

KANSAS
HERPETOLOGICAL
SOCIETY



NEWSLETTER

NUMBER 32

AUGUST 1979

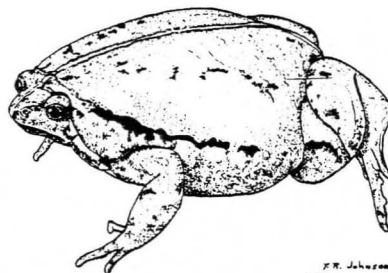
LOW ATTENDANCE SLOWS KHS

Approximately twelve persons braved summer temperatures and the gas pinch to attend the KHS field trip in Cherokee County the weekend of 20-22 July. The rendezvous site was the well-known Schermerhorn Park just outside of Galena, the only known locality for several species of state-endangered amphibians. Most KHS'ers were in attendance by Friday night with additional members arriving the next morning. Friday night our intrepid group occupied itself with attempts at seining in Shoal Creek. Shoal Creek is one of the clearest and coolest streams in Kansas, and we were able to observe numerous varieties of fish that inhabit this beautiful waterway. Unfortunately, we were unable to locate any mudpuppies along the rocky streambed. On Saturday members dispersed throughout the area to locate more herps. The cave site is much the same as before. Dark-sided salamanders were common in the twilight area and a Cave Salamander was taken from further inside. The hills overlooking Shoal Creek also yielded several species, with Five-lined Skinks and Rough Green Snakes being common. Newly-hatched Five-lined Skinks were abundant. The Kansas locality for Rana clamitans were checked but only Rana utricularia was observed. A short float trip down Shoal Creek might easily yield more localities for the Green Toad in Kansas. Since attendance was low the executive council did not meet. Most members left for home that afternoon. Our next field trip is September 14-16 at Scott County State Lake so plan now to attend. This should be an excellent trip with many opportunities for county records. Species identified in Cherokee County were:

Eurycea longicauda melanopleura
Eurycea lucifuga
Acris creptans blanchardi
Bufo americanus
Rana utricularia
Graptemys sp.
Eumeces fasciatus

Sceloporus undulatus hyacinthinus
Scincella laterale
Nerodia sipedon x pleuralis
Opheodrys aestivus
Storeria dekayi texana

---PETER GRAY, Museum of Natural History, University of Kansas, Lawrence,
Kansas 66045.



UPCOMING HERPETOLOGY MEETINGS

On August 10-11 the Knoxville Zoological Park will be sponsoring the third annual Reptile Husbandry and Propagation Symposium, which will be held at the University of Tennessee in Knoxville, Tennessee. Interested people may contact Howard Lawler, Department of Herpetology, Knoxville Zoological Park, P.O. Box 6040, Knoxville, TN 37914.

Then, on August 12, the third annual Regional Herpetological Societies Conference will be held at the same location (Knoxville), with the joint annual meeting of the Herpetologist's League and the Society for the Study of Amphibians and Reptiles (SSAR). It sounds like a concentrated fun-filled weekend, and I hope many of you will be able to attend. Refer to the February KHS newsletter for details.

* * * * *

WORLD CONFERENCE ON SEA TURTLES

The World Wildlife Fund-U.S., along with other private organizations and Federal agencies will host the first World Conference on Sea Turtle Conservation at the State Department in Washington, D.C., November 26-30, 1979.

The conference will assemble an international forum of conservationists, scientists, and government officials to address the many complicated aspects of sea turtle conservation. (The final agenda for the sessions will be announced when available.)

For registration information write Vivian Silverstein, Conference Coordinator, 3rd Floor, 1244-19th St., NW., Washington, D.C. 20036 (or phone 202/659-9510). (Taken from Endangered Species Technical Bulletin, April, 1979)

* * * * *

CURRENT LITERATURE

This current literature section has been compiled by J. T. Collins, and contains titles of books and articles on amphibians and reptiles of possible interest to KHS members. Generally, titles listed here are those written by KHS members, those which contain direct reference to Kansas herpetofauna, or those of significance regarding North American amphibians and reptiles.

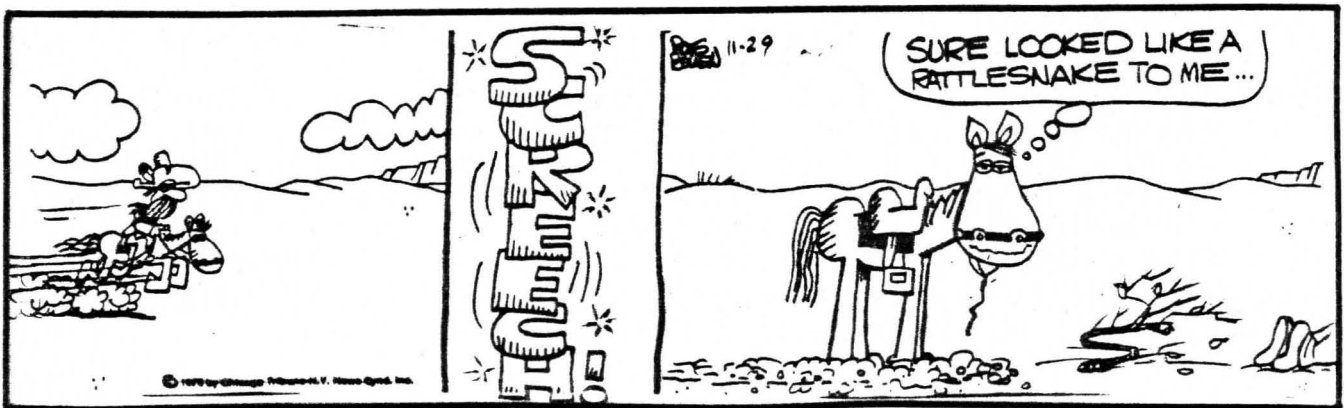
Adler, K.

1979. A brief history of herpetology in North America before 1900. SSAR Herp. Circ., 8:1-40.

Chiszar, D. et al.

1979. Rate of tongue-flicking by cottonmouths (Agkistrodon piscivorus) during prolonged exposure to various food odors, and strike-induced chemosensory searching by the cantil (Agkistrodon bilineatus). Trans. Kansas Acad. Sci., 82(1): 49-54.

- Cogger, H. G.
1979. Reptiles and amphibians of Australia. Second revised edition. Ralph Curtis Books, Hollywood, Florida. 608 pp.
- Collins, J. T. and J. L. Knight
1979. USFWS protected amphibians and reptiles: an update. Herp. Review, 10(2):64.
- Duvall, D. et al.
1979. An observation of maternal behavior in the Mexican desert spiny lizard, Sceloporus rufidorsum. Trans. Kansas Acad. Sci., 82(1): 60-62.
- Knight, J. L.
1979. (Review of) A herpetological cookbook: How to cook amphibians and reptiles, by E. A. Liner. Herp. Review, 10(2):63.
- Rundquist, E. M.
1979. The status of Bufo debilis and Opheodrys vernalis in Kansas. Trans. Kansas Acad. Sci., 82(1):67-70.
- Simbotwe, M. P. and S. D. Garber
1979. Feeding habits of lizards in the genera Mabuya, Agama, Ichnotropis and Lygodactylus in Zambia, Africa. Trans. Kansas Acad. Sci., 82(1):55-59.
- Street, D.
1979. The reptiles of northern and central Europe. B. T. Batsford, Ltd., London. xi + 268 pp.
- Weler, J. R.
1978. Poisonous snakes of Texas. Texas Parks and Wildlife Dept. Bull., 31:1-53.



WELCOME TO A NEW REGIONAL HERPETOLOGICAL SOCIETY

It is with great pleasure that I inform you of the formation of a new regional herpetological society - The Nebraska Herpetological Society. Some obvious benefits immediately come to mind: development of a better understanding of the Nebraska herpetofauna; providing a vehicle through which appropriate conservation measures and recommendations can be directed; and, enabling people to share their interests and experiences.

Members of the Nebraska Herpetological Society, we congratulate and welcome you.

* * * * *

JUAN RENJIFO, MS RETURNS HOME

Juan Renjifo, a native of Bogota, Colombia, has recently received a Master's Degree in Herpetology at the University of Kansas. A major part of his research consisted of a systematic review of all the species of the genus Bothrops (Crotalidae) that occur in Colombia. In addition to being reunited with his family and old friends, Juan will resume his former position as head of antivenom production for the country of Colombia.

I know those of us who had the opportunity and pleasure of knowing Juan and his wife Patricia, will miss them both and will join with me in wishing them the best.

FEDERAL RULES PROPOSED

The following three items are summaries of proposed Federal regulations concerning reptiles and amphibians.

LOCATION IN FEDERAL REGISTER: Vol. 44, No. 106/Thursday, May 31, 1979.

DEADLINE FOR RECEIVING COMMENTS: July 30, 1979.

...SUMMARY: The Endangered Species Scientific Authority (ESSA) proposes findings as to whether commercial export of American alligator hides harvested after June 28, 1979, will not be detrimental to the survival of the alligator or other crocodylian species. These findings are meant to satisfy ESSA's responsibilities under Article IV, paragraph 2 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Federal export permits could be issued only for hides that were harvested in Louisiana and Florida subject to specified conditions. The ESSA seeks public comment in order to base such determinations on the best available information.

SEND COMMENTS TO: Executive Secretary, Endangered Species Scientific Authority, 18th and C Streets, NW, Washington, D.C. 20240.

LOCATION IN FEDERAL REGISTER: Vol. 44, No. 101/Wednesday, May 23, 1979.

DEADLINE FOR RECEIVING COMMENTS: was 23 July 1979

...SUMMARY: Regulation of activities concerning captive wildlife under the Endangered Species Act of 1973 appears to have hindered propagation efforts. In view of this, the service has determined that its primary concern under the Act should be to conserve wild populations of Endangered and Threatened species, and that regulations should interfere as little as possible with captive propagation of these species. This proposed rule incorporates public comments on an advance notice about the same topic. The Service proposes to grant general permission to the public to take, engage in interstate and foreign commerce, and conduct certain other prohibited activities with captive-bred wildlife. Such permission would be limited to activities conducted to enhance the propagation or survival of the affected species. It also would be limited to exotic species and those native species that are sufficiently protected in the wild. Persons operating under these rules would be required to register and report on activities to the Service so that a necessary minimum level of control can be maintained.

SEND COMMENTS TO: Director, Fish and Wildlife Service, Federal Wildlife Permit Office, Washington, D.C. 20240.

LOCATION IN FEDERAL REGISTER: Vol. 44, No. 99, 21 May 1979, pp. 29566-29577.

DEADLINE FOR RECEIVING COMMENTS: 20 August 1979

...SUMMARY: The Endangered Species Act of 1973 requires the Service to conduct a status review of all species listed at least once every five years. The purpose of this action is to insure that the listing accurately reflects the most current status of the listed species. In order to aid the Service in discharging this responsibility, the Director is requesting comments and appropriate data from any party which could potentially alter the status for the selected species of endangered or threatened wildlife. If as a result of this review, the present classification of endangered or threatened does not comport with current evidence, the Secretary is authorized to change such classification accordingly.

SEND COMMENTS TO: Director, Office of Endangered Species, Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C. 20240.

* * * * *

CRITICAL HABITAT DETERMINED FOR LEATHERBACK SEA TURTLE

(Taken from Endangered Species Technical Bulletin, April, 1979)

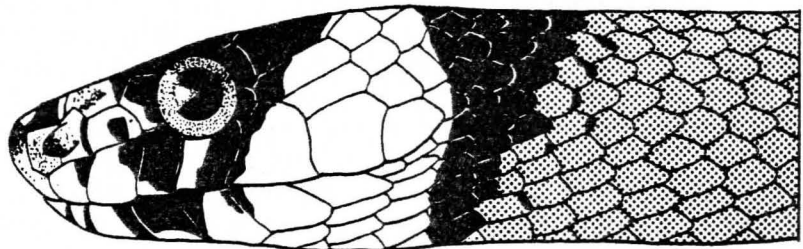
In a final rulemaking, the National Marine Fisheries Service (NMFS) has designated as Critical Habitat for the leatherback sea turtle (Dermochelys coriacea) the waters adjacent to Sandy Point Beach, St. Croix, U.S. Virgin

Islands (F. R. 3/23/79). The beach itself was previously designated as Critical Habitat for the leatherback by the U.S. Fish and Wildlife Service (F. R. 9/26/78). (NMFS has jurisdiction over listed marine species while they are in the water and the Fish and Wildlife Service has jurisdiction while they are on land.) The NMFS ruling went into effect on March 31, 1979.

The designation was made to provide protection for the species during use of these waters for courting, breeding, and access to and from nesting areas on Sandy Point Beach. Although the leatherback spends most of its life in waters 150 feet deep or more, it comes ashore to nest and lay eggs. It is believed that courtship and mating occur in the waters adjacent to the nesting beaches just prior to egg laying.

Under the 1978 amendments to the Endangered Species Act, the economic impact of a proposed Critical Habitat designation must be considered. To this end, notice of the proposed designation was published in Virgin Island newspapers, distributed to local government personnel, and written comments were solicited from the public. Consultation with the U. S. Fish and Wildlife Service, U. S. Coast Guard, U. S. Navy, U. S. Army Corps of Engineers, and the Government of the U. S. Virgin Islands indicated that the proposed designation would not create any significant impacts.

At a public meeting to discuss the proposal (also required under the 1978 amendments), the issue of sand mining to alleviate the serious sand shortage in the Virgin Islands was raised. A two-year study to identify potential offshore sand mining sites is underway. It is possible that mining, if proposed for the Critical Habitat area, could be impacted.



HISTORICAL NOTE

The Eastern Collared Lizard (*Crotaphytus collaris collaris*) is found in southeastern and central Kansas, avoiding both the western High Plains and the northeastern Glaciated Region. Did you know, however, that a small breeding population existed on the KU Natural History Reservation in Douglas County for three years? In a recent conversation with Dr. Henry Fitch, I discovered that about a dozen collared lizards were released at the Rock Quarry on the Natural History Reservation in 1949. During the next few years hatchlings were seen, indicating that a small breeding colony had been established. However, due to the lack of suitable habitat, there was no room for the colony to expand. Being extremely territorial in nature, the small area that was available was almost equally divided between two adult

males. The next year, only one male controlled the entire region.

The year of the great flood, 1951, proved to be almost as disastrous to the Crotaphytus colony as it was to the city of Lawrence. Cool, wet weather prevailed, which drastically reduced the hatching success of the developing egg clutches. Predation was also an important factor that led to the ultimate demise of the small colony in 1952. Two adult females were found in a nearby nest of a Broad-winged Hawk (Buteo platypterus).

---HANK GUARISCO, Museum of Natural History, University of Kansas, Lawrence, Kansas, KS 66045.

PRELIMINARY LABORATORY OBSERVATIONS OF PREDATION BY NATIVE TEXAS GARTER SNAKES UPON HATCHLING FIVE-LINED SKINKS

A female Texas Garter Snake (Thamnophis sirtalis annectans) that had been given to me earlier in the year, gave birth to eleven young on July 25. On July 30, I introduced several Five-lined Skinks (Eumeces fasciatus) that had just hatched, and, observed three instances of predation. The skinks remained active when placed into the garter's cage. Typically, one would move about swiftly for a short time, then move its tail in a slowly or rapidly undulating manner when it came to rest. The garter snakes were generally attracted to the skinks, but did not appear to be specifically attracted by the tail movements alone. In all three cases of predation that I observed, the snake first grasped the skink's body dorsally, directly above the location of the hind limbs. Once in its jaws, the garter snake would work its way to either the head (2 cases) or the base of the tail (1 case); then, begin swallowing its prey. Returning to the cage several hours later, I noticed that a total of 7 or 8 skinks had been eaten. There were no tail fragments in the cage, and the remaining skinks had complete tails.

Although more trials are needed for statistical validity, these preliminary observations indicate that the well-known tail-living behavior of the Five-lined Skink is a relatively ineffective defense mechanism against attempted predation by the Texas Garter Snake. Note that both the skinks used in this study were native. Therefore, learned behavior can be eliminated as a possible explanation of these observations. Furthermore, a preliminary perusal of the literature failed to show predation of garter snakes upon skinks. Fitch's ecological study of the Red-sided Garter Snake (Thamnophis sirtalis parietalis) revealed a total of two hundred prey items that were eaten. The list includes Leopard Frogs (Rana pipiens), Bullfrogs (R. catesbeiana), American Toads (Bufo americanus), Gray Tree Frogs (Hyla versicolor), Cricket Frogs (Acris crepitans), Western Narrow-mouthed Toads (Gastrophryne olivacea), a Garden Toad (Bufo woodhousei), a Striped Chorus Frog (Pseudacris triseriata), earthworms (Allolobophora caliginosa), Wood Mice (Peromyscus leucopus), Prairie Voles (Microtus ochrogaster), a

Harvest Mouse (Reithrodontomys megalotis), an unidentified bird, and a juvenile Copperhead (Agkistrodon contortrix). Many earlier studies show a similar diversity of prey items, but none mention finding even one skink in the stomach contents of Thamnophis sirtalis. However, in a recent conversation with Dr. Henry Fitch, I discovered that other species of garter snakes found in the western part of the country do prey upon a variety of lizards. It would be interesting to observe their feeding behavior to compare it with the observations in the present report. There are many plausible hypotheses concerning the observed interaction. One could, for example, argue that the very fact that the defensive behavior of Eumeces fasciatus is ineffective against Texas Garter Snake predation attempts could indicate that the garter snake is not a significant skink predator, because if it were, the selective pressure of this predation would have either eliminated the Five-lined Skink or would have led to the development of a more effective means of defense.

---HANK GUARISCO, Museum of Natural History, University of Kansas, Lawrence, Kansas, 66045

* * * * *

MORE ON NON-COLLECTING "COLLECTING" TRIPS

Several months ago NOAH members voted to prohibit the collecting of herps on NOAH field trips except for photographic purposes. This action was prompted by the concern of many NOAH members, as well as many others, over the decline of herp populations in many areas which is caused, in part, by private and commercial collectors. NOAH received several HURRAH's for this decision, including the letter which appears below, written by Frank Watrous, a corresponding member from Herndon, Virginia.

"My congratulations to NOAH for its decision to henceforth sponsor only non-collecting field trips. This important move must be duplicated by herp groups across the country if we are to be successful in redirecting efforts towards placing primary emphasis on observing the animals under more natural circumstances, as opposed to the mere maintenance of collections. There is a place for captives, of course, but not to the degree exercised by many of us. The amount of useful data extracted is often scanty in proportion to the number of animals involved. To some extent ornithology was once as collection-oriented as is herpetology today. Egg collecting was popular, with journals devoted to this subject alone. Museums considered it important to obtain specimens of rare birds before they became extinct, regardless of the impact that such collecting had on the species involved. All this is largely past now. Today, "birders" devote their efforts primarily towards observing and preserving wild populations in their habitats. Perhaps herpetology could benefit from a similar evolution.

"When, some years ago, the Washington Herpetological Society discontinued any collecting on its field trips, there was some not-unexpected grumbling. But the bulk of the membership strongly supported the move and there has never been a problem enforcing the change." (Taken from February 27, 1979 NOAH Newsletter)

WHAT'S SO SPECIAL ABOUT THE VIRGINIA OPOSSUM?

Those of us who have had the opportunity of observing the Virginia opossum (Didelphis virginiana) in the wild, will undoubtedly conjure up the mental image of a slow-moving, dull-witted animal that seems to be rather oblivious to its surroundings. (That is, of course, unless the opossum was frightened by the observer). This lack of concern apparently extends to being bitten by members of various species of Crotalids which occur in different parts of the opossum's range.

Several years ago, S. G. Seashole, who was employed as a youth counselor in Everglades National Park, observed an adult opossum being bitten by a 5 1/4 ft. Eastern Diamondback Rattlesnake (Crotalus adamanteus). The opossum walked away from the encounter showing no apparent signs of distress. Interested in this field observation, Jack Kilmon (Biologicals Unlimited), injected a quantity of Eastern Cottonmouth (Agkistrodon p. piscivorus) venom, corresponding to more than five times the lethal dose in dogs, into an opossum. Once again the opossum showed no signs of distress. A small red area appeared immediately surrounding the injection site, but no swelling or necrosis was observed. This is particularly unusual since the venom of members of the family Crotalidae is especially rich in proteolytic enzymes, i.e. enzymes which digest protein. Therefore, the usual reaction of such a bite includes extensive swelling, hemorrhage, and necrosis in the vicinity of the fang punctures. Also, the bitten animal typically shows signs of distress, such as changes in its behavior and rate of breathing.

To discover the extent of the opossum's immunity to the bites of venomous snakes, Robert Werner and James Vick injected opossums with venom from several species of snakes belonging to the Crotalidae, Elapidae, Hydrophidae, and Viperidae. Again the opossums showed immunity to the Crotalid venoms. The species of Crotalids used in this study include the Eastern Diamondback (Crotalus adamanteus), the Western Diamondback (C. atrox), the Southern copperhead (Agkistrodon c. contortrix), the Cottonmouth (A. piscivorus), the Korean Mamushi (A. halys brevicaudata), and the Central American Moccasin (A. bilineatus). When challenged with Elapid venoms (Indian Cobra (Naja naja), Chinese Cobra (Naja naja atra), Cape Cobra (Naja nivea), and Coral snake (Micrurus fulvius)), however, all the opossums died within six hours. Death also resulted when sea snake (Laticaudata semifasciata) venom was used.

What peculiar trait protects this primitive mammal from the potentially lethal bite of a Crotalid? The answer has yet to be discovered.

Suspecting that the opossum's serum may be involved, Robert Werner and Robert Faith tested the ability of the sera from the opossum, horse, and dog, and commercially available antivenin to neutralize snake venom. Each of the above was mixed with venom from the Copperhead, Cottonmouth, Eastern Diamondback and Western Diamondback. These solutions were then injected into mice. The authors discovered that the opossum serum was able to neutralize the venom of the Copperhead and the two species of rattlesnakes to the same degree as commercially prepared antivenin. In the case of the Cottonmouth venom, it was more than twice as effective.

Therefore, something present in the opossum's serum appears to explain at least part of its immunity to Crotalid bites. Jack Kilmon proposed the following possibilities: "...there may be two basic mechanisms responsible for this phenomenon: (a) the molecular targets for the toxins simply are not there; (b) something in tissue may inactivate the toxins before they reach their targets."

That the opossum has developed immunity to Crotalid bites makes sense when we consider that it is predominantly found along limestone bluffs and stream courses - the favorite habitat of both Timber Rattlers (C. horridus) and Copperheads (A. contortrix). Being a curious, omnivorous, slow animal; there is a good chance that an opossum would be bitten by a venomous snake.

Maybe the next time we encounter our primitive friend, we may feel slightly envious of his special trait; especially if we happen to be collecting in an area containing a healthy Copperhead population.

Fitch, H. S. and H. W. Shirer

1970. A Radiotelemetric Study of Spatial Relationships in the Opossum. Amer. Midland Nat. 84(1):170-186.

Kilmon, J. A., Sr.

1976. High Tolerance to Snake Venom by the Virginia Opossum, Didelphis virginiana. Toxicon 14:337-340.

Werner, R. M. and R. E. Faith

1978. Decrease in the Lethal Effect of Snake Venom by Serum of the Opossum, Didelphis marsupialis. Lab. Anim. Sci. 28(6):710-713.

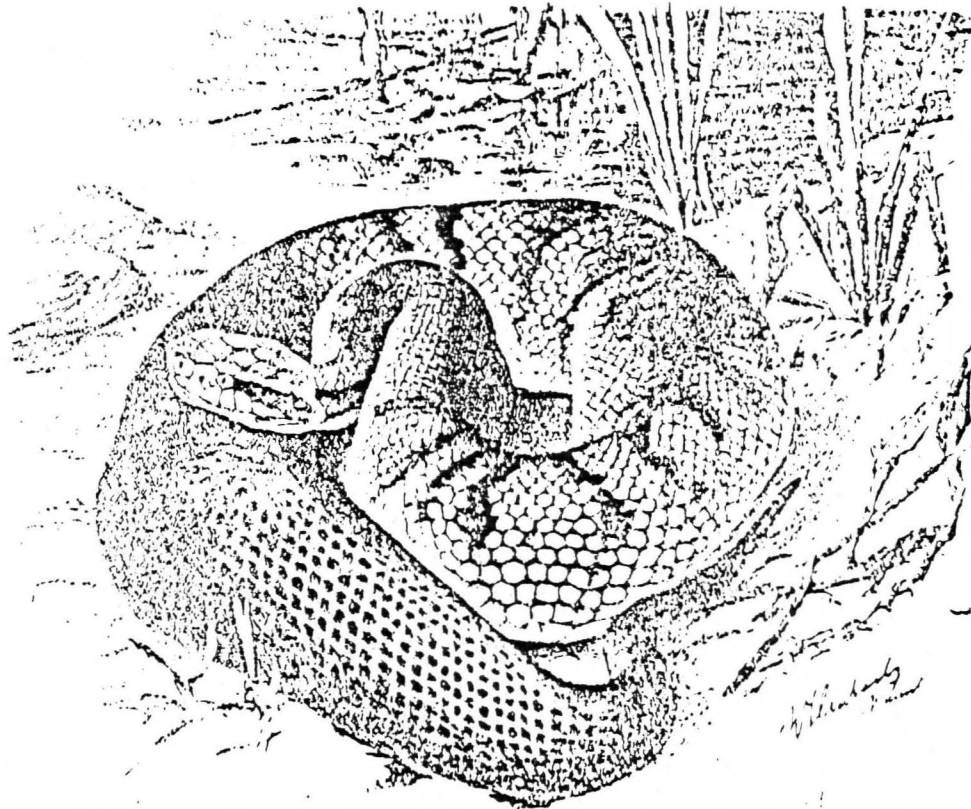
Werner, R. M. and J. A. Vick

1977. Resistance of the opossum (Didelphis virginiana) to Envenomation by Snakes of the family Crotalidae. Toxicon 15:29-33.



T.R. Johnson

Handbook of Snakes



VOLUME 3: BIBLIOGRAPHY

about 200 pages, with new introduction, portrait; 6 x 9 inches

ALBERT HAZEN WRIGHT and Anna Allen Wright's *Handbook of Snakes of the United States and Canada* was first issued by Cornell University Press in 1957. The accompanying bibliography, which gives full citations for the literature references abbreviated in volumes 1 and 2, was not issued until 1962 and published privately by the Wrights themselves. The continuing demand for the *Handbook* caused Cornell to reissue it several times since but the bibliography, which is essential to the full use of those volumes, has been unavailable for nearly a decade and yet it is absolutely necessary for any comprehensive library on North American reptiles.

The bibliography is a detailed list of 3500 references arranged in several sections. There is a general list given chronologically and divided into named periods; a list of literature according to life zones and ecological classifications; and finally a geographic listing by state and province. The extensive bibliography on pitvipers in Klauber's *Rattlesnakes* overlaps only slightly with the Wrights' list so that together these two works provide the most complete bibliography of the snakes of North America.

Prices and Ordering

SSAR members, if ordered *before November 15* \$10 clothbound

Institutions; Non-members; All orders received after November 15 \$15 clothbound

Orders should be placed now; the book will be issued in December 1979. To take advantage of special pre-publication rates, SSAR members must send their orders *before November 15*. All orders should be sent to Dr. Douglas H. Taylor, Department of Zoology, Miami University, Oxford, Ohio 45056, USA. Please make checks payable to "SSAR"; receipt sent on request only. *Prices include packing and shipping, world-wide.*

A pricelist of other Society publications can be obtained on request from Dr. Taylor.

FREE ADVERTISING FOR HERPS

The Naturalists' Directory is a book published approximately every two years listing people around the world interested in nature. Anyone can place a listing in it without charge and no obligation to buy a copy.

The purpose of the directory is to help people contact others with similar interests. Each person's listing gives their name, individual index number, address, and one or more 4-part code numbers describing (a) their subject of interest, (b) their geographical area of interest, (c) their field of interest in the subject and (d) how the interest is applied (collect, research, etc.). To exemplify this, my personal listing in the 43rd edition (1979-80) appears as follows:

LOVE, William B. (L-638), 306 Tropcalia, Jensen Beach, FL 33457. (213-542-1-90; 271-542-1-90; 274-542-1-70) Herpetology, zoogeography, esp. U.S.; captivity records (breeding, pathology); wildlife education programs.

In this case, 213, 271, and 274 as the first parts of each of my code numbers represents herpetology, captive propagation, and environmental education respectively. This allows my interests to be cross-indexed under three major headings. 542 stands for the southeastern U.S. as the second part of all my code numbers, allowing me to be indexed geographically by interest. 1 in the third parts means that I have a general interest in the natural history of each of these subjects. 90 and 70 in the fourth parts indicate no specific activity involved and desire to collect data for research, respectively.

The editors chose the new code system for ease of use in multiple references. My current code numbers were created from information in my original letter requesting listing. I have since submitted a more precise set of numbers and written resume for the next edition which is due by May 1, 1980.

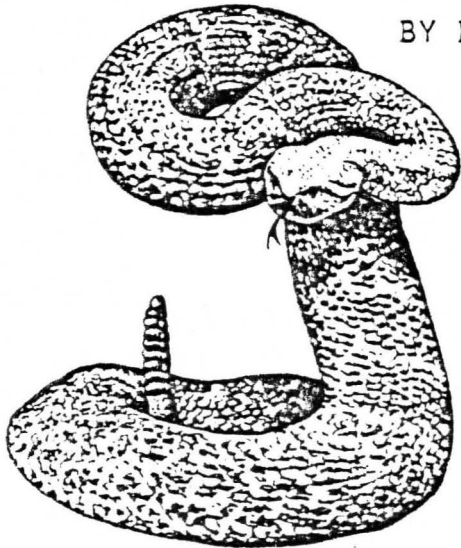
The Naturalists' Directory would like to list as many naturalists, both amateur and professional, as possible. There is absolutely no cost or obligation. They know the better the publication, the greater the demand. It's to your advantage to send them a detailed listing today. Contact: NATURALISTS DIRECTORY, World Natural History Publication, 1330 Dillon Heights Ave., Baltimore, Maryland 21228.

---WILLIAM B. LOVE, Jensen Beach, Florida 33457.

 ---THE KANSAS HERPETOLOGICAL SOCIETY NEWSLETTER is issued every other month by the Kansas Herpetological Society. All interested persons are invited to become members. Membership dues per calendar year are : \$4.00 (regular) and \$15.00 (contributing) payable to: Al Kamb, Secretary-Treasurer, Department of Geology, University of Kansas, Lawrence, KS 66045. All manuscripts and notes should be sent to the editor. EDITOR: Hank Guarisco, Museum of Natural History, University of Kansas, Lawrence, KS 66045. ASSOCIATE EDITOR: Rose Etta Kurtz, Museum of Natural History, University of Kansas, Lawrence, KS 66045.

THE NATURAL HISTORY OF MEXICAN RATTLESNAKES

BY BARRY L. ARMSTRONG AND JAMES B. MURPHY

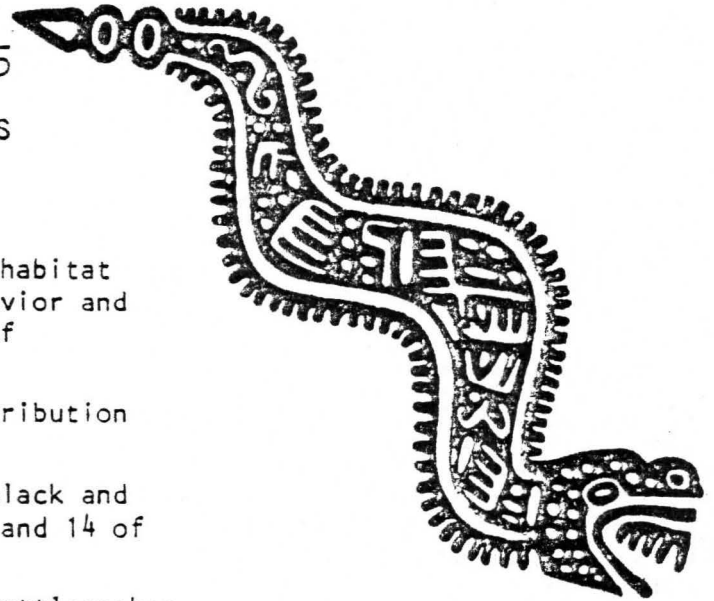


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