ploughing and levelling killed up to 10,000 over an area of 150 ha. Before the destruction the expedition had estimated the tortoise population in their 75 ha study area at about 5000, with an average density of 55 per ha. In the best habitat - dry heathland with scattered scrub - densities may have exceeded 150 per ha. They also found that the population was roughly equally divided into adult males, adult females and juveniles. The maximum age was about 50 years. Detailed measurements were made of nearly 800 tortoises, and the report discusses several facets of tortoise ecology. The expedition received a grant from the Oryx 100% Fund.

Postscript: In a recent communication from the Hellenic Society for the Protection of Nature it is reported that the ministry for Co-ordination and Planning are still refusing planning permission, despite continued pressure from the people of Kitros. David Stubbs, in conjunction with Dr. Ian Swingland, Chairman of the IUCN?WWF Tortoise Specialist Group, has started on a three-year research project on the population ecology of T. hermanni in southern France, supported by a NERC grant.

-----taken from "Oryx," 16(2):176-178.



PREDATION BY THE SHARPTOOTH CATFISH CLARIAS GARIEPINUS (SILURIFORMES: CLARIIDAE) ON THE COMMON PUFF-ADDER BITIS ARIETANS (SQUAMATA:VIPERIDAE)

Since April 1978 the fisheries research section of the Cape Department of Nature and Environmental Conservation has conducted regular quarterly gillnet and longline surveys of the P K le Roux Dam on the Orange River. The dam lies 15km due east of the town of Petrusville (South Africa). Four of the sampling sites are in an inlet of the Hondeblaf River. Gillnets are set at these sites for general fish sampling, and longlines with 25 hooks are set specifically for the sharptooth catfish, Clarias gariepinus (Burchell 1822).

One of these catfish, caught in the October 1980 survey, was found to contain a dead puff-adder, Bitis arietans, 605 mm in length and presumably subadult. It was rolled into a tight coil and the skin was apparently undamaged by the predator's fine teeth. The C. gariepinus was a female, 944 mm in total length, with a mass (including the puff-adder) of 6683 g. The puff-adder was not weighed separately but is believed to have weighed approximately 400 g. It has been noted by both authors, on several occasions, that C. gariepinus normally swallows its prey head-first. Digestion is rapid (we have seen the foreparts of carp, Cyprinus carpio, partially digested in the stomach of a catfish while the tail still protruded from the mouth of its captor). In spite of the fact that her stomach was greatly distended, this particular catfish was obviously still greatly attracted to the longline bait.

C. gariepinus takes a wide variety of animal prey; it is cannibalistic, eats other fish species and also takes crustaceans, molluscs, insects and arachnids (Bruton 1979; Groenewald 1964) as well as amphibians, small mammals and birds (Van der Waal 1972). Bruton (1979) also lists the various ways in which the catfish feeds. Larger specimens often feed with their bodies at an angle of approximately 60 to the surface of the water; prey "is sucked into the mouth accompanied by loud smacking noises as the mouth is opened and closed." It would seem quite feasible for a swimming puff-adder to suffer a similar fate. Van der Waal (1972) recorded an unidentified snake skin in the stomach of a sharptooth catfish in the Elands River, Transvaal, but Bruton (1979), who has worked extensively on the species in Lake Sibaya in Natal, found no instances of predation on snakes. It is, however, interesting to note that Pitman (1974) found both the forest cobra, Naja melanoleuca, and Smythe's water snake, Grayia smythii, to have preyed upon Clarias sp.

Acknowledgements

The authors would like to thank the Director of Nature and Environmental Conservation of the Cape Province for permission to publish this paper, and their colleagues, J C Greig and P H Lloyd of the Jonkershoek Nature Conservation Station, Stellenbosch for their advice.

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-----written by S C Thorne and K C D Hamman, taken from, *Journal of the Herpetological Association of Africa*, 25:14-15. (1981).

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ESHL GIVES A PARTY...AND THE GUESTS OF HONOR DON'T SHOW

On Saturday, October 17, the Eastern Seaboard Herpetological League (ESHL) held its Fall meeting at the Holiday Inn in Port Jervis, New York. Over fifty members of the 13 constituent societies of ESHL attended this meeting, held amid the blazing fall colors of the Poconos. Hosted by the Association for the Conservation of Turtles and Tortoises, the meeting was intended to provide answers to the many questions surrounding the Fish and Wildlife "sting" operation of last July. Unfortunately, the representatives from the U.S. Fish & Wildlife Service cancelled out just prior to the meeting, after having made a commitment to attend several months prior to the October 17th date.

According to one of the organizers of the conference, the initial contact with Fish & Wildlife suggested there would be no problem in providing a Federal official to present a paper at the ESHL meeting and answer questions about the operation. Mr. Bill Zimmerman, of the Division of Law Enforcement, U.S. Fish & Wildlife Service, Washington, D.C., initially said that their office would be able to provide one of two speakers. The next contact was with Mr. Rick Leach, of the Division of Law Enforcement, U.S. Fish & Wildlife. Mr. Leach at the time said he would attend the meeting. About six weeks prior to the meeting, Mr. Leach indicated that he could not come, but would send a replacement. October 17th came and went, but no Federal officials appeared (that we know of!).

Efforts were also made to provide input from State wildlife officials. New York officials stated that they did not have anybody qualified to answer law enforcement questions...unless the questions were provided beforehand to their department. The State of New Jersey was the only government agency to provide a representative. Miss Joann Frier, Nongame Zoologist for the Endangered & Nongame Species Project of the New Jersey Department of Environmental Protection, attended the meeting and provided valuable information of the rules and regulations for purchasing, selling or collecting animals (in New Jersey), and what permits are available and how to obtain them. Miss Frier provided some very straightforward answers about the current rules and regulations, why they are necessary, and how they are enforced. Although Miss Frier was questioned on the tactics and motivations of the U.S. Fish & Wildlife Service, in the "sting" operation, she indicated that neither she nor her Division (Div. of Fish, Game, and Wildlife) were involved in this operation and could not comment on it.

Although there was no input from Federal officials at this meeting, there was no lack of discussion about their tactics or intentions. As part of the program, Tom Bloomer (Assoc. for the Conservation of Turtles and Tortoises, and an organizer of the conference) told of his experiences at the hands of the Federal government. He told of receiving several packages through the mail (unordered) containing snakes (including the endangered San Francisco Garter Snake) from the Atlanta Wildlife Exchange, the "front" for Fish & Wildlife). He told of immediately shipping these animals back to Atlanta. He told of receiving these animals a second time. And he told of being "set up" by a Federal agent, then strip searched in the parking lot of the Holiday Inn and interrogated as if he had committed the crime of the century!

-----taken from "Notes From NOAH" the Northern Ohio Association of Herpetologists,
Vol 9 (1), October 27, 1981.

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FEEDING AND NUTRITION OF MONITOR LIZARDS IN CAPTIVITY AND IN THE WILD

Frye (1981) lists twenty-one nutritional disorders associated with captive reptiles. Guard (1980) observes that, "nutritional requirements for reptiles have not yet been established." Nevertheless, many reptile keepers encounter diet-induced deficiencies in their charges, which are often ascribed to other causes. Studies with several species of monitor lizards (genus Varanus) have yielded data showing wide variance even among similar and closely related species in regard to dietary needs.

Green tree monitors (V. prasinus) used during a long term study were initially fed a diet largely composed of mice and crickets. An inordinate number of animals began to produce reduced fecal masses, these usually quite dry and composed largely of hair and chiton. As animals were acquired, fecal analyses were used to attempt to define the natural diet. The results of these analyses showed that frogs comprised 55 % of the sample by weight. The rest of the sample consisted of geckos (17%), plant matter (12%) and various soft-bodied insects and vertebrates. Captives were subsequently given a diet of lizards (Anolis), tree frogs (Hyla) and bananas in addition to occasional feedings of crickets, hairless mice, and eggs. While birds or rodents took 36-72 hours to digest, and often caused obstructions, the modified diet could be processed by the lizards in 12-18 hours, and, no further impactions or overly dry feces were encountered. Furthermore, animals that had been anorexic or listless became more active and alert, and all fed regularly.

Prior to being placed on Appendix I of CITES (Convention on International Trade of Endangered Species of Wild Flora and Fauna), Bengal monitors (V. bengalensis) were the least expensive and most frequently encountered varanid in private collections. As a result, there are more data available for this species. Bengal monitors feed on small vertebrates and large insects, which are typically swallowed whole and head first (Loop and Bailey, 1972). In this species, mice can form the bulk of the captive diet, but they will also readily accept small birds, eggs, chopped meat and fish. In my experience, a diet consisting totally of rodents caused fewer problems in V. bengalensis than a similar diet caused in other reptiles; but even so, occasional intestinal impactions occurred. With as little as we know about nutrition in herpetofauna, it remains a question as to how valuable and important a varied diet actually is. Nevertheless, there seemed to be fewer instances of apathy and better overall feeding response in those lizards given a varied diet.

In comparing the digestive tract morphology in several varanids, it is readily apparent that there is greater internal variation between species than external morphology would indicate. The Bengal monitor has a "typical" lacertilian gut, the largest portion being the large intestine, with the narrow small intestine convoluted into four subequal chambers (figure 1 A). This gut resembles that of other carnivorous lizards, such as tegus. The more aquatic Mangrove monitor (V. indicus) feeds upon a wide variety of small vertebrates, including, lizards and frogs, but also feeds largely on snails and crabs. In this species, perhaps as a consequence of the need to digest large, calciferous bodies, stomach and intestines are similar

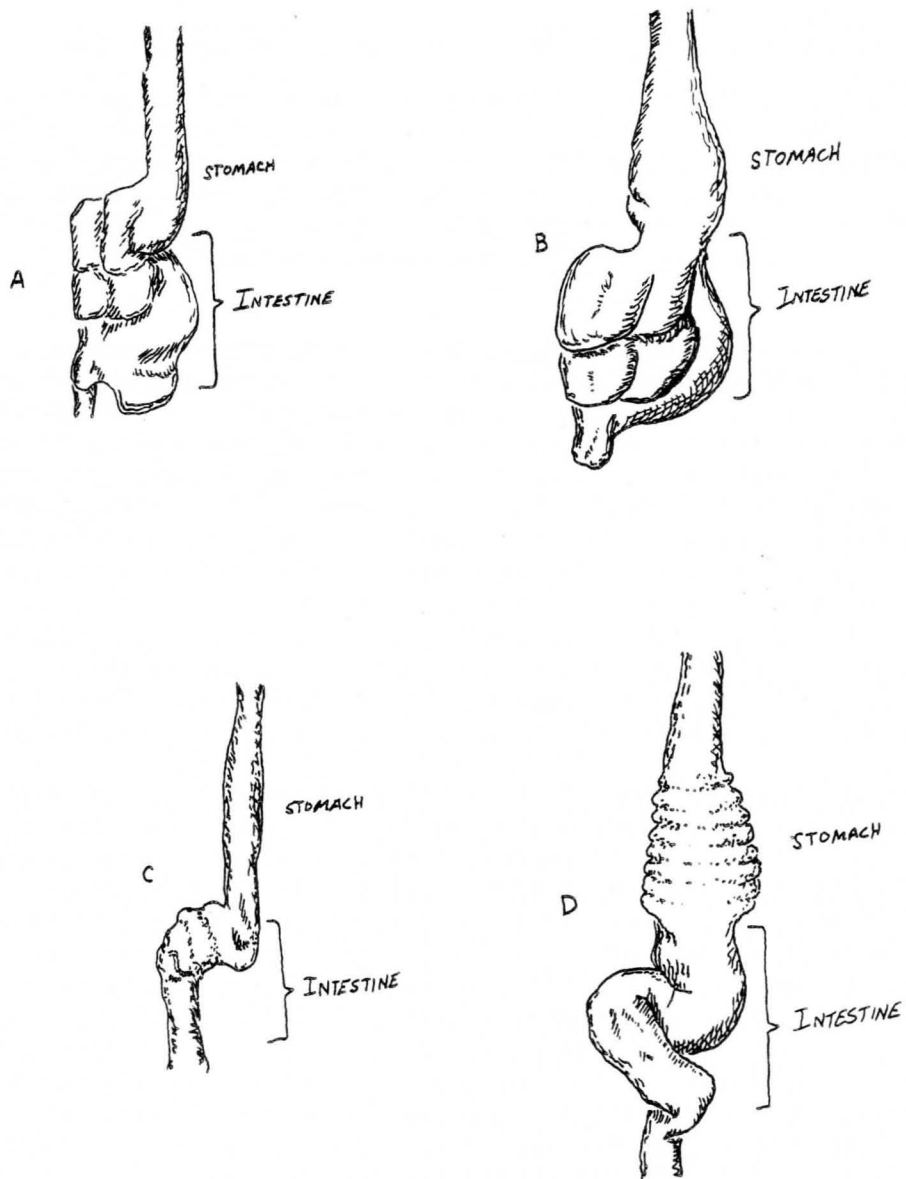


Figure one. Ventral aspects of the guts of A) Varanus bengalensis (RGS 37), B) V. indicus (RGS 143), C) Lanthanotus borneensis (AMNH 113983), D) V. prasinus (FSM 42180). Drawn approximately to scale, slightly larger than life-size. Drawings by author.

to the form of bengalensis, but proportionately larger (Figure 1 B). Dumeril's monitor (V. dumerili) also feeds largely on crabs and snails (Horn and Schultz, 1977) and has a similar gut, with large individual organs. As mentioned above, the diet of the green tree monitor consists largely of soft materials. The gut is significantly abbreviated in contrast to other varanids (Figure 1 D), but is rather similar to the "earless monitor" (Lanthanotus borneensis) in its brevity and greatly reduced small intestinal area. Lanthanotus is also a lizard which feeds on soft prey items such as fish and worms (Mertens, 1970, Sprackland, 1972). In Lanthanotus, however, the stomach is undifferentiated except by having a slightly larger diameter than the esophagus (Figure 1 C). In the green tree monitor, the stomach is conically annulated, perhaps to accommodate the vegetable portion of its diet.

While the green tree monitor is considered specialized in its diet, stomach analyses yielded at least nine different food classes (eg. hylid frogs), each in turn probably composed of several species (Sprackland, in preparation). Similar, if not more extensive, dietary components can be found for other, more generalized varanids. It would seem that in order to maintain health of captive specimens, a varied diet would be of benefit. Certainly, seasonal availability of prey species varies, and there is reason to believe that food content might be linked to hormonal production, fertility and growth rate. Perhaps, the difficulty encountered in breeding monitors, or hatching eggs is in part due to dietary deficiencies. Over the course of 14 years of working with live varanids, I have found many factors that enhance their health. Providing, as close as possible, the varied diet they would encounter in the wild is one of these factors. In addition, all of my study animals were given multiple vitamin drops (Avitron-Lambert Kay) in their water at least once per week. Each species would be given at least two principle dietary components (ie. crickets and eggs) which would be frequently supplemented with several other items. My initial experiences with varanids were not always good, and disease, often fatal, was not uncommon. By varying the diet, providing occasional sunlight, and isolating and treating any lizard at first sign of illness, husbandry became more effective and losses rare. On hand at any given time would be most of the following food items: chopped meat, canned dog food, mice, crickets, eggs, bananas, goldfish, locusts, crabs (small, live), frozen fish, moths, anoles, geckos, chicken parts, cantaloupe, earthworms, skinks, and shrimp. In the event of a bacterial infection, appropriate antibiotics would be administered. Anorectic lizards would be given injectable vitamin C, while, those that would eat would be given vitamin C orally. Recovery in treated lizards was quicker and fewer complications developed than in those that were not treated (Sprackland, in preparation). It was also noted for several species that normal, voluntary feeding behavior resumed more readily if the temperature was increased during treatment, and the humidity kept around 40%. In all, these methods helped maintain over 14 species of varanids in good health, and have subsequently been used with great success with many other reptiles.

As might be noted from the items listed above, mealworms (Tenebrio, larvae and adults) were scrupulously avoided in the diets of my varanids and other insectivores. These insects have the all too common tendency of being ingested alive, only to

later burrow out of the gut and then the body wall, killing the lizard. I have advised elsewhere (Sprackland, 1977) against using these insects as a food source for small lizards. As a supplement for larger lizards there would be perhaps greater risk, as monitors are quite capable of swallowing the Tenebrio intact and alive. Besides, there are too many alternatives available to warrant the risk.

Acknowledgements

For use of specimens and facilities, I wish to extend my thanks to Drs. William E. Duellman, Hymen Marx, Ernest E. Williams, George Zug and Richard G. Zweifel. For collecting data of various sorts I thank Joseph T. Collins, H.G. Petzold, Robert Mertens, Hans-George Horn, Michael Cheung and Benedict Sandin. I particularly want to thank Dr. Walter Auffenberg for his many kindnesses and moral encouragement, and my wife, Teri, a writer who has not-so-reluctantly consented to become a herpetologist.

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- Robert George Sprackland, Dept. of Herpetology, Oklahoma City Zoo, Oklahoma City, OK 73111.

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TURTLES IN THE SOUP ON CARIBBEAN ISLAND WILL TRY LUCK AT SEA

Sometime during Pirates Week, an annual holiday put on for tourists here each October, thousands of young, green sea turtles will escape the knife of the slaughterhouse and swim to freedom in the turquoise waters surrounding this tiny Caribbean island (Grand Cayman Island). The turtles owe their lives to Cayman Turtle Farm Ltd., which really would rather be serving them up to gourmets, but thanks to conservationist fervor in the U.S., the farm - which claims to be the only true commercial turtle farm in the world - is forced to spare the turtles because it can't find enough customers for turtle steaks. And therein lies a tale of communism, environmentalists, turtle soup and a German tampon baron.

"It's a terrible, deplorable dilemma," says Archie Carr, a well-known turtle zoologist at the University of Florida and no friend of turtle farms. "But they brought this on themselves."

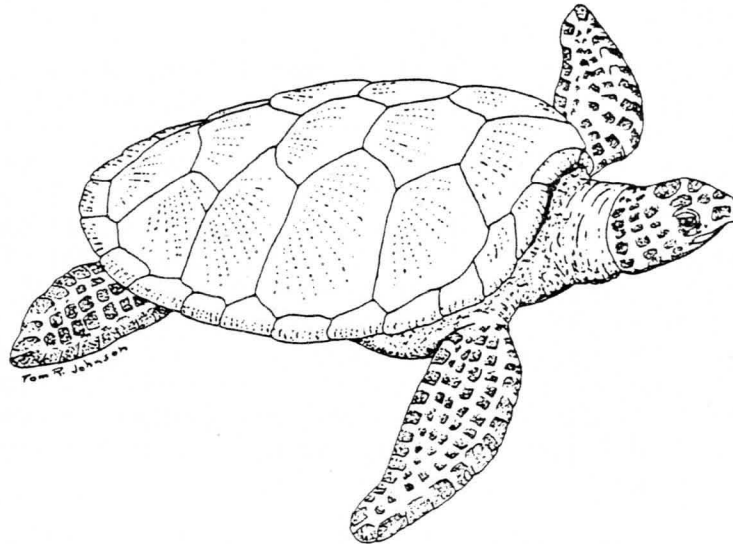
Christopher Columbus first named the Cayman Islands Las Tortugas (the turtles) in 1503 because turtles in the surrounding sea were so abundant. They looked like little bobbing rocks. And the buccaneers of the 17th century prized the sweet, tender meat of the turtle as well as its unusual ability to survive aboard ship. Kept wet on its back in a boat so it won't skitter away, a turtle can live for two months off its own fat, providing a source of fresh meat at sea. European sailing ships used to haul turtles from Cayman to London, leading to the development of clear turtle soup with sherry, a broth that became a favorite of Winston Churchill - who himself ran afoul of turtle protectors. Mr. Churchill used to drink a cup of turtle broth every night before bed, says Mr. Carr, and he loved it so much that when the Caribbean Conservation Corp. pleaded with him in the 1950s to break his habit as an example to the world of concern for the turtle's welfare, Sir Winston refused. "His secretary said it would give him more suffering than anyone else in the world," Mr. Carr says, "and we should get somebody else to quit drinking it."

This sort of devoted appetite for turtle eventually depleted the Caribbean waters of green sea turtle (*Chelonia mydas*) and got it listed by the U.S. Departments of Commerce and the Interior as a threatened species under the U.S. Endangered Species Act. But Caymanians still adore turtle, especially when its meat, lungs, flippers and liver are combined in a rich stew. The British colony even honors the reptile with a turtle emblem on its official seal, its flag and its airline. So Caymanians were ecstatic when a group of British and American investors established a turtle farm here in 1968. The investors hoped turtle meat might become a staple of fast-food places and a popular substitute for chicken. Scientists say turtle is about 15% protein and only 1% fat. And an adult turtle, which can weigh as much as 600 pounds, can provide as much as 100 pounds of meat. The Cayman farm kills its turtles when they are three or four years old and weigh 50 pounds.

The farm, however, ran into financial difficulty, mostly because it was built in a tidal inlet that didn't flush out turtle wastes fast enough, says James Wood, the head of the farm's research. In 1975, the company went into receivership, and domestic turtling might have ended then and there but for Heinz Mittag, a wealthy German industrialist. Mr. Mittag, who had sold his share of a tampon-making company to Johnson & Johnson in the mid-1970s, bought into the farm in 1976, as did the Cayman Islands government. Mr. Mittag pumped several million dollars into the farm, which moved to

a series of land-based tanks of concrete and glass fiber. Things went swimmingly until U.S. environmentalists objected to the wisdom of farming turtles and to the import of turtle meat, shell, oil, leather and soup into the U.S. (Wild-turtle imports already were banned). "We had people saying we laundered wild meat," says an incredulous Joshua Brown, the manager of operations at the farm.

After five years of heated debate, the U.S. finally banned the import and trans-shipment of the farm's products in May 1979, effectively eliminating two-thirds of the farm's market and dashing hopes for a profit. "What the Americans did to us was bloody nasty," says Dennis Foster, the chief secretary of the island's government. Now the plight of the farm has become something of a "cause celebre." Because of the ban, the farm had to curtail operations, and last year it got stuck with 300,000 pounds of excess slaughtered turtle meat.



At this point, the turtle debate became ideological. Some sympathetic U.S. officials, like Sen. Roger Jepsen, the Republican of Iowa, believe the farm should be allowed to export turtle to the U.S. as a means of encouraging a capitalist philosophy in the Caribbean. "Here we are in the middle of a sea of (Cuban) communism, and the U.S. is effectively cutting out the only exporter of the Cayman Islands," says Mr. Brown, a native Californian who says he is sympathetic to conservationist causes. The turtle issue also involves Cayman economics. At one point, the farm employed 100 persons, or 2% of the islands' working population.

Conservationists brush these geopolitical arguments aside. They argue that sea turtles of all types are listed as threatened and that, therefore, none should be imported. Turtle zoologists like Mr. Carr believe that allowing trade in farmed turtle meat will encourage poaching of wild turtles because the farmed meat will create a world appetite for turtle that the farm won't be able to satisfy. Before the U.S. ban, Mr. Carr says, poaching throughout the Caribbean was growing. Some environmentalists say the farm is helping to deplete the wild population by taking wild turtles for breeding. Indeed, at a recent international conservation conference, a Nicaraguan representative accused the Caymanians of taking turtles off Nicaraguan shores for use at the farm, according to Michael Bean of the Environmental Defense Fund.

"I wouldn't deny that there is the occasional boatload of turtles brought into Cayman illegally," says the farm's Mr. Wood, "but they don't show up on the farm." He says the farm hasn't taken eggs from the wild since 1978 and hasn't taken wild turtles for breeding since 1977. (The wild breeders are much more prolific than the farm-bred breeders, he says, because the farm turtles "just haven't gotten their reproductive act together yet.")

Further muddying the waters is the average Caymanian's unabashed preference for wild-turtle meat over farm-turtle meat. Even Mr. Foster, the chief secretary, confesses to preferring seagoing turtle. Most restaurants in Cayman serve the farmed variety, which, smothered in onions, tomatoes and fried peppers, tastes like a slab of coarse, tough veal. Wild turtle, however, tends to be much tastier - resembling a juicy, gamy cross between pheasant and filet mignon. Because of their preference for wild meat, Caymanians acknowledge that poaching in the waters off Nicaragua - where turtles are relatively plentiful - does take place. In fact, the Caymanian government is said to be so miffed at the U.S. import ban that it turns its back on poached turtle coming in through Georgetown on Grand Cayman.

The controversy doesn't help the farm, and even the planned release of the 10,000 turtles is causing a stir. The farm wants some big American corporation or interest group to sponsor the release, but environmentalists don't like this scheme either. They say that because the farm's turtles are descended from turtles in Costa Rica, Surinam, Guyana, Nicaragua and Ascension Island, their release will destroy the turtle gene pools of the Caribbean. "It's a pain in the neck to think someone would upset the natural strains," says Mr. Carr, an advocate of species purity among turtles.

Furthermore, "scientists are concerned that those turtles will not know how to behave in the wild," says Mr. Bean of the Environmental Defense Fund. Experts seem particularly concerned over how the turtles will return to climb a lot of coral reefs. Meanwhile, the 8,600 turtles still down on the farm seem happy enough, swimming about in their concrete tubs and eating their high-protein animal feed. No one knows yet how this soft living affects the life span of sea turtles, which are believed to have been around since dinosaur days and are thought to live to be at least 100 years old.

Nesting season is in full swing on the artificial beach here at the farm. Eggs are collected as they are laid and placed in Styrofoam chests to keep them warm. Mr. Wood expects his turtles to produce about 17,000 little hatchlings this summer. And by fall, he should be awash in a sea of turtles he can't afford to feed, Mr. Brown says. "We spend \$1 million a year just on feed," he says. Now, for \$5, tourists can come to the farm, pick out a tagged turtle and let it go. "We can't afford to keep them because of economic considerations of the market," says Mr. Wood. "It's better to release turtles than to hit them on the head and throw them in the trash."

-----taken from the "Wall Street Journal," July 16, 1981.

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NOTES ON A BROOD OF NORTHERN WATER SNAKES FROM KANSAS

On August 28, 1981 a female northern water snake (*Nerodia s. sipedon*), measuring 1069 mm in total length was collected at Mary's Lake in Lawrence (Douglas County), Kansas. It was later determined to be gravid and was kept until it gave birth. On September 4, three stillborn young were deposited. All three had opaque eyes, and one baby had a kinked spine, which made it impossible to determine its length. The other two had an average snout-vent length of 18.0 mm and an average total length of 23.75 mm. Three days later, on September 7, thirty babies were born. These had an average snout-vent length of 19.5 mm and an average total length of 24.0 mm. Collins (1974) stated that the litter size varies from 6 to 46, with an average of 26 young. Therefore, the size of this litter is above average.

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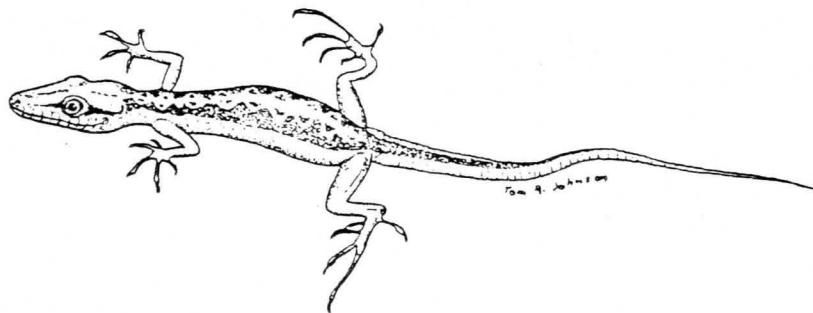
-----Jim Pilch, 808 W. 27th St., Lawrence, Kansas 66044.

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ADDRESS CORRECTION FOR THE NEBRASKA HERPETOLOGICAL SOCIETY

The address in the last issue of the KHS newsletter for the Nebraska Herpetological society is incorrect. The following is the correct address:

Nebraska Herpetological Society
James D. Fawcett
Dept. of Biology
University of Nebraska at Omaha
Omaha, Nebraska 68182



REQUEST FOR SPECIMENS

In addition to my duties at the Houston Zoological Gardens, I am working on my Ph.D. at the University of Houston under Dr. David Jameson. My dissertation concerns variation and evolution in Crotalus viridis (prairie rattlesnake). Basically, what I will be doing are restriction analyses of the mitochondrial DNA of this species. I will also collect isozyme data from liver tissue, and compare both of the above to each other and to morphometric data. To date, I have found heterozygosity through gel electrophoretic analyses, and have isolated and analyzed the mitochondrial DNA. To successfully complete this research, I need 3 to 6 live specimens from a given area. If you know of any collective sites where I might readily find C. viridis, please let me know. If you could save me any specimens you happen to acquire, I would be most appreciative. Your help is greatly appreciated.

-----Hugh Quinn, Curator, Dept. of Herpetology, Houston Zoological Gardens,
1513 Ouber Belt Drive, Houston, Texas 77030.

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NEW BOOK ANNOUNCEMENT: STANDARD COMMON AND CURRENT SCIENTIFIC NAMES FOR NORTH AMERICAN AMPHIBIANS AND REPTILES (Second Edition)

The first edition of this reference, issued in 1978 as SSAR Herpetological Circular No. 7, quickly became a standard reference for herpetologists, biologists, zoos, museums, conservation organizations, wildlife societies, book publishers, and Federal and state wildlife agencies. This second, revised edition is an up-date listing over 1300 common and scientific names for species and subspecies of North American (north of Mexico) salamanders, frogs and toads, crocodylians, turtles, lizards, and snakes. New features in this edition (not in the 1978 version) are an appendix of Hawaiian amphibians and reptiles, the inclusion of the names of describers for all genera, species and subspecies, and the addition of a table comparing the number of currently recognized subspecies with those listed in earlier publications. The SSAR Committee on Common and Scientific Names considered over 50 proposed changes for this edition, the majority of which were adopted. The second edition, authored by Joseph T. Collins, Roger Conant, James E. Huheey, James L. Knight, Eric M. Rundquist and Hobart M. Smith, will be published as Herpetological Circular No. 12, and will be available during the summer of 1982.

Herpetological Circular No. 12, Society for the Study of Amphibians and Reptiles \$3.00.

* * * * *

BOOK REVIEW: BIOMEDICAL AND SURGICAL ASPECTS OF CAPTIVE REPTILE HUSBANDRY

This newest contribution to the veterinary care of reptiles follows the publication of Marcus (1981), but without reference to amphibians. Frye has essentially updated and expanded his previous work, and enhanced the present volume with numerous color plates on virtually every page.

The text begins with chapters on taxonomy and husbandry which present little new information; rather, they seemed aimed at the clinician to introduce him to a largely unfamiliar topic. There follows a chapter on nutrition, which enumerates several dietary maladaptations. Next follows a lengthy and well-illustrated section on hematology, followed by a chapter on radiology. Polaroid prints are used in which bone appears dark, and thus clearer for observation. Chapters 6 through 9 detail various diseases; 10 and 11, anesthesia and surgery; 12, reproduction; 13, developmental anomalies; 14 euthanasia and necropsy; 15, histology and 16, pathology. An index is included at the end of the book.

Frye has some taxonomic oversights not included in the erratum, (ie., Heloderma mexicanum for H. horridum (fig.1-7, p.4) and Varanus rugosa for V. dumerili (Case 2, p.113)), but these are not overly important in a work of this kind. Rather, he presents a great deal of information rarely seen in one volume, especially physiological material vital to someone treating herpetofauna. By that same token, this book will probably miss a large potential audience. Written for the practicing veterinarian, there is no glossary of technical terms, nor the simple outlining of disease and treatment, such as that presented by Murphy (1975). For those not professionally involved in animal medicine, the text by Marcus (1981) is somewhat more lucid without being of lesser quality, while also covering amphibian disease and treatment.

Frye's book is printed on good paper and is of high quality. It will be of interest to those pursuing veterinary medicine or related fields, and will probably be invaluable to the clinician for many years to come. For amateurs and those not well versed in medical terminology, there are more useful alternatives on the market.

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Marcus, L. 1981. Veterinary Biology and Medicine of Captive Amphibians and Reptiles. Lea & Febiger Publ., 239 pp.

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Biomedical and Surgical Aspects of Captive Reptile Husbandry, by Frederic L. Frye, DVM, MS, i-xiv, 1-456 pp. Veterinary Medicine Publ. Co., Edwardsville, Kansas.

-----Robert George Sprackland, Dept. of Herpetology, Oklahoma City Zoo, Rt.1, Box 1
Oklahoma City, OK 73111.

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THE KANSAS HERPETOLOGICAL SOCIETY PRESENTS ENDANGERED AND THREATENED AMPHIBIANS AND REPTILES IN KANSAS

Six kinds of amphibians and reptiles have been officially designated by the state of Kansas as endangered or threatened. **Endangered** species are those species of wildlife whose continued existence as a viable part of the Kansas fauna is determined to be in jeopardy. They are restricted to specialized habitats which may be subjected to alteration by human activities. Thus, they potentially face extinction in Kansas unless closely monitored and protected. Species designated as **threatened** in Kansas are those which appear likely, within the foreseeable future, to become endangered. Their habitat requirements are more widely available in the state, but could be adversely affected by habitat alteration due to human activities.

This brochure presents information about the six endangered or threatened amphibian or reptiles as a service to the residents of Kansas, in order that they may become more aware of, and thus better appreciate, the place of these harmless creatures in the environments of the Sunflower State.

Four salamanders (amphibians) are considered endangered in Kansas. The threatened species consist of a frog (amphibian) and a turtle (reptile). Persons wishing to learn more about Kansas amphibians and reptiles are encouraged to join the Kansas Herpetological Society. Information about this organization may be obtained by writing to: Kansas Herpetological Society, Museum of Natural History, University of Kansas, Lawrence, 66045.

ENDANGERED IN KANSAS



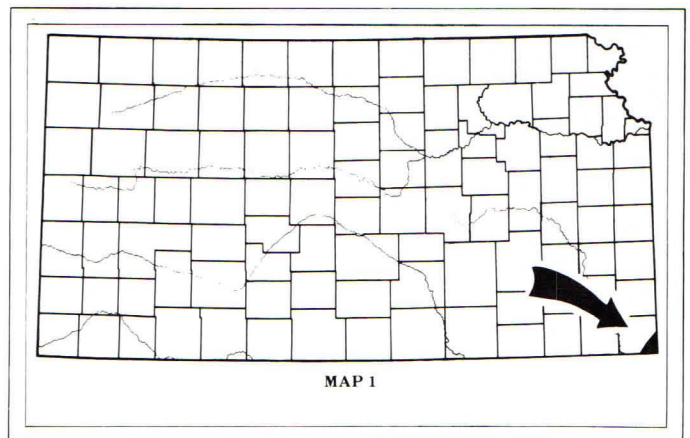
An adult cave salamander (*Eurycea lucifuga*) from Cherokee County, Kansas.

Cave Salamander (*Eurycea lucifuga*)

This attractively colored amphibian is found only in the Ozarkian area of Cherokee County in extreme southeastern Kansas (the black area indicated on map 1 by an arrow). It prefers to live in the twilight zone of limestone caves with associated streams and in wet areas beneath overhanging limestone outcrops in small streams and springs. Although abundant to the east and southeast of Kansas, the cave salamander has available only a very limited amount of suitable habitat in our state, and thus its populations are comparatively small.

Adult cave salamanders are normally $4\frac{3}{4}$ to $6\frac{1}{4}$ inches in length. The largest Kansas example measured was $6\frac{1}{2}$ inches. Elsewhere in its range, it is known to grow to slightly over 7 inches. Females have slightly longer bodies than males. Little is known of the breeding habits of this amphibian in Kansas, but breeding and egg-laying probably take place from October to May. Courtship behavior is unknown. Female cave salamanders lay from 50 to 90 eggs, and these are attached to the underside of submerged limestone rocks

in streams. After hatching, the aquatic larvae live in the stream until they metamorphose, at a length of $2\frac{1}{4}$ to $2\frac{1}{2}$ inches, into adults. The food of cave salamanders consists entirely of small insects and spiders.



MAP 1

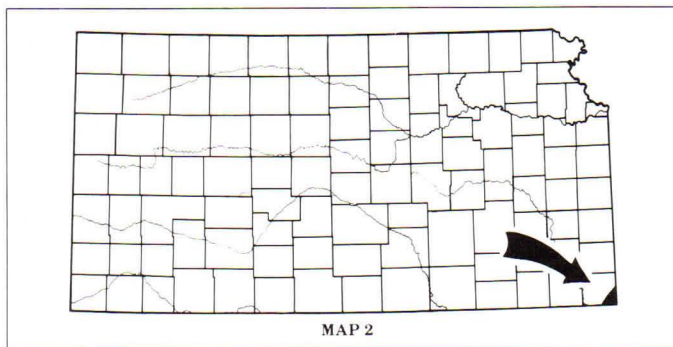


An adult greybelly salamander (*Eurycea multiplicata griseogaster*).

Greybelly Salamander
(*Eurycea multiplicata griseogaster*)

Probably less is known about the greybelly salamander in Kansas than any other amphibian in the state. It is the smallest salamander known to occur in our state, with adults growing 2 to 3 inches in total length. This amphibian is known in the Sunflower State only from four larval individuals, the largest of which was 3 inches, and all were found in a limestone cave stream in Cherokee County. Elsewhere in its range, adults of this species reach a maximum length of 3 13/16 inches, but larvae may grow to 4 1/4 inches.

As with the cave salamander, the greybelly salamander is restricted in Kansas to the Ozarkian area in extreme southeastern Kansas (see map 2). Little is known of the reproductive habits of this salamander, but the eggs are probably deposited in cave- or spring-associated streams anytime from October to June. Normally, the newly-hatched larvae eventually metamorphose into adults and live in moist areas beneath rocks on hillsides near a stream. However, they may elect to mature as larvae in the stream, and maintain an aquatic existence. It is not known whether either or both of these life styles are used in the Kansas portion of the range of this amphibian. Both adults and larvae feed on small insects.



MAP 2

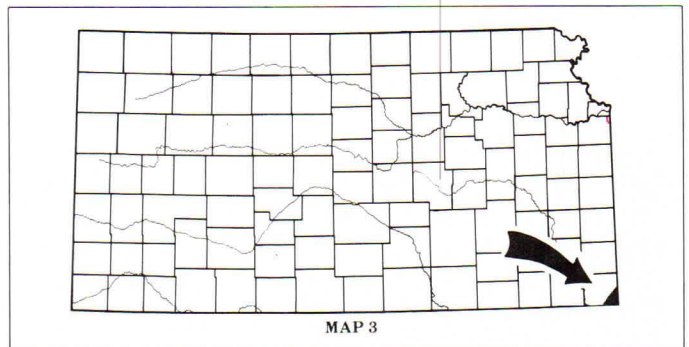


An adult captive-raised grotto salamander (*Typhlotriton spelaeus*), photographed with the compliments of the Cincinnati Zoo.

Grotto Salamander
(*Typhlotriton spelaeus*)

Adult grotto salamanders, unlike all other Kansas salamanders, require a cave interior in which to live. Their larvae reside in streams or springs outside a cave, but enter the cave interior to metamorphose into adults, where they spend the rest of their lives. Adults do not have functioning eyes, and reach lengths of 3 to 4 3/4 inches. The largest Kansas example measured 3 3/8 inches, but elsewhere in its range this amphibian may grow to 5 5/16 inches. Only one adult of this salamander has been discovered in Kansas, but numerous larvae approaching metamorphosis have been recorded.

As with the cave and greybelly salamanders, the grotto salamander is restricted in Kansas to the Ozarkian area in Cherokee County in extreme southeastern Kansas (see map 3). Virtually nothing is known of the breeding cycle of this amphibian in Kansas, but females probably attach their eggs to the underside of submerged rocks. The larvae may require two or three years before metamorphosing into adults. Population estimates of 5 to 10 individuals per square meter have been made for this salamander in Kansas, but only under optimal habitat conditions. The grotto salamander feeds on mosquito larvae, flies, beetles, small snails and centipedes. Due to its reliance on caves for suitable habitat, this salamander is probably the most endangered amphibian in the Sunflower State.



MAP 3



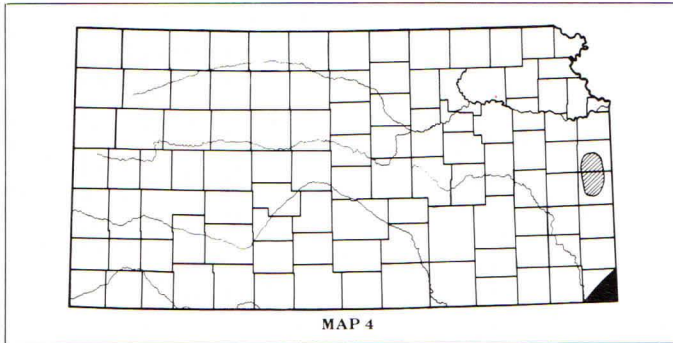
An adult central newt (*Notophthalmus viridescens louisianensis*) from Cherokee County, Kansas.

Central Newt
(*Notophthalmus viridescens louisianensis*)

The central newt, unlike the three salamanders just discussed, is an amphibian that prefers still water, and is normally found in ponds and quiet pools. It once had a slightly wider range in Kansas than the cave, greybelly and grotto salamanders, but is probably now restricted to ponds in Cherokee County. Map 4 shows its current known distribution (solid black) and earlier records (cross-hatching). The earlier records were based on central newts found in suitable ponds near the Miami-Linn county border, but these ponds have evidently been drained for cultivation.

This salamander exhibits three stages of development after hatching from eggs laid in ponds. The first stage is the aquatic, larval condition typical of other Kansas salamanders, followed by metamorphosis into an "eft," a terrestrial stage lasting two to three years. At the end of this time, the efts return to ponds and transform into completely aquatic adults, spending the rest of their lives in this final stage.

Adult central newts are 2¾ to 3½ inches in total length. The largest Kansas example measured was 3⅞ inches, but elsewhere in its range this salamander grows to a total length of 4½ inches. These small amphibians feed on insects, insect larvae, worms, and other small aquatic animals.



MAP 4

THREATENED IN KANSAS



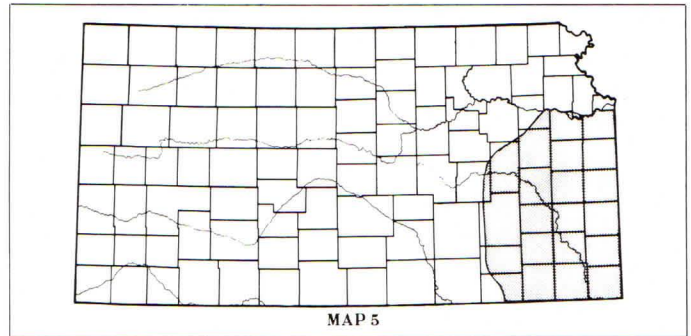
An adult northern crawfish frog (*Rana areolata circulosa*) from Cherokee County, Kansas.

Northern Crawfish Frog (*Rana areolata circulosa*)

The northern crawfish frog is found throughout a large area of eastern Kansas, east of the Flint Hills and south from the Kansas River valley (shaded area on map 5). It is considered threatened because of its habitat requirement of subirrigated wet meadows with stable water table levels, a diminishing resource in some areas of its range in the Sunflower State. Crawfish frogs are very secretive, live in burrows beneath the ground in areas of both permanent and temporary water, and emerge only during extremely heavy rains in spring and summer.

Adult northern crawfish frogs grow from 2½ to 3¼ inches in total body length. The largest example from Kansas measured 4¾ inches, and elsewhere in its range this frog may reach a total length of 4½ inches.

This frog breeds during the spring and early summer after heavy rains. Each female may lay up to 7000 eggs in masses 5 to 6 inches in diameter. The eggs hatch soon after laying, and the tadpoles remain in the water until they grow large enough to metamorphose in late summer. Northern crawfish frogs eat beetles, spiders, crickets and possibly crayfish.



MAP 5



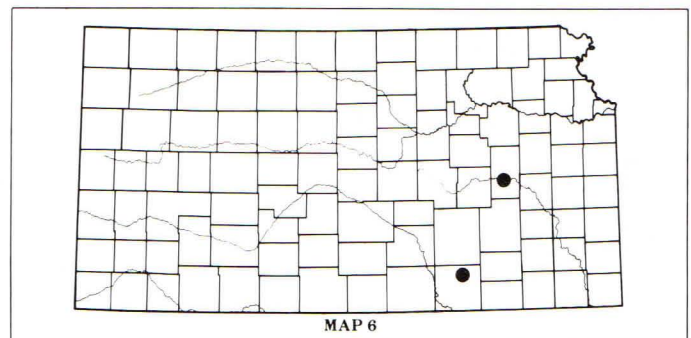
An adult alligator snapping turtle (*Macrolemmys temmincki*), photographed with the compliments of the Topeka Zoo.

Alligator Snapping Turtle (*Macrolemmys temmincki*)

The alligator snapping turtle is the only reptile in Kansas designated as endangered or threatened. This is the largest freshwater turtle in the world, with adults having upper shell lengths of 15 to 26 inches. Only two examples of this reptile have been found in Kansas, the largest of which had an upper shell length of 22 inches. Maximum upper shell length for this turtle is 31½ inches.

The two known Kansas examples of the alligator snapping turtle were found in the Arkansas and Neosho river drainages in the southeastern portion of the state, but it may be more common (see map 6). This turtle is very secretive, inhabiting the deepest parts of large rivers and reservoirs. Only females are known to leave the water, and then only for the purpose of nesting. Alligator snapping turtles mate in the water during the warmer months of the year. One clutch per year of 15 to 50 round, white eggs are laid by a female, and the eggs hatch in approximately 3 to 4 months.

The alligator snapping turtle feeds actively at night and is carnivorous, eating anything it can overpower and swallow. When resting motionless on the bottom of a lake or river during the day, it blends with mud and debris. In this position it holds its mouth open wide and uses a small, pink, worm-like, fleshy projection of its tongue as a lure to attract unwary fish. When a fish swims too close to investigate the worm-like lure, the turtle has a meal.



MAP 6

OTHER KANSAS AMPHIBIANS AND REPTILES OF SPECIAL CONCERN

Within the last decade, various kinds of amphibians and reptiles have been recommended for protection in Kansas, for a wide variety of reasons. These creatures, listed below, are not protected by state law, but are of special concern to the Kansas Herpetological Society because little is known about their biology in Kansas.

Salamanders:

Dark-sided Salamander

Lizards:

Texas Horned Lizard
Broadhead Skink

Frogs and Toads:

Western Green Toad
Red-spotted Toad
Strecker's Chorus Frog
Northern Spring Peeper
Green Frog
Pickerel Frog
Eastern Narrowmouth Toad

Snakes:

New Mexico Blind Snake
Milk Snake
Texas Longnose Snake
Texas Night Snake
Checkered Garter Snake
Rough Earth Snake
Western Earth Snake
Northern Redbelly Snake

OTHER KANSAS WILDLIFE DESIGNATED AS ENDANGERED OR THREATENED

In addition to the six kinds of amphibians and reptiles currently so listed by state law, Kansas has designated six fishes, six birds, two mammals and four invertebrates as endangered or threatened. These eighteen animals are listed below.

Fishes:

Neosho Madtom (Endangered)
Pallid Sturgeon (Endangered)
Sicklefin Chub (Endangered)
Blue Sucker (Threatened)
Arkansas Darter (Threatened)
Topeka Shiner (Threatened)

Birds

Bald Eagle (Endangered)
Peregrine Falcon (Endangered)
Whooping Crane (Endangered)
Eskimo Curlew (Endangered)
Prairie Falcon (Threatened)
Least Tern (Threatened)

Mammals:

Black-footed Ferret (Endangered)
Gray Bat (Endangered)

Invertebrates:

Amphibious Snail (Endangered)
Warty-backed Mussel (Endangered)
Heel-splitter Mussel (Endangered)
Riffle Beetle (Threatened)

INFORMATION

Anyone wishing additional information about endangered or threatened animals in Kansas should contact the Kansas Fish and Game Commission, R.R. #2, Box 54-A, Pratt, Kansas 67124. Interested individuals wishing to learn more about amphibians and reptiles may join the Kansas Herpetological Society by sending \$4.00 (annual dues) to: Kansas Herpetological Society, c/o Museum of Natural History, University of Kansas, Lawrence, Kansas 66045. Interested readers desiring more detailed information on these and other kinds of Kansas amphibians and reptiles may wish to consult "Amphibians and Reptiles in Kansas" by Joseph T. Collins at their local library.

SPONSORS

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**Kansas Fish and Game Commission
Non-Game Wildlife Fund
Route 2, Box 54-A
Pratt, Kansas 67124**

**Museum of Natural History
University of Kansas
Lawrence, Kansas 66045**

This brochure was written by a committee of the Kansas Herpetological Society consisting of Joseph T. Collins, Peter Gray, Hank Guarisco, Kelly J. Irwin and Larry Miller. All photographs © 1981 by Joseph T. Collins.



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