

THE TIMBER RATTLESNAKE IN VIRGINIA: ITS DISTRIBUTION AND PRESENT STATUS

by: W.H. Martin, III*
Harpers Ferry, WV

Although it is not my primary intention to discuss the taxonomic status of Crotalus horridus, neither should my inclusion of the Tidewater population imply that I consider the species monotypic in VA. In a recent study,^{1/} the northern population of the timber rattlesnake was compared with the southern population, Crotalus horridus atricaudatus, commonly called the 'canebrake rattlesnake.' In the study, significant differences were not found and the authors (Pisani, et al recommended against continued recognition of the southeastern subspecies.

It should be understood that classification of living things is a somewhat subjective and inexact science and that life forms are not static but continually evolving. When a population is looked at as a whole, one may get a different view from that which one gets when certain parts are compared.

Hence, although Appalachian C. horridus specimens are readily distinguishable from Tidewater specimens, when an Appalachian sample is combined with an Upper Mississippi Valley sample differences are diluted. Not only are

the Appalachian and Tidewater populations geographically isolated from each other, but the respective populations have been cut up into disjunct colonies by man's activities.

As I see the situation regarding this species, we have a generalized animal, Crotalus h. atricaudatus, occupying a wide variety of habitats in the South, and a specialized montane ecotype, C. h. horridus, of generally smaller size and darker color, adapted to the scantier food supply and colder climate of the Appalachian Mountains.

In our eastern mountains, the timber rattlesnake occurs in light and dark color phases, color seeming to be a function of thermoregulation and procrypsis (camouflage). There is a definite color frequency cline that correlates strongly with climate; the colder the zone the higher the proportion of dark specimens in the population. Black specimens do not occur on the Coastal Plain, nor do

they occur among populations in the Upper Mississippi Valley, indicating that melanism probably arose in the Southern Appalachians as mutant a strain in the past 10,000 years or so, since the glacier retreated and the climate ameliorated.

The major factors determining timber rattlesnake distribution appear to be climate, habitat, and human predation. A wooded area of sufficient size to serve as a sanctuary and reservoir, reasonably free from human disturbance and continuously wooded at least in part from early historical times to the present, seems to be essential. Such sanctuaries have been provided by the swamps and cane thickets of the southeastern part of the state and by the highlands in the western portion. An additional factor operating in the mountains is the necessity for suitable rock exposures for hibernating and gestating. In Virginia, rattlesnakes are precluded by climate only in the Mount Rogers - Whitetop area with its Canadian vegetation.

(Continued on page two.)

*VaHS member; ** VaHS Dir.

VaHS BULLETIN is a newsletter appearing at least four times a year. Its pages are open for articles or comment on topics related to Virginian herpetology. The principal activity is the state survey of reptiles and amphibians. (Request VaHS BULLETIN No. 80 and VaHS BULLETIN Number 85.)

VaHS BULLETIN is sent free of cost to Virginia's university and college biology, zoology, and natural science departments.

High School Bio-Science teachers may receive the VaHS BULLETIN (with membership card) at \$1 a year; please make request on a school letterhead, if possible.

TIMBER RATTLESNAKE IN VA.
DISTRIBUTION AND STATUS,

continued from page one:

It is not known whether rattlesnakes ever occurred statewide in Va. However, it is possible that a sparse population may have ranged through much of the Piedmont and up the Atlantic Coastal Plain as far north as Long Island, New York. They were found in the cedar swamps and pine barrens of Long Island in the early part of this century and still occur in the Pine Barrens of southern New Jersey. Specimens from southern NJ are often considered intermediate in character between Appalachian and southern populations. Several small relict populations occur in the Piedmont of Pennsylvania and Maryland. They once occurred near Washington, D. C. Rattlesnake distribution in the Virginia Piedmont is limited to several relict colonies on isolated mountain ranges in the upper Piedmont and a rough wooded area along the James River from Lynchburg downstream to Scottsville. Some Va. Piedmont specimens, as well as some specimens from along the Blue Ridge face in North Carolina, show strong atricaudatus traits. A "Rattlesnake Creek" in BRUNSWICK Co.,

in the lower Va. Piedmont, suggests that rattlers may have occurred there at one time. Rattlesnakes identifiable as atricaudatus are found in scattered colonies throughout the North Carolina Piedmont.

The bulk of Virginia's rattlesnakes are found in the Blue Ridge and in the mountains to the west collectively referred to as the Alleghanies and the Cumberlands. I have seen them at elevations in excess of 4,400 feet on Great North Mountain in AUGUSTA County, and on North Fork Mountain in nearby Pendleton County, West Virginia.

Rattlesnake numbers are probably but a fraction of what they once were, nevertheless, they are still common in some of the more remote, rougher areas. It is not uncommon to see 15 to 16 at a good den. Such dens probably have a total population of between 100 and 200 rattlesnakes, and most dens are shared with the copperhead (Agkistrodon contortrix mokasen). At most dens, one seldom sees but one to three rattlesnakes. A population of 20 to 30, perhaps, is average for the more than 150 dens at which I have observed rattlers in Virginia.

The total rattlesnake population of a given area is a function of habitat suitability and human predation. Per den

population is a function of these two factors and of one additional -- den-spacing. Den-spacing is determined entirely by the availability of sites suitable for hibernating and basking and has nothing to do with proximity of other dens. Spacing of dens, however, can affect the per den population. A given area can support only a limited number of snakes because of food supply. I know of areas where suitable habitat is exceptionally abundant and rattlers are usually seen as singles or occasionally in small groups of two or three. In such areas, per square-mile population density may greatly exceed that in areas where the per den population is higher but the dens are widely spaced.

With the exception of the Tidewater population, the Virginia rattlesnake populations are in better shape than those in any of the northeastern states. All of my informants, however, agreed that rattlesnake numbers have declined over the past 20-to-30 years. Estimates range from "a little less" to a 90% reduction. I have personally noted a considerable decline, especially with populations nearest to the Washington Metropolitan area and at more accessible dens.

Continued on page three.

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Correspondence on matters relating to:

articles, VaHS program: Franklin J. Tobey, Jr.
Editor, VaHS BULLETIN
P.O. Box #1376
Leesburg, VA 22075

contributions, VaHS support:
Louis C. Baker, Treasurer,
Va. Herpetological Society
Yorktown High School
5201 North 28th Street
Arlington, VA 22207

meetings, VaHS programs: Michael J. Clifford
P.O. Box 311,
Amelia, VA 23002

During the 18th and 19th centuries, large areas of Virginia were cleared for agriculture and rattlers were extirpated in these sections and reduced in those adjoining. During the first half of this century, many small farms were abandoned. The Federal Government acquired cut-over woods and mountain farms for Shenandoah National Park, the George Washington and Jefferson National Forests. Old fields with their rock piles and stone walls became overgrown. Rodents multiplied and rattlers followed, in artificially-restored favorable environments. In recent years several factors have combined to reverse that trend. Destructive lumbering practices that characterized our earlier times have largely ceased and wildfire is kept out of the woods with the result that much rattlesnake habitat in the way of sunny ledges and huckleberry brush has become shaded over by large timber. Habitat destruction for homesites and commercial use has been most pronounced in the Tidewater section of the state but has occurred also in the mountains. An increase in the number of roads and automobiles is probably the most important factor in reduction of rattlesnake numbers. In the past 10 years, there has been a vast in-

crease in the recreational use of our woodlands. The proliferation of off-road vehicles has allowed large numbers of people access to the backcountry. As a result of all this, the timber rattlesnake has come under increasing pressure from its number one enemy -- mankind.

As is the case with other long-lived predators with few natural enemies, the timber rattlesnake has a low reproductive rate. Litters average about 7 or 8 snakelings. Females probably bear their first young at the age of 6 or 7 years, and thereafter under favorable weather conditions for feeding and fat storage, it seems at 3-year intervals. Their low reproductive rate, coupled with their propensity for gestating and hibernating communally, make them highly vulnerable to man's attack.

A word for conservation may be in order. Rattlesnakes are under enough pressure from advancing development and from people who don't like them, without compounding their problems. There have been instances where amateur and professional herpetologists have taken large numbers of snakes from a den. If one has a valid reason to take a specimen, then do so; but, don't clean out the den! Don't take a gravid snake especially if she is the only one at the den. If

specimens are kept, and later released, release them at the exact spot where they were taken. Above all, guard carefully any knowledge of the location of a den. These should never be pinpointed in a publication.

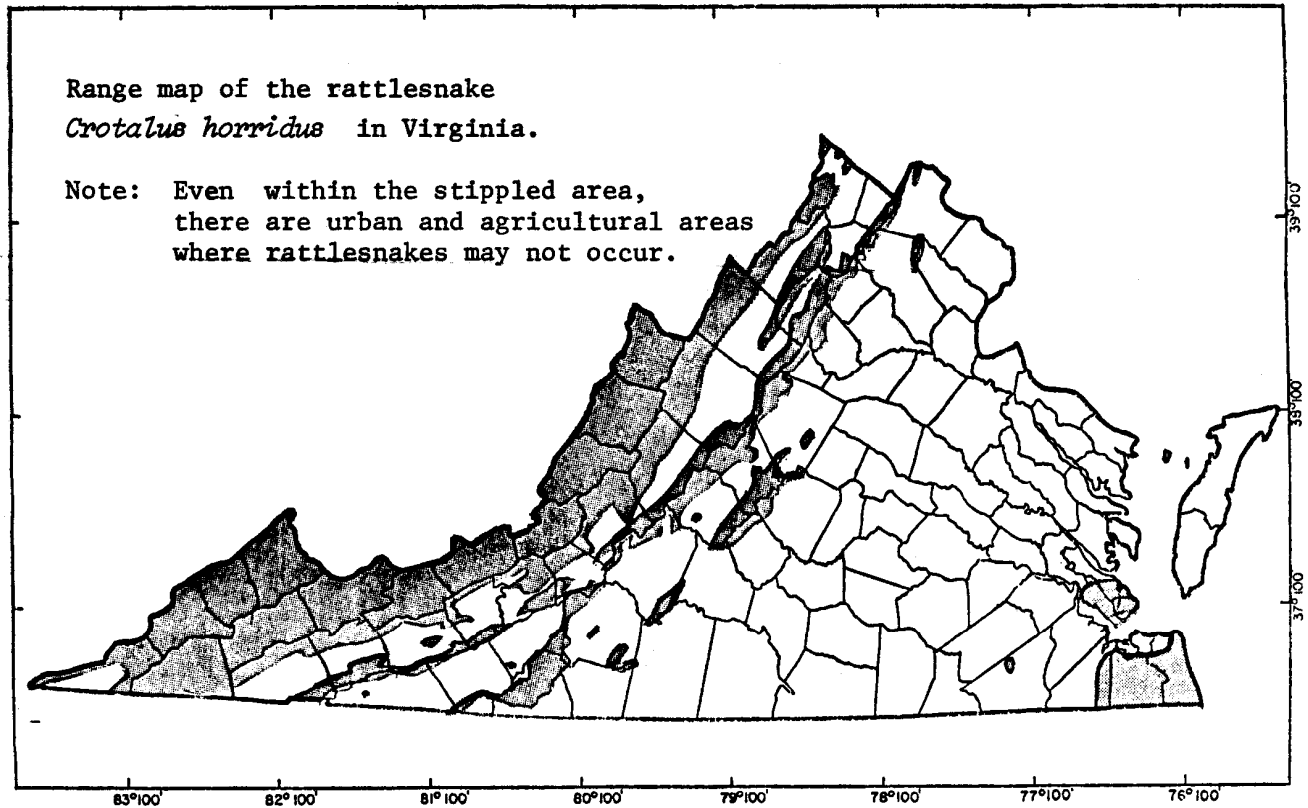
During my studies, in excess of 1,500 specimens of Crotalus horridus were examined from more than 250 locations within VA.

I wish to thank the many persons in the National Park Service and the U.S. Forest Service, the Va. State Parks, the Virginia Commission of Game and Inland Fisheries, and the many others who have contributed observations.

Correspondence welcomed:

(Mr.) W. H. Martin, III*
Rt. #4, Box 366,
Harpers Ferry, WV
25425

Range map and bibliography
on next page. Map prepared
by W. H. Martin, III.*



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HISTORICAL SIDELIGHT TO
THE COMPILATION OF DATA
FOR VA HERPETOLOGICAL
SURVEY RECORDS

VaHS members and friends who have taken part, or who are planning to participate, in the VA survey, will be pleased to note the distinguished company they are in. While recording raw data from several scientific collections in the 3-volume record books these names stood out in stark relief: Raymond L. Ditmars, Emmett R. Dunn, Nathaniel S. Shaler, and Professor Louis Agassiz.

The interesting added bit to the mention of Agassiz was the date and collecting site for the specimen. Richmond, VA., 1862! Here is a little background on Dr. Louis Agassiz (1807 - 1873), one of the great naturalists of his time:

He was born in Switzerland and attended school at Bienne, Lausanne, and Zurich. He was attracted to Heidelberg University by the great reputation of its teachers, particularly Karl George Leuckart, the zoologist. In 1827, the new University of Munich opened. There he was a student of Doellinger and von Martius. From Doellinger he learned methods of study in natural history.

In 1830, Agassiz received the doctor of medicine degree from Munich University. In 1832, he became a

professor of natural history at Neuchatel, Switz. His ambition was to be "the first naturalist of his time." His claim to this title must rest upon his researches on fossil fishes, and glaciers.

Agassiz' professorial career spanned 41 years. During the first third of this period (1832 - 1845), he was professor of natural history at the Lyceum of Neuchatel, and during the remaining two-thirds (1848 - 1873), he was professor of zoology and geology at the Lawrence Scientific School, Harvard University, Cambridge, MA. During this period, his chief responsibilities to Harvard were the delivery of lectures on zoology and geology, the supervision of the advanced students in these fields, and the examination of candidates for degrees in the Lawrence Scientific School. In 1861, Agassiz became a U.S. citizen.

Agassiz exerted a powerful influence upon the general public through a series of natural history talks in large towns. Age was no obstacle to Louis Agassiz' campaign to popularize science. Even before coming to America, he had perfected his skill in instructing the young. He was able to popularize science without reducing its prestige because he never lost contact with the stream of scientific research of his day.

He also identified himself with the organizations seeking to advance scientific investigation and science education.

He helped found a society for the pursuit of the natural sciences at Neuchatel. He helped to launch both the French and the American Associations for the Advancement of Science, serving as president of the latter.

A study of the relative emphasis which Agassiz placed on the laboratory, the lecture, and the text as aids in the learning process indicates his attitude towards methods of learning. He emphasized: (1) Instruction in making accurate observations; and, (2) guidance in the making of fertile comparisons. He believed that the comparison should be limited to a thorough study of a few representative species and their interrelationships -- not superficial acquaintance with a large number of species. Agassiz never integrated the laboratory, lecture, and text into a comprehensive system of biological instruction as did Huxley. Nearly all biological teaching today is modeled upon Huxley's system. Yet, to teach the scientific method properly, a practical classroom method must be found for Agassiz' route.

Continued on the next page:

CONGRATULATIONS !

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(Dr. J. J. Murray, Jr.**
Co-Director, MLBS)

(Dr. J. L. Riopel
Co-Director, MLBS)

Inquiries concerning summer courses: Gilmer Hall, U.of VA Charlottesville, VA
22903

(No herpetology course this summer.)

LOUIS AGASSIZ:
HISTORICAL COLLECTING NOTE
(continued)

He played an important role in the development of the university spirit, the museum, and the summer school (biological station) in America. He trained a generation of men imbued with the European ideals of scholarship and research. In turn, these students gave a powerful impulse to the university spirit in the U.S. In promoting the development of universities in America, Agassiz put the emphasis on adequate collections of natural objects as research tools and teaching aids. As a result of this he became spearhead of a movement which established some of America's great museums.

Continued at top of col 2.

VaHS POLICY CONCERNING ALL
POISONOUS SNAKES: CAUTION!

VaHS policy recommends to all members, friends that venomous snakes are best kept in public zoological (museum or zoo) collections, or university and college biology/ zoology, or natural science dep't laboratories in properly-designed, secured cages.

Curators of such zoology collections should see to it that any unnecessary handling of venomous varieties is avoided.

The specimen, which was donated by Agassiz for 1862, Richmond, Virginia, was a six-lined race-runner (Cnemidophorus s. sexlineatus) preserved in the Museum of Comparative Zoology (CMZ) Cambridge, MA.

Twice, his collections served as nuclei around which museums grew. The objects which he had accumulated during his first 6 years in America were the beginnings of the Museum of Comparative Zoology at Cambridge, Mass.

Agassiz' influence on the development of museums in America was exerted indirectly through his disciples and students. Many of the students associated with Agassiz at the dedication of the Museum of Comparative Zoology became heads of other great museums -- among them the American Museum of Natural History, New York City.

The greatest of his efforts in behalf of better

education for teachers was the summer school to provide for the training of teachers in the method of instruction which he pursued in natural history. Six of the people associated with him became pioneers in setting up summer schools in biology.

Agassiz died at Cambridge, Mass., in December 1873. He had had great ability as a field naturalist and he developed a method of teaching based on direct contact with nature.

(Based upon a longer biographical sketch in the Collier's Encyclopedia (1964) Crowell-Collier Publishing Co., New York.)

FJT

All personnel who are obliged to care for these specimens should receive adequate training in the use of instruments used to handle venomous specimens. Adequate firstaid and emergency medical assistance should be provided for in advance. Anyone handling poisonous or 'mildly' poisonous snakes should be enrolled under a hospitalization plan.

Members and friends, who may be collecting snakes are advised to avoid all contact with poisonous

species: in Virginia, the timber rattlesnake (pp. 1 to 4), the copperhead, the eastern cottonmouth, and the canebrake rattler. It is easier to avoid a bite than to treat snakebite.

Use caution while collecting in areas where poisonous snakes are known to occur. Wear adequate leg protection, carry lights at night in snake country.

Watch where you put your hands and feet. Use a hoe or other long-handled tool to move a specimen.

Herpetology friends on the MOVE. Keep the VaHS posted on your location.

Send the Coordinator your address, town, and zip #.

Your summer address is

Highlights of the VaHS James Madison University meeting on 21 April 1979, was a guest featured speaker from the Zoology Department, University of Maryland, College Park. Dr. Douglas E. Gill spoke on population dynamics of the red-spotted newt (N. v. viridescens) in the Blue Ridge Mountains, VA.

His project areas are in the G.Washington National Forest in ROCKINGHAM Co. Several techniques for recognizing individuals were mentioned and the advantages of each. It was noted by Dr. Gill that in red-spotted newts the pattern of each individual is unique - not unlike human fingerprints. Study involved distinguishing between breeding populations in several different ponds and noting shifts, if any, from one pond to another of adult newts. Apparently, shifting to a new breeding pond is rare.

Keith A. Berven, one of Dr. Gill's undergraduate students (U.of Md) spoke on breeding behavior of wood frogs (R. sylvatica). Comparison studies of populations at 3,500 to 4000 with lowland populations in Maryland were made. An observation was made that wood frogs apparently have a longer life span in the Va. mountains. The first reproduction occurs (minimum) after two years; (majority mature at three years in the mountains).

HIGHLIGHTS OF THE VaHS MEETING IN HARRISONBURG at James Madison Univ

Breeding occurs between February 20 and into April when 60°F temp. coincide with warm dry days; rain-fall is not necessary. An 8mm film of wood frog breeding populations was shown. Mr. Reid Harris, a former student of Dr.J. R. Bailey's at Duke Univ., N.C., spoke on spotted salamander (A. maculatum) egg masses. Mr. William D. Venko has made studies of rapid tadpoles from egg development to metamorphosis. Ms. Beverly A. Mock spoke of trypanosome infections in newt populations. Her studies are on parasite life cycles. She has found that levels of infection in newts lessen with age. Peak infection is in August dropping off in the Fall. Trypanosome life cycles require the leech as an intermediate host; the trypanosome is apparently specific to newts; i.e., does not infect other amphibians in the same pond.

We would like to thank the group from U. of Md. that came out to Harrisonburg. Any errors above are mine, and not to be attributed to the speakers. Anyone interested in greater details should write to the speaker in care of:

Zoology Dep't, U.of Md.
College Park, MD 20742

Mr. Joseph C. Mitchell* of Richmond, VA., renewed his plea for phenology data (see VaHS-B//81 & 87). Spring moves across the countryside at 17 to 18mi a day and it takes 4 days for every 100 meters in elevation, Joe observed. He is interested in your notes, from this spring or a previous spring, on any Va. phenological occurrences. Mitchell is VaHS Phenology Program Coordinator, and a biology instructor at Virginia Commonwealth University.

He cited the need for more precise dating of phenophases. A phenophase is the timing and duration of life history events, such as leaf opening, flowering, leaf fall, etc.

Mr. Barry W. Fox* Amelia, VA., high school teacher, showed an excellent series of color slides of species native to Virginia. Mr. Chris A. Pague* was meeting recorder of projects during the round-table.

Members and friends in attendance at the VaHS meeting came from: Amelia, Bedford, Farmville, Harrisonburg, Loudoun Heights, Portsmouth, Radford, and Richmond, VA. **N O T I C E** The next VaHS Meeting will be: Saturday, 13 OCTOBER 1979 at: LONGWOOD COLLEGE FARMVILLE, VA

Dr. Donald A. Merkle** Dep't of Natural Sciences will be the host. (FJT)

The Next Meeting is at

LONGWOOD COLLEGE
FARMVILLE, VA

13 OCTOBER 1979

DETAILS WITH VaHS-B//90!

HIGHLIGHTS OF THE RECENT VaHS MEETING (continued):

Besides the excellent papers, the Madison University meeting provided a round table on short or long-term herpetology projects that might be done by Virginia students. Dr. Elwood Fisher** VaHS Director and host for the VaHS meeting, was chairman of the roundtable. Among the ideas suggested were:

- (1) Nutritional value of gelatin in amphibian egg masses.
- (2) Algae in relation to amphibian egg masses.
- (3) Frog calls in VA: the need for taped calls.
- (4) Adopt-a-county and adopt-a-species VaHS projects (see B #88).
- (5) Effects on herpetiles of heating a pond or a section of a pond.
- (6) Herpetofauna of areas where clear-cutting of timber is regularly practiced; effects.
- (7) Amphibian predators.
- (8) Herpetile behavior.
- (9) Hognosed snakes: occurrence of melanism.
- (10) Egg brooding in Va salamanders: Is one female brooding her own clutch or is it a communal activity?
- (11) Do the following occur in Virginia ?
 - (a) green anole (SE);
 - (b) Dwarf salamander
 - (c) mole salamander
 - (d) Blanchard's treefrog (SW Va.).

Continued at top of next column.

- (12) Any new records for:
 - (a) hellbender
 - (b) greater siren
 - (c) mudpuppy
 - (d) waterdog, and
 - (e) amphiuma.
- (13) Treefrog populations in relation to ice-storm damage (tree-falls as new hiding-places for treefrogs?
- (14) Distribution of Hyla versicolor and Hyla chrysoscelis in VA.

Attention was called to existing literature on a number of these projects, notably 2 and 5. Effects of heating Parr Pond near Aiken, S.C. on resident yellow-bellied turtles (C. scripta scripta) is well documented by Dr. J. Whitfield Gibbons, et al., the Savannah River Ecology Laboratory (U.of Georgia).

Mr. Chris A. Pague* Portsmouth, VA., has agreed to prepare "FROGS of VA." as a special VaHS BULLETIN. We hope this may be ready for distribution in early 1980. "Salamanders of VA" is to follow and may be done by a VaHS team - Joe Mitchell* and Chris Pague*.

At present, Coordinators Tobey and Mitchell are at work on the first special Va. Herpetological Survey publication: distribution maps and Va. bibliography on reptiles and amphibians with credit to all collections and curators particularly, as well as individual participants.

Ophidiophobia Clinics: See "Afraid of Snakes ?" by Larry van Goethem, pp 17-19 NATIONAL WILDLIFE magazine June-July 1979 published by the National Wildlife Federation 1412 16th Street NW Washington, D.C. 20036

Dr. Thomas H. Krakauer**, Director of the Roanoke Valley Science Museum was named "Conservation Educator of the Year 1978" by the Virginia Wildlife Federation and received his award on 21 October '78 in Alexandria, VA. + + +

Dr. Krakauer is the vice president of the Virginia History and Museum Federation (VHMF) succeeding Ms. Elizabeth S. McKemie who became VHMF president on 1 December 1978. FJT

Question: Is melanism in snakes, at least, a device to make the animal a more efficient heat receiver ? (Both black snakes range out of hibernation in NE earlier in the spring than other species of lighter coloration. What about the melanism in Timber rattlers and the hog-nosed snake ? If it increases as the distribution extends northward it may be an adaptation to the colder mountainous habitat -- ? Any comments ? Solar collectors are painted black, as a general rule.)

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LETTERS, COMMENTS, IDEAS:

Mt. Olive, N.C.

"The recent flooding in many of the southeastern states brings to mind a question that has played on my mind for many years, but one for which I have never been given a logical answer.

With complete flooding of many swamp and river bottoms and surrounding areas, for extended periods, and involving cold air and water temperatures -- how do reptiles, such as snakes or lizards, that don't seem to be able to use cutaneous respiration -- survive? I am aware that many species of frogs, turtles, and salamanders can survive under water by cutaneous respiration, but snakes/lizards caught underwater in hibernation for days at temperatures too cold for them to move, seemingly would perish -- yet apparently many must survive!

Could we have some response? -- letters to the VaHS-B -- on how Nature pulls such reptiles through these floods before the ground is really thawed out?

Your response welcomed.

Dr. A. J. Bullard* (DDS)
103 Smith Chapel Road
Mt. Olive, N.C. 28365

Editor's Note: It was a great pleasure to hear from Mr. Reid A. Dunn of Richmond, VA, as a result of the Richmond TIMES-DISPATCH article by Chris Darg in May 1978.

The late Dr. Doris M. Cochran, U. S. National Museum of Natural History spoke often of his older brother, Emmett R. Dunn, and gave me a copy of one of his early lists of VA amphibians and reptiles.

Also, Dr. G. Congdon Wood, a neighbor of mine in the Oakton, VA, area in the 1950's used to speak of E.R. Dunn and his work in Virginia. Many of his collecting records are reflected on the VaHS distribution maps and credited to him, by name, in the three-volume set of supporting records and literature sources. It was only natural that we noted E.R. Dunn's earlier contributions in VaHS-B No. 85, page 1, column 1.

----- FJT -----
"... I think the Bulletin is getting more and more interesting. Many thanks!"

(Dr.) Laurence E. Bayless*
Dep't of Biology
Concord College
Athens, WV 24712

* VaHS Member
** VaHS Director

A Two-header! (Box turtle)

"When I came home, he said he had a two-headed turtle said David Wayne Rice of his son David. "I didn't think he really meant it."

He did. David found the two-headed box turtle, about 2" in diameter, at the Rice home near Rt. 301 and Pearson's Corner Elementary School. "I don't know whether to call it 'it' or 'they'," David's mother said. It didn't bother David, a first grader, "I found him in my shed," he claimed. (From: The HERALD PROGRESS newspaper, Hanover, VA March 7, 1979, item sent in by Mr. Bill Gagnon*
Mechanicsville, VA 23111

A number of people are reflecting great concern over poisonous snakebites or other grave accidents involving exotic reptiles. Good summertime reading: THE SNAKE, by John Godey, paperback \$2.50 (Berkley) is a story focusing on the havoc wrought by an 11-foot black mamba when it succeeds in getting loose in N.Y.C's Central Park. Quick, light, short reading. Fiction for the hot days ahead! This is the 'China Syndrome' of herpetology -- portent of disaster.

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