

**A SURVEY OF THE HERPETOFAUNA OF
MONTGOMERY COUNTY, TENNESSEE**



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A SURVEY OF THE HERPETOFAUNA OF
MONTGOMERY COUNTY, TENNESSEE

An Abstract
Presented to
the Committee on Graduate Studies
Austin Peay State College

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in Education

by
Arthur Floyd Scott
August 1967

A survey of the herpetofauna of Montgomery County, Tennessee was conducted during 1966 and the first half of 1967, using standard methods of collection and preservation.

Fifty-seven of an expected sixty-six species were collected. Five unexpected forms were taken, representing new distribution records, and raising the total of forms known or assumed to occur in the county to seventy-one. The unexpected species were Ambystoma talpoideum, Hyla avivoca avivoca, Hyla gratiosa, Natrix erythrogaster neglecta, and Agkistrodon piscivorus leucostoma.

Presumed intergrades were observed in five species. This was considered to be due to the contiguity of major physiographic types within the county.

Neoteny was observed in one species, Ambystoma talpoideum.

With few exceptions the herptiles of Montgomery County were consistently taken from habitats typically utilized in other parts of their ranges. Except for Ambystoma talpoideum and Hyla gratiosa which were taken in upland areas, the occurrence of unexpected forms is thought to be associated with the presence of appropriate habitats in the Cumberland River Valley.

A SURVEY OF THE HERPETOFAUNA OF
MONTGOMERY COUNTY, TENNESSEE

A Thesis
Presented to
the Committee on Graduate Studies
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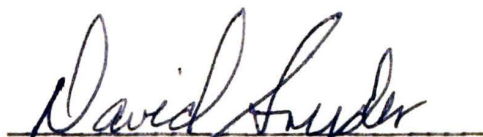
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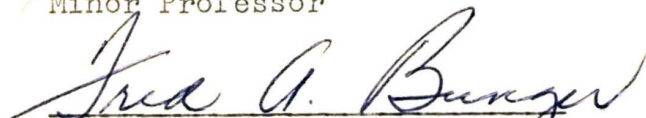
To the Committee on Graduate Studies:

I am submitting herewith a thesis written by Arthur Floyd Scott entitled "A Survey of the Herpetofauna of Montgomery County, Tennessee." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts in Education, with a major in Biology.


Major Professor

We have read this thesis and
recommend its acceptance:


Minor Professor


Third Committee Member

Accepted for the Committee:


Director of Graduate Studies

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

Available information concerning the amphibians and reptiles of Middle Tennessee is scanty compared to that of East and West Tennessee. While researchers have been attracted by the herpetofauna of the Great Smoky Mountains to the east and Reelfoot Lake to the west, the central portion of the state and especially the Western Highland Rim physiographic section, have remained practically unworked.

Statement of the Problem

It was the purpose of this study (1) to inventory the herpetofaunal resources of Montgomery County, Tennessee; (2) to augment and organize the collection of amphibians and reptiles from Montgomery County, Tennessee to be available for inspection by later researchers, students, and teachers; (3) to construct keys to the orders, families, genera, species, and subspecies of the amphibians and reptiles occurring in Montgomery County, Tennessee; and (4) to collect incidental data relating to the life histories of the forms encountered.

Importance of the Study

This study is important to both the future researcher

and student of local herpetology. It will benefit the researcher by serving as a basis for any later studies that might be conducted on any amphibian or reptile of Montgomery County or contiguous areas. To the student, it will serve as a ready source of information that deals directly with the local herpetofauna.

Limitations of the Study

The study was confined to Montgomery County, Tennessee, although very little collecting was conducted in the Fort Campbell Military Reservation. The study was conducted between January 1, 1966 and July 31, 1967. Detailed consideration of taxonomic characters was restricted to cases of suspected intergradation.

Nomenclature

Throughout this manuscript, scientific and common names of species follow those of Conant (1958), except where otherwise indicated. Order and family names are as used by Schmidt (1953).

Definition of Terms

Certain terminology used in this paper is somewhat restricted in its usage. To avoid possible misinterpretation, the following words are defined.

Herptile - any amphibian or reptile.

Herpetofauna - a collective term referring to the complex of amphibians and reptiles inhabiting any given area.

Intergrade - an individual that is intermediate in its taxonomic characteristics between subspecies of a species.

Neoteny - the failure of an animal to metamorphose before reaching sexual maturity, due to environmental conditions, but retaining the ability to do so if the retarding environmental conditions are corrected (Goin and Goin, 1962).

Literature Review

Although comparatively little has been written about the herpetofauna of Middle Tennessee, the accounts that have appeared are significant ones and should be mentioned here. Only five papers have been published that consider the herptiles in whole or in part. Two of these (Shoup, et al., 1941, and Gentry, 1941) deal with the herpetofauna of the watersheds of the Obey River and adjacent streams of the eastern Highland Rim and Cumberland Plateau. A paper by Sinclair (1950), based on two years of collecting, consists of an annotated list of seventeen species of salamanders, mainly from Middle Tennessee. Gentry (1955 and 1956) published in two parts an annotated check list of the amphibians and reptiles of Tennessee that has become the standard reference of its type. The most recent report

(Ashton, 1967) is a consideration of the Caudata of Davidson County.

Other works concerning a particular genus or species in Middle Tennessee are as follows: Mittleman (1942), Sinclair (1951a and b), Barr (1952), Dunlop (1960), Sinclair (1965), and Brigham, Gnilka and Dimmick (1967).

CHAPTER II

DESCRIPTION OF THE STUDY AREA

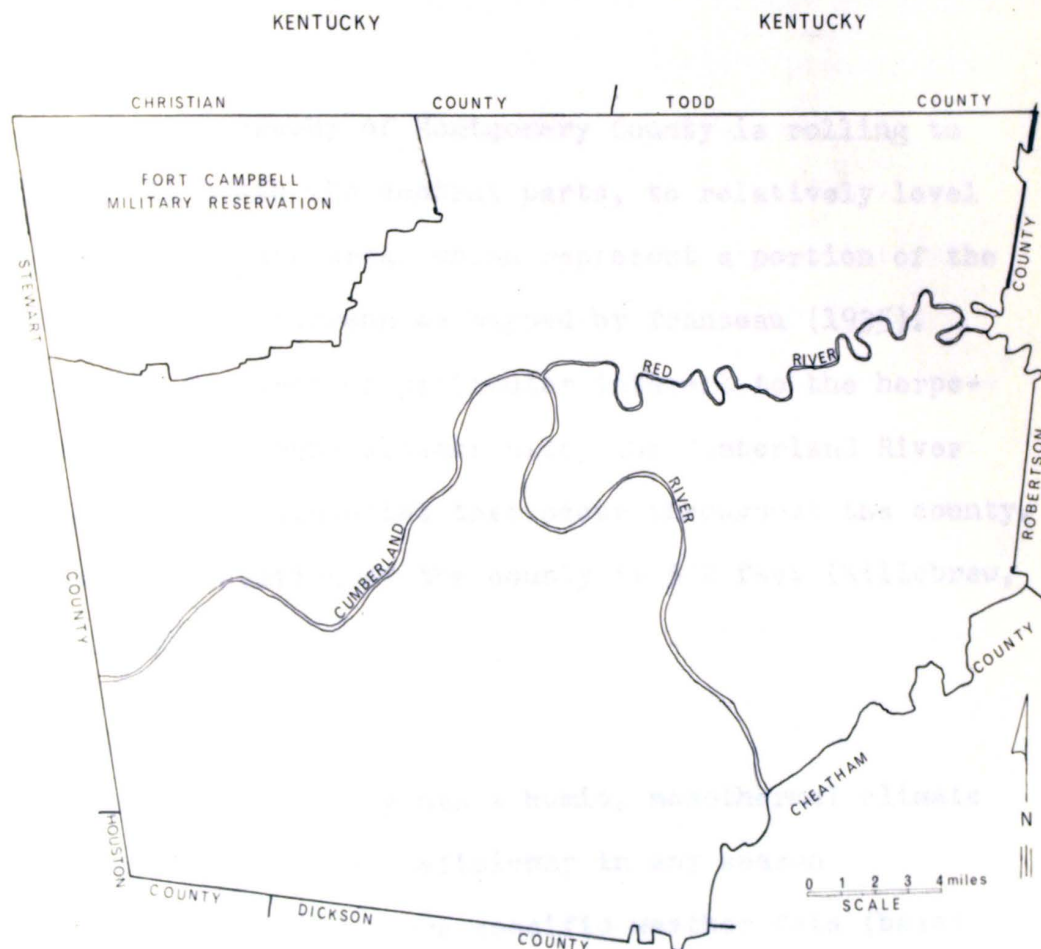
Montgomery County, which comprises 347,502 acres, is located in the northwest section of Middle Tennessee (Figure 1) and is bordered on the west by Stewart County, on the south by Houston and Dickson Counties, and on the east by Cheatham and Robertson Counties. To the north, the bordering counties are Christian and Todd, Kentucky (Figure 1).

Physiography

Physiographically, Montgomery County is on the northwestern Highland Rim Section of the Interior Low Plateau Province (Fenneman, 1938). "Geologically, the county is on the upper or Lithostrontion bed of the silicious group of lower Carboniferous formation" (Killebrew, 1870). It is primarily underlain by St. Louis and Warsaw limestones, with some deposits of Ste. Genevieve limestone occurring in areas of the northern quarter (Hardeman, et al., 1966). Outcroppings of these formations can be observed along the rivers and streams.

The county is covered with red soils and white chert (Wilson, 1958), plus alluvial deposits along the Cumberland and Red Rivers that drain the region (Figure 1). The larger

A



B

Figure 1. (A) Location of Montgomery County in Middle Tennessee (B) Map of Montgomery County showing major rivers and bordering counties.

Cumberland enters from the southeast and flows northwest to Clarksville where it turns and runs southwest to Stewart County. Red River enters the county from the northeast at Port Royal and flows to its effluence into the Cumberland River at Clarksville.

Topography

The topography of Montgomery County is rolling to hilly in the south and central parts, to relatively level in certain northern areas which represent a portion of the Kentucky prairie barrens as mapped by Transeau (1935). Topographic features of particular interest to the herpetologist are the many sloughs along the Cumberland River and the numerous sinkholes that occur throughout the county. The average elevation of the county is 500 feet (Killebrew, 1870).

Climate

Montgomery County has a humid, mesothermal climate with little or no water deficiency in any season (Thorntwaite, 1948). More specific weather data (based on records from the Clarksville weather station) are as follows: The mean annual precipitation is 48 inches, with a maximum in January and a minimum in September. The mean temperature for January, normally the coldest month, is 39.3 degrees fahrenheit, while the mean for July, normally the

hottest month, is 79.7. Mean dates for the first and last killing frost are October 26 and April 3, respectively.

Vegetation

Montgomery County is located within the Western Mesophytic Forest Region of the Deciduous Forest Formation (Braun, 1950). Its woody vegetation consists principally of oaks and hickories with mesophytic and hydrophytic species occupying streambank and bottomland habitats (Duncan, 1965). The prairie barrens have been practically eliminated by cultivation, but were reported by Shanks (1958) to have been "floristically similar to the prairies of the middle west, with relatively few plants of coastal plain affinities, and very infrequent occurrence of woody mesophytes." Killebrew (1870) lists the following as the dominant plants of this region: " . . . black jack oak, red oak, post oak, hickory, hazle, sumac, gum, dogwood, and brush broom."

CHAPTER III

MATERIALS AND METHODS

Collecting

General collecting methods for both amphibians and reptiles included: seining; overturning logs, stones and other debris in all types of likely habitats; and scouting both graveled and hard-surfaced roads at night, especially during or after periods of rain. Special efforts, such as setting trotlines and wading the shallows of the two major river systems, were employed in collecting the more aquatic salamanders of the genera Cryptobranchus and Necturus. Frogs were taken by hand and by dip nets. Funnel traps were used to capture turtles. Lizards and some snakes were collected by hand and in some cases by the use of .22 caliber bird shot discharged from a smoothbore gun. Venomous and pugnacious snakes were collected with the aid of snake sticks similar to those described by Conant (1958). Figure 2 shows some of the collecting equipment used.

Captured specimens were placed with a field label into collecting jars or bags, sufficiently ventilated and supplied with moisture, and then transported to the lab where they were housed until preserved.

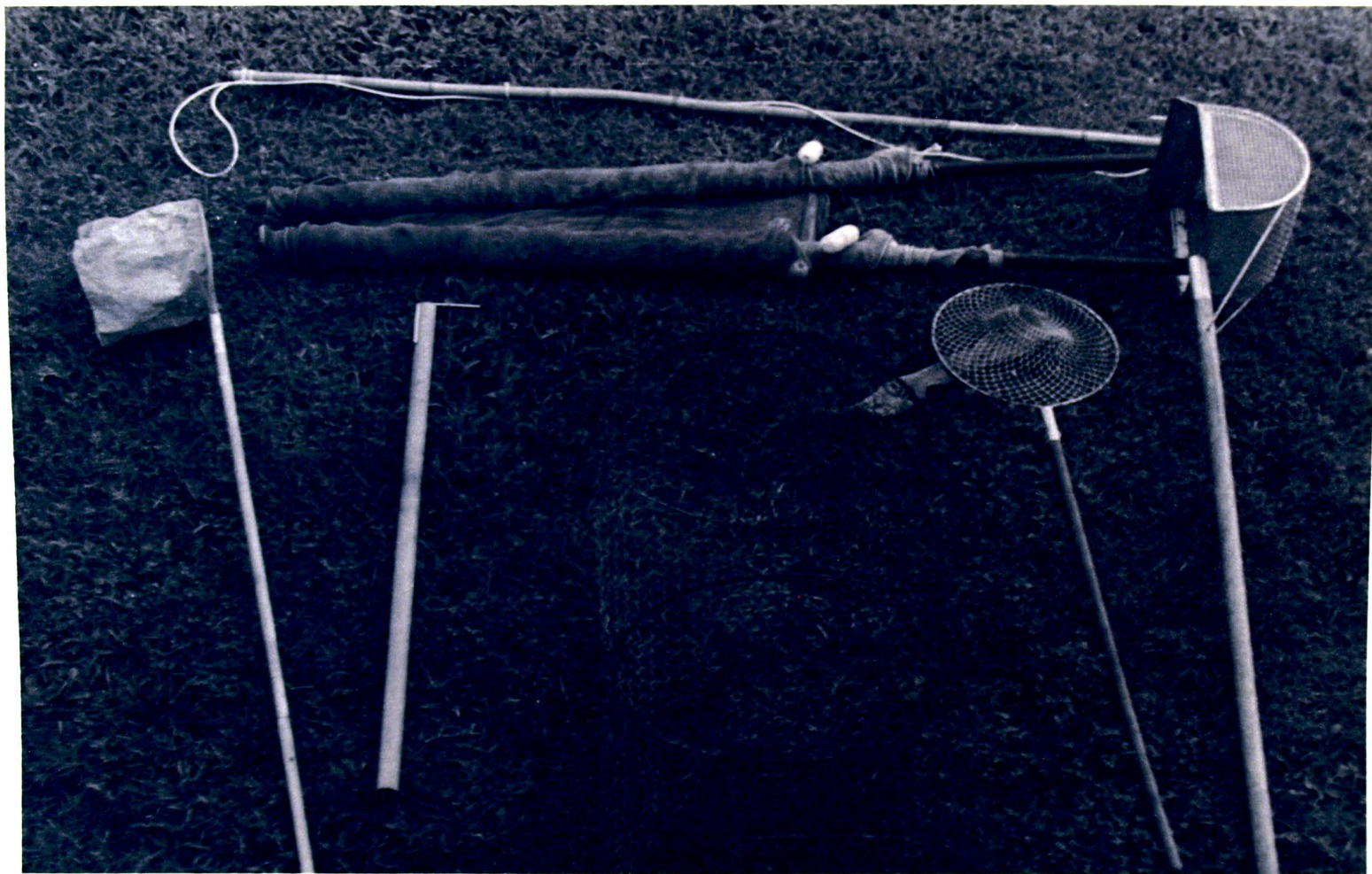


Figure 2. Equipment used in collecting.

Killing, Fixing and Preserving

Various methods were used to kill animals. Except for hellbenders and mudpuppies, which usually died from hook wounds, most amphibians and some small reptiles were immersed in fifty-five percent ethanol until dead. Larger reptiles and some amphibians were killed by freezing or with ether.

All animals were fixed and preserved in ten percent formalin. Large specimens were injected with formalin to preserve the internal organs. Amphibians, turtles, and lizards were placed in dissecting trays, pinned in a natural position, immersed in preservative and left to harden. When fixed (hardened in the desired position), they were transferred to glass jars or plastic containers and again immersed in formalin. Upon injection, snakes were promptly coiled into glass jars or plastic containers, which were then filled with the preservative.

Once in permanent storage containers, the specimens were given permanent labels. These labels included at least the following information (if known): (1) location (state, county, nearest town or post office); (2) collector's name; (3) date of collection; (4) specimen number (corresponding to the number in the permanent record book); and (5) scientific and common name. Additional information

relating to measurements, habitat type, etc., appeared when of special interest.

Data Recording

Data acquired from major field trips were recorded on special collection data sheets. These included date and time of day, location, collector, sex and age of specimens, habitat type, collection methods, and remarks of special interest. A brief summary of each major collecting trip was recorded in a field notebook. Later the information on the collection data sheets was transferred to a permanent record book in which each specimen was given a number. Data relating to specimens acquired other than on major field trips were entered into the record book directly. Toward the end of the study, a portion of the information in the permanent record book (specimen number, date, collector, and source of each collection) was assorted according to taxonomic groupings and transferred to a catalog, which also contains maps showing the approximate locations of all records for each form encountered in Montgomery County.

Besides collections affected in the course of this study, specimens in the Austin Peay State College Museum of Zoology were surveyed and the data incorporated into the findings.

All specimens and data collected during this study are now in the care of the Biology Department, Austin Peay State College.

CHAPTER IV

RESULTS

Of the sixty-six species of amphibians and reptiles expected in Montgomery County, based primarily on the range information of Gentry (1955, 1956) and Conant (1958), fifty-seven were collected. Five additional unexpected species were taken, thus establishing new distribution records outside their previously reported ranges and raising the total of expected forms for the county to seventy-one. Of all species expected and collected, thirty-three were amphibians and thirty-eight reptiles. Five orders, eighteen families, and forty-four genera were represented. Forty-four of the seventy-one expected species were recognized subspecies; five of them appeared to be intergrades. The best-represented order was Serpentes with twenty-two species, followed closely by Caudata with eighteen. The best-represented family was Colubridae with nineteen species, surpassing the next-best-represented one, Plethodontidae, by ten species. Ambystoma and Rana were the best represented genera with five species each. A comparison by orders of the number of species expected and the number collected appears in Table I.

TABLE I

A COMPARISON BY ORDERS OF THE NUMBER OF SPECIES OF
AMPHIBIANS AND REPTILES EXPECTED AND COLLECTED
IN MONTGOMERY COUNTY, TENNESSEE

Order	No. Expected	No. Collected	No. expected but not collected	No. collected that were not expected	Revised total
Caudata	17	15	3	1	18
Salientia	13	14	1	2	15
Chelonia	11	8	3	-	11
Sauria	5	4	1	-	5
Serpentes	20	21	1	2	22
Totals	66	62	9	5	71

Range Extensions

The five unexpected species collected were Ambystoma talpoideum (mole salamander), Hyla avivoca avivoca (western bird-voiced treefrog), Hyla gratiosa (barking treefrog), Natrix erythrogaster neglecta (copper-bellied water snake), and Agkistrodon piscivorus leucostoma (western cottonmouth). They represent range extensions of from about ten to 130 miles. Following is a discussion of each, in which distance is given in air miles.

Until Brigham, Gnilka, and Dimmick (1967) reported a population of Ambystoma talpoideum from Putnam County, only one record of its existence in Middle Tennessee had been reported (Gentry, 1955). The population discovered during this study was about 100 miles west of the Putnam County record and approximately fifty miles east of the West Tennessee population as mapped by Conant (1958). However, it was only about ten miles north of the "uncertain boundary" of the eastward segment of the range as mapped by Shoop (1964). Figure 3 shows the Montgomery County record in relation to the above range data.

Apparently, based on Conant (1958), Smith (1966), and Gentry (1955), Hyla avivoca avivoca has not previously been definitely recorded east of the Tennessee River in Tennessee. The specimens collected during this investigation were taken

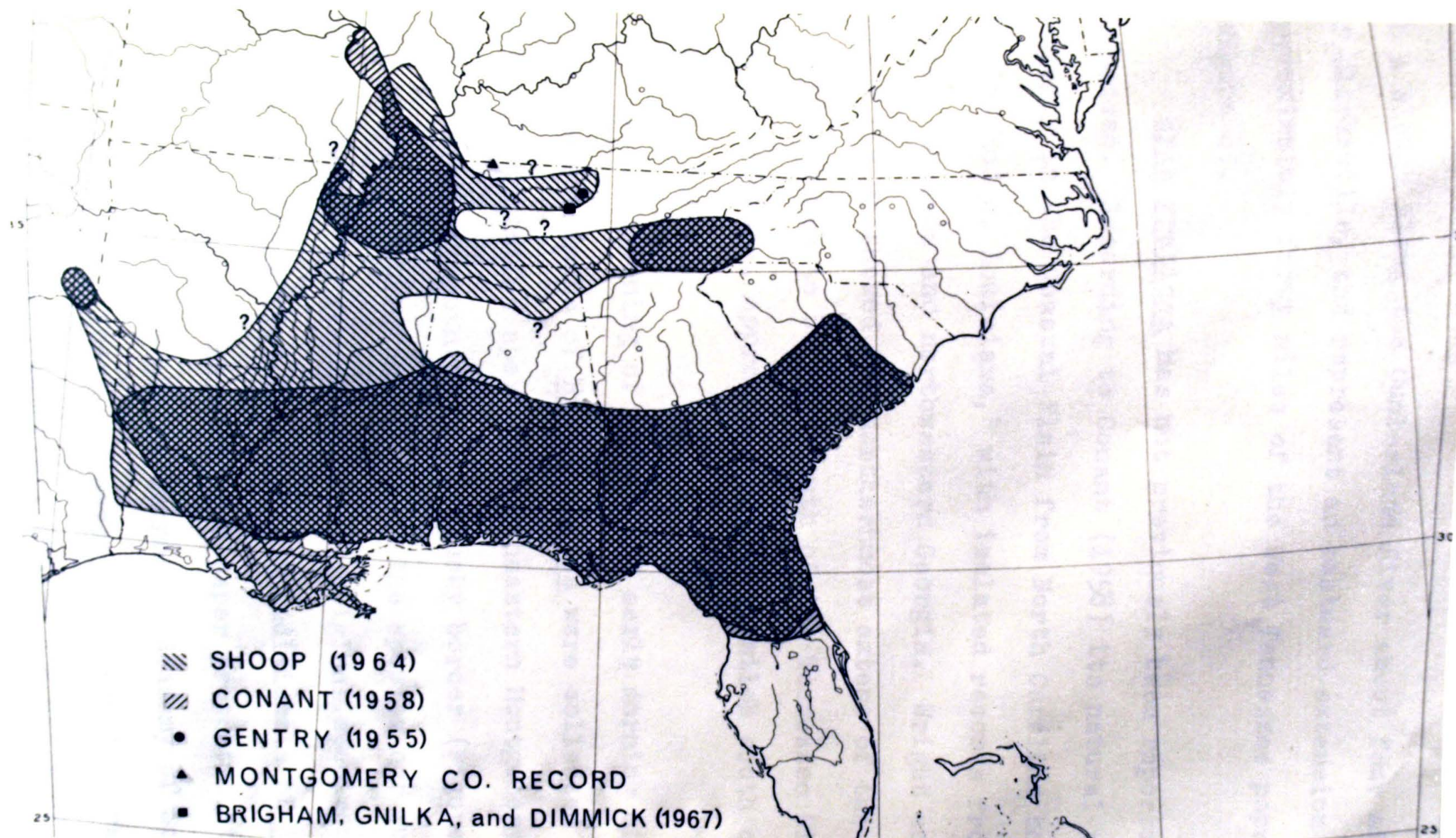


Figure 3. Montgomery County record of Ambystoma talpoideum relative to the range data of Shoop (1964), Conant (1958), Gentry (1955), and Brigham, Gnilka, and Dimmick (1967).

in a slough along the Cumberland River about four miles west of Clarksville, and represent an eastward extension of approximately forty miles of the West Tennessee population (Figure 4).

Hyla gratiosa has not previously been reported from Tennessee. According to Conant (1958) its natural range is "chiefly in the Coastal Plain from North Carolina to s. Florida and e. Louisiana," with isolated records from east central Alabama and northwestern Georgia. Wright and Wright (1949) showed the northernmost extent of the range of this species to be just south of the Tennessee River in northern Alabama, approximately thirty miles south of the Tennessee border.

On the evening of May 16 and early morning of May 17, 1966, two specimens of Hyla gratiosa were collected from locations ten miles apart in northeastern Montgomery County, about six miles south of the Kentucky border (Figure 5). Since I was neither familiar with the species nor suspected its occurrence so far north, these original specimens were tentatively identified as corpulent individuals of Hyla cinerea and reported as such in a paper presented at the seventy-sixth meeting of the Tennessee Academy of Science. (Scott and Snyder, 1967). However, upon further evaluation of the preserved material, and on the basis of another individual collected on May 26, 1967, in the same locality

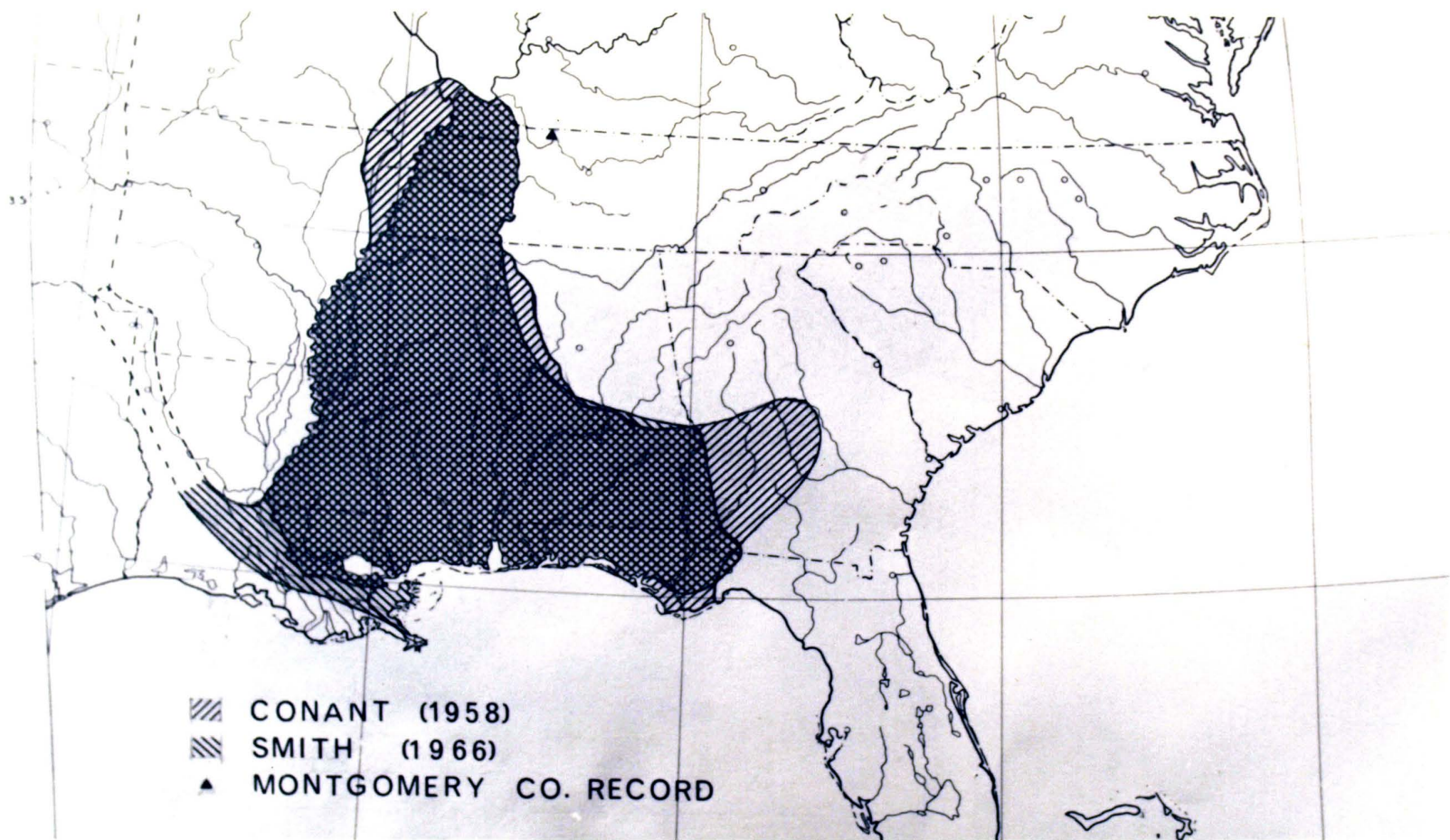


Figure 4. Montgomery County record of Hyla avivoca avivoca relative to the range as mapped by Conant (1958) and Smith (1966).

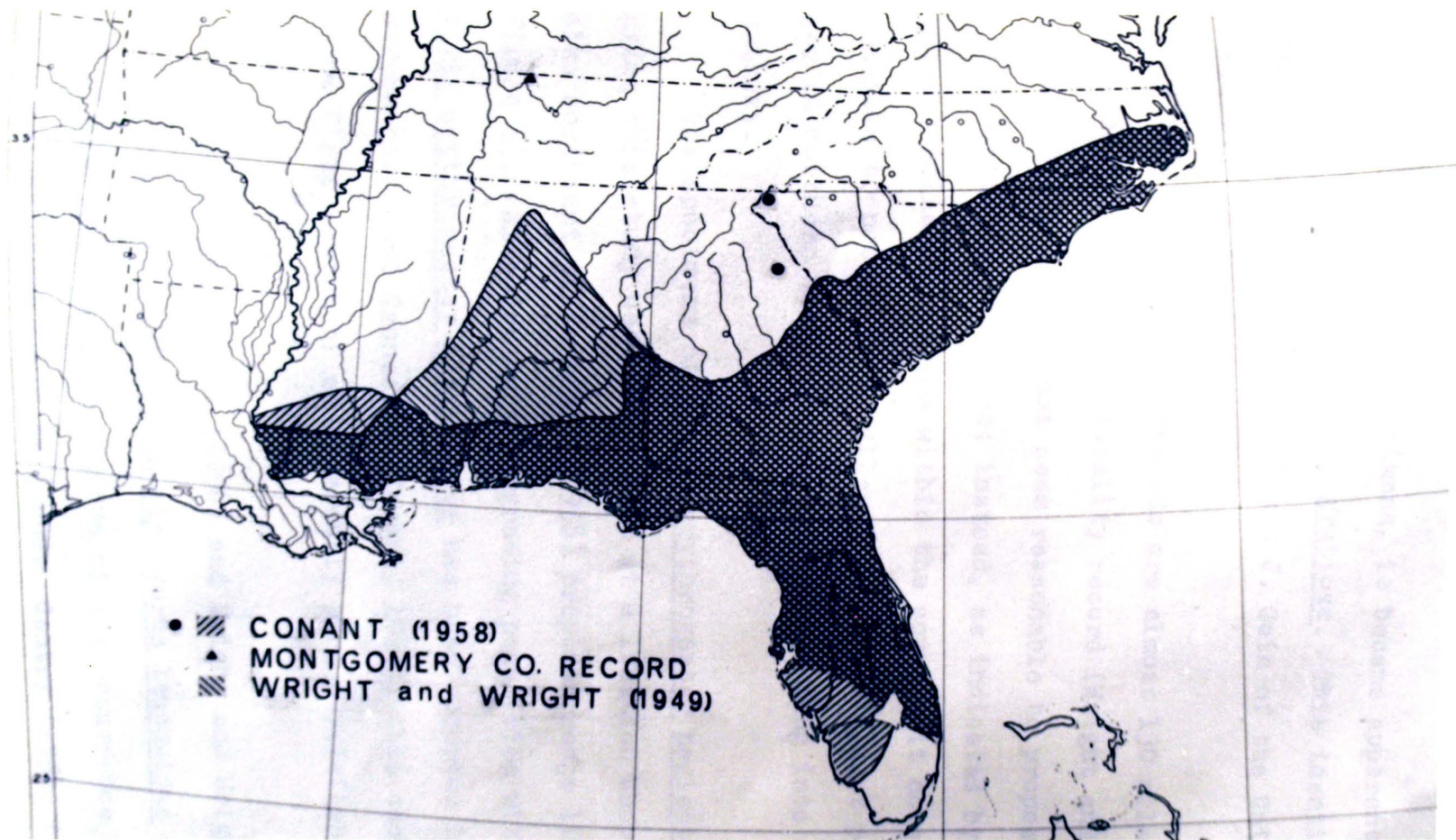


Figure 5. Montgomery County record of Hyla gratiosa relative to the range as mapped by Conant (1958) and Wright and Wright (1949).

as one of the original specimens, it became apparent that all three specimens were Hyla gratiosa. This identification was confirmed by Dr. Coleman J. Goin of the University of Florida.

Since the present records are almost 130 miles north of the nearest published locality record (Wright and Wright, 1949), it does not seem reasonable to propose a continuous range extension; instead, as indicated by the separate collection sites within the county, it does seem plausible to postulate a well-established disjunct population in northern Tennessee, possibly extending into southern Kentucky.

The specimens of Natrix erythrogaster neglecta taken during this study were discovered at a location about sixty miles southeast of Conant's (1958) proposed range limits (Figure 6). Although an intergrading population with Natrix erythrogaster flavigaster has been reported in extreme northwest Tennessee (Conant, 1949), this seems to be the first report of an apparently pure population in the state.

Even though Conant (1958) and Wright and Wright (1957) show the range of Agkistrodon piscivorus leucostoma extending into Middle Tennessee, no records of its occurrence east of the Tennessee River could be found. Gentry (1956) lists the subspecies from West Tennessee only. The specimens

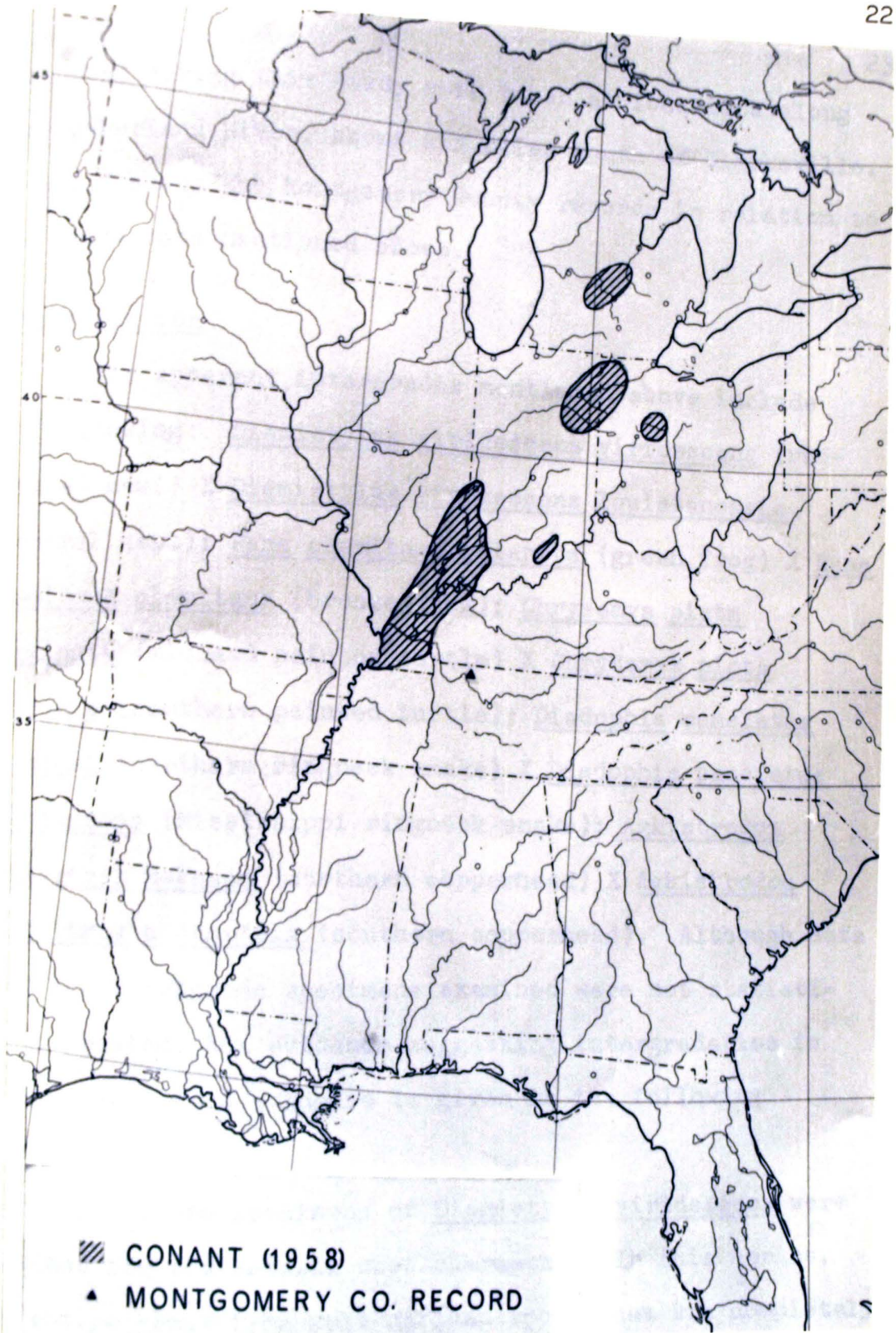


Figure 6. Montgomery County record of *Natrix erythrogaster neglecta* relative to the range as mapped by Conant (1958).

collected during this study were taken at locations along the Cumberland River, about six miles south of Clarksville. Figure 7 shows the Montgomery County records in relation to the range data mentioned above.

Intergradation

The apparent intergrades mentioned above include the following: Diemictylus viridescens viridescens (red-spotted newt) X Diemictylus viridescens louisianensis (central newt); Rana clamitans melanota (green frog) X Rana clamitans clamitans (bronze frog); Chrysemys picta marginata (midland painted turtle) X Chrysemys picta dorsalis (southern painted turtle); Diadophis punctatus edwardsi (northern ringneck snake) X Diadophis punctatus stictogenys (Mississippi ringneck snake); Agkistrodon contortrix mokeson (northern copperhead) X Agkistrodon contortrix contortrix (southern copperhead). Although data from the intergrade specimens examined were not statistically treated, the evidence suggesting intergradation is persuasive. This evidence is given in the following paragraphs.

Forty-one specimens of Diemictylus viridescens were examined for the lateral spot character. In this series, the entire gamut from well defined spots that are completely bordered by black (typical of Diemictylus viridescens

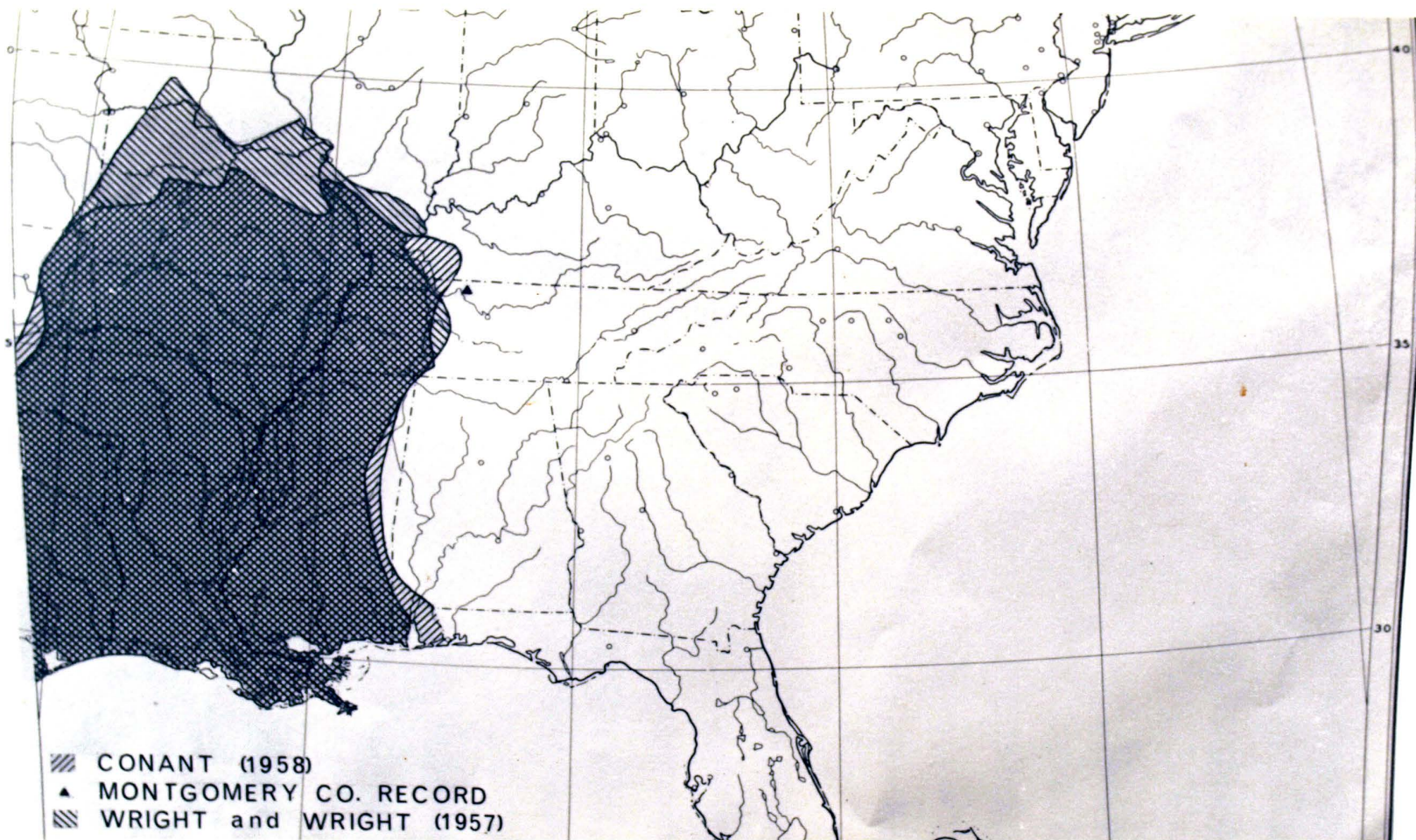


Figure 7. Montgomery County record of Agkistrodon piscivorus leucostoma relative to the range as mapped by Conant (1958) and Wright and Wright (1957).

viridescens) to no spots (typical of Diemictylus viridescens louisianensis) was observed. However, the majority of the specimens examined tended toward Diemictylus viridescens viridescens.

Bronze frogs may be distinguished from green frogs by the dark wormlike markings present on the venter (Conant, 1958). Of the five specimens taken in Montgomery County, two had no pigment on the venter, two had pigmented venters, and one had pigment that was concentrated at the edges of the venter.

All specimens of Chrysemys picta examined during this investigation were typical of Chrysemys picta marginata, except for the presence of a thin, middorsal, red stripe, which is characteristic of Chrysemys picta dorsalis. A similar intergrade was described by Smith (1961) from extreme southern Illinois.

Blanchard (1942) lists the following as distinguishing characteristics of Diadophis punctatus stictogenys and Diadophis punctatus edwardsi:

- | <u>D. p. stictogenys</u> | <u>D. p. edwardsi</u> |
|--|---------------------------------|
| 1. Seven upper labials. | 1. Eight upper labials. |
| 2. Generally fewer than 145 ventrals. | 2. Usually 145 to 170 ventrals. |
| 3. Neck ring narrow and | 3. Uninterrupted neck ring. |
| 4. Belly more or less irregularly black-spotted. | 4. Generally unspotted belly. |

In eleven specimens of Diadophis punctatus from Montgomery County, six had 7+7 upper labials, three had 8+8, and one had 7+8. The mean number of ventral scales among these snakes is 151.4 with a range of 139 to 161. Spotted venters were present in eight, while two had no spots ventrally. All had a complete neck ring.

Northern and southern copperheads differ in color tone and in width of the dorsal crossbands at the midline (Wright and Wright, 1957). In four specimens from Montgomery County, two approached the darker color of Agkistrodon contortrix mokeson. The average widths of the dorsal crossbands at the midline for each of these were 2.6 (typical of Agkistrodon contortrix contortrix) and 3.3 scales (typical of Agkistrodon contortrix mokeson). The remaining two were similar to the paler Agkistrodon contortrix contortrix, with average dorsal crossband widths of 2.4 (typical of Agkistrodon contortrix contortrix) and 3.3 scales (typical of Agkistrodon contortrix mokeson).

Neoteny

Apparent neoteny was observed in one species, Ambystoma talpoideum. Several large larvae (larger than normal adults) were collected from a woodland pond in early February, 1966 and placed in a wire cage submerged in tap water. The following morning a small fragile mass of eggs

was discovered attached to the wire. This find prompted the dissection of two larvae, both of which contained fully developed eggs. The remaining larvae were placed in an aquarium filled with tap water. Within ten days the gills had begun to shorten and by the end of the third week all had transformed into normal adults. Other reports of neoteny in this species have been made by Carr and Goin (1943) and Volpe and Shoop (1963).

CHAPTER V

DISCUSSION AND CONCLUSIONS

The diversity of habitats afforded by the physiography of Montgomery County, Tennessee renders this region a prime one for the existence of a wide variety of amphibians and reptiles. This is evidenced by the number of species collected during this study, which approaches one half of the state total as reported by Gentry (1956).

The herptiles of Montgomery County may be conveniently divided into three categories according to habitat utilization throughout their ranges: (1) species typical of lowland habitats of the Mississippi Embayment and Coastal Plain; (2) species typical of upland habitats of the Appalachian Highlands and the Interior Low Plateau; and (3) species occurring regularly in both lowland and upland habitats. About 50 percent of the forms considered during this study belong to the third category and were taken regularly in both types of habitats. Some 40 percent belong to the second category and were consistently taken from upland areas. The remaining 10 percent, including all those forms that represent new distribution records, belong to the first category, and were normally found in embayment-type habitats. However, two of this group, Ambystoma talpoideum and Hyla gratiosa, both

representing new distribution records, were collected only in upland habitats.

Based on evidence presented earlier, intergradation seems rather common in Montgomery County. Although of interest, this is not surprising due to the county's location in a region of interdigitation of upland habitats to the east and lowland habitats to the west. In a situation such as this, interbreeding and consequent genetic exchange would be expected. More data are needed, however, before the extent of the intergradation can be determined.

I cannot explain the presence of both normal adult and neotenic Ambystoma talpoideum in the same pond. Additional work on this population would be of value toward a fuller understanding of the life history of this species.

CHAPTER VI

SUMMARY

A survey of the amphibians and reptiles of Montgomery County, Tennessee was conducted during 1966 and the first half of 1967, using standard methods of collection and preservation.

Fifty-seven of an expected sixty-six species were collected. Five unexpected forms were taken, representing new distribution records, and raising the total of forms known or assumed to occur in the county to seventy-one. The unexpected species were Ambystoma talpoideum, Hyla avivoca avivoca, Hyla gratiosa, Natrix erythrogaster neglecta, and Agkistrodon piscivorus leucostoma. Five intergrading populations of upland and lowland races were encountered.

Neoteny was observed in one species, Ambystoma talpoideum, during the month of February.

The herptiles of Montgomery County fall into one of three categories according to typical habitat utilization throughout their ranges: (1) species typical of lowland habitats of the Mississippi Embayment and Coastal Plain; (2) species typical of upland habitats of the Appalachian Highlands and the Interior Low Plateau; and (3) species occurring regularly in both upland and lowland habitats.

With two exceptions, the occurrence of unexpected forms is thought to be associated with the presence of appropriate habitats in the Cumberland River Valley, these habitats connecting via that valley to more extensive and typical lowland habitats in the Ohio and Mississippi River Valleys. The contiguity of major physiographic types within the county accounts for the relatively large amount of inter-gradation observed.

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APPENDIX A

KEY TO THE ADULT FORMS OF AMPHIBIANS AND REPTILES OF MONTGOMERY COUNTY, TENNESSEE

The following is a key to the identification of the adult amphibians and reptiles of Montgomery County, Tennessee. It includes all species and subspecies collected during this study, as well as expected forms that were not taken.

The key has been designed for both live and preserved specimens, but to accurately identify any individual it is necessary to have the animal in hand. Since color fades in preserved specimens, it has been used sparingly as a distinguishing characteristic. Instead, lasting traits such as body proportions and scale characters have been used whenever possible.

This key is not intended to be original in its contents, for during its preparation I have drawn freely from characters used in other keys. Its construction and arrangement of characters, however, reflect my opinion of the local populations. Any errors herein are solely my responsibility.

Scientific terminology is used in this key as defined by Peters (1964).

An asterisk (*) appears following the scientific name of those forms not yet collected from Montgomery County, but assumed to occur there.

Key to the Classes

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- Skin with scales; fingers and toes (if present) provided with claws Class Reptilia p. 44
- Skin without scales; fingers and toes (if present) without claws Class Amphibia p. 38

Key to the Orders of Adult Amphibia of Montgomery County, Tennessee

- Tail present; back legs (if present) only slightly larger than front legs (Salamanders) Order Caudata p. 38
- Tail absent; back legs markedly larger than front legs (Frogs and Toads) Order Salientia p. 41

Key to the Adult Caudata of Montgomery County, Tennessee

- 1. Both front and back legs present 2
- 1a. Back legs absent (Family Sirenidae, Western Lesser Siren) Siren intermedia nettingi Goins*
- 2(1). Four toes on each hind foot. 3
- 2a. Five toes on each hind foot. 4
- 3(2). Aquatic, with external gills; total length to 17 inches (Family Proteidae, Mudpuppy).
. Necturus maculosus maculosus Rafinesque
- 3a. Terrestrial, no external gills; total length less than four inches (Family Plethodontidae, Four-toed Salamander). Hemidactylium scutatum Schlegel*
- 4(2a). Body flattened and longitudinally wrinkled; one obscure gill slit on each side of neck; toes with free fleshy margins; total length to 24 inches (Family Cryptobranchidae, Hellbender).
Cryptobranchus alleganiensis alleganiensis Daudin

- 4a. Body not flattened or longitudinally wrinkled; no gill slits; toes without fleshy margins. 5
- 5(4a). Costal grooves present 6
- 5a. Coastal grooves absent (Family Salamandridae, Newt
. Diemictylus viridescens viridescens
Rafinesque X D. v. louisianensis Wolterstorff
- 6(5). Nasolabial grooves present (use lens) (Family
Plethodontidae). 11
- 6a. Nasolabial grooves absent (Family Ambystomidae). 7
- 7(6a). Dorsal or lateral pattern of bold crossbands or spots present; flecks and lichen-like markings not present 9
- 7a. Dorsal or lateral pattern of bold crossbands or spots absent; bluish-white flecks or grayish lichen-like markings sometimes present 8
- 8(7a). Costal grooves 10 when counting one each in axilla and groin; head distinctly wider than neck; bluish-white flecks sometimes present on back and sides (Mole Salamander). . . Ambystoma talpoideum Holbrook
- 8a. Costal grooves usually 14 when counting one each in axilla and groin; neck as wide or wider than head; grayish lichen-like markings sometimes present over entire body (Small-mouthed Salamander)
. Ambystoma texanum Matthes
- 9(7). Dorsal pattern of four to eight silvery crossbands (sometimes incomplete) on dark background (Marbled Salamander). . . Ambystoma opacum Gavenhurst
- 9a. Not as above. 10
- 10(9a). Two dorsolateral rows of irregularly spaced yellow spots, those on the head often orange-red; venter and lower sides unspotted (Spotted Salamander).
. Ambystoma maculatum Shaw
- 10a. Irregularly spaced and shaped yellow markings on back, tail, sides and venter (Eastern Tiger Salamander)
. Ambystoma tigrinum tigrinum Green

- 11(6). Light line from eye to angle of jaw; tail triangular in cross section (Spotted Dusky Salamander) Desmognathus fuscus conanti Rossman
- 11a. No light line from eye to angle of jaw; tail not triangular in cross section 12
- 12(11a). Tongue with a central pedicel, free all around; dorsal ground color yellow, brown, orange or red; venter yellow or white 13
- 12a. Tongue attached in front, free behind and at sides; dorsal ground color black, gray or brown, sometimes with a reddish-brown band extending from the head to the tip of the tail 18
- 13(12). Vomerine and parasphenoid teeth continuous; body relatively stout; tail length (if complete) usually less than 50 percent of total length. 14
- 13a. Vomerine and parasphenoid teeth not continuous; body relatively slender; tail length (if complete) usually more than 50 percent of total length. . 15
- 14(13). Body large (total length up to six inches); dorsal and lateral surfaces profusely spotted with irregular, rounded, black spots; ground color red or reddish orange (Northern Red Salamander) Pseudotriton ruber ruber Sonnini
- 14a. Body small (total length less than four inches); dorsum with a wide light band extending from head to tip of tail, bordered laterally by black ground color (No common name). . Eurycea aquatica Rose and Bush*
- 15(13a). Color on sides of tail tending to form many dark vertical bars (herringbone design) (Long-tailed Salamander) . . Eurycea longicauda longicauda Green
- 15a. Color on sides of tail not tending to form any dark vertical bars. 16
- 16(15a). Ground color red, orange or yellow-orange with numerous black spots or dashes scattered over back and sides (Cave Salamander) Eurycea lucifuga Rafineaque

- 16a. Ground color some shade of yellow or brown; a broad middorsal light band (sometimes stippled with black) down back and tail, bordered laterally by two dark lines. 17
- 17(16a). Lateral dark lines covering entire side and extending to tip of tail; animal aquatic. Eurycea aquatica Rose and Bush*
- 17a. Lateral dark lines located dorsolaterally and tending to break up into dots or dashes on tail; aquatic or terrestrial. Eurycea bislineata rivicola Mittleman.
- 18(12a). With many silvery-white flecks scattered over sides and back; total length $4 \frac{3}{4}$ to $6 \frac{3}{4}$ inches (Slimy Salamander). Plethodon glutinosus glutinosus Green
- 18a. No silvery-white flecks scattered over sides and back; total length $2 \frac{1}{2}$ to $3 \frac{1}{2}$ inches (Zigzag Salamander) Plethodon dorsalis dorsalis Cope

Key to the Adult Salientia of

Montgomery County, Tennessee

1. Parotoid glands present; horny tubercles on heel of each hind foot. 2
- 1a. Parotoid glands absent; no horny tubercles on heel of each hind foot 4
- 2(1). One elongate spade-like tubercle on inner margin of each heel; parotoid glands round and small; eye pupils vertically elliptical in good light (Family Pelobatidae, Eastern Spadefoot Toad) Scaphiopus holbrooki Harlan
- 2a. Anterior and posterior horny tubercles on heel; parotoid glands prominent and elongate; eye pupils horizontally elliptical in good light (Family Bufonidae). 3

- 3(2a). Largest dark spots on back usually containing only one or two warts; enlarged warts present on thighs; chest and forward part of abdomen usually spotted with dark pigment; parotoid glands reniform (concave laterally) and either separate from the cranial crest or connected to it by a short spur; second subarticular tubercle of fourth toe frequently divided (American Toad)
 Bufo americanus americanus Holbrook
- 3a. Largest dark spots on back usually containing three or more warts; no enlarged warts present on thighs; chest and belly unspotted except for a single median breast spot; parotoid glands oval, touching cranial crest; second subarticular tubercle of fourth toe never divided (Fowler's Toad)
 Bufo woodhousei fowleri Hinckley
- 4(1a). Transverse fold of skin across back of head; tympanum not apparent; head less than one-fourth snout-vent length (Family Microhylidae, Eastern Narrow-mouthed Toad).
 Gastrophryne carolinensis Holbrook
- 4a. No transverse fold of skin across back of head; tympanum apparent; head approximately one-third snout-vent length 5
- 5(4a). Posterior margin of tongue entire or with shallow notch; terminal toe pads and intercalary cartilages present (Family Hylidae). 6
- 5a. Posterior margin of tongue with a deep notch; terminal toe pads and intercalary cartilages absent (Family Ranidae). 11
- 6(5). Toe pads distinctly wider than penultimate joints; maximum snout-vent length 70 mm 8
- 6a. Toe pads only slightly wider than penultimate joints; maximum snout-vent length 35 mm 7
- 7(6a). Toes on hand foot conspicuously webbed; longitudinal dark stripe on rear surface of thighs (Blanchard's Cricket Frog) . . Acris crepitans blanchardi Harper
- 7a. Toes on hand foot poorly webbed; no longitudinal dark stripe on rear surface of thighs (Upland Chorus Frog) . . Pseudacris triseriata feriarum Baird

- 8(6). Back with a large, distinctive, dark X-mark; fingers not webbed (Northern Spring Peeper).
 Hyla crucifer crucifer Wied
- 8a. Back without a large, distinctive, dark X-mark; fingers with a small amount of webbing. 9
- 9(8a). Light spot on upper lip, beneath the eye; dorsal ground color varying from green through brown to pearl-gray; back with irregular blotches, but no distinct spots. 10
- 9a. No light spot on upper lip beneath the eye; back green, sometimes with small golden dots and/or larger round dark spots; light, irregular, lateral stripe evident (Barking Tree Frog).
 Hyla gratiosa Le Conte
- 10(9). Concealed portion of thighs in live specimens washed with green or greenish-yellow; maximum snout-vent length 50 mm (Western Bird-voiced Tree Frog).
 Hyla avivoca avivoca Viosca
- 10a. Concealed portion of thighs in live specimens without any greenish wash; maximum snout-vent length 60 mm (Eastern Gray Tree Frog).
 Hyla versicolor versicolor Le Conte
- 11(5a). Dorsolateral ridges present 12
- 11a. Dorsolateral ridge absent (Bull Frog)
 Rana catesbeiana Shaw
- 12(11). Dorsolateral ridge extending to groin 13
- 12a. Dorsolateral ridge extending only halfway to groin (Green Frog). Rana clamitans melanota Rafinesque X R. c. clamitans Latreille
- 13(12). Dorsal pattern consisting of large conspicuous spots; no black mask extending backwards from the eye 14
- 13a. Dorsal pattern not consisting of conspicuous spots; a black mask extending backwards from the eye (Wood Frog) Rana sylvatica Le Conte*

- 14(13). Two parallel rows of squarish or rectangular spots extending longitudinally between dorsolateral ridges; bright yellow or orange on concealed surfaces of the hind legs in live animals (Pickerel Frog) Rana palustris Le Conte
- 14a. Two or three irregular rows of rounded spots extending longitudinally between dorsolateral ridges; groin lacking bright yellow or orange pigment (Southern Leopard Frog).
 Rana pipiens sphenoccephala Cope

Key to the Orders of Adult Reptilia of
 Montgomery County, Tennessee

1. Body with bony or leathery shell (Turtles)
 Order Chelonia p. 44
- 1a. Body without bony or leathery shell 2
- 2(1a). Legs present; external ear openings present; venter covered with many rows of scales anterior to anus; eyelids present (Lizards) . . Order Sauria p. 46
- 2a. Legs absent; external ear openings absent; venter covered with a single row of scales anterior to anus; eyelids absent (Snakes) . Order Serpentes p. 47

Key to the Adult Chelonia of Montgomery County, Tennessee

1. Carapace covered with horny shields; four or more claws on each front foot 3
- 1a. Carapace covered with leathery skin; three claws on each front foot (Family Trionychidae) 2
- 2(1a). Shell smooth, without spiny projections on anterior part of carapace; nostril tubes rounded, without internal longitudinal ridges (Smooth Softshell).
 Trionyx muticus Le Sueur*
- 2a. Shell not smooth, with spiny projections at least on anterior edge of carapace; nostril tubes crescentic, with internal longitudinal ridges (Eastern Spiny Softshell). . . Trionyx spinifer spinifer Le Sueur

- 45
- 3(1). Plastron (exclusive of bridge) with 12 plates
(Family Emydidae) 6
- 3a. Plastron (exclusive of bridge) with 11 or fewer
plates 4
- 4(3a). Posterior margin of carapace serrate; plastron with
fewer than 11 plates (Family Chelydridae, Common
Snapping Turtle).
. Chelydra serpentina serpentina Linnaeus
- 4a. Posterior margin of carapace not serrate; plastron
with 11 plates (Family Kinosternidae) 5
- 5(4a). Pectoral plates of plastron nearly triangular in
shape; plastron with two hinges; head without
longitudinal light stripes (Eastern Mud Turtle)
. Kinosternon subrubrum subrubrum Lacepede
- 5a. Pectoral plates of plastron not triangular in shape;
plastron with one hinge; head usually with light
stripes along sides (Stinkpot).
. Sternotherus odoratus Latreille
- 6(3). Plastron with well developed hinge, permitting tight
closure of shell; carapace highly domed, height
more than 44 percent of length (Eastern Box Turtle)
. Terrapene carolina carolina Linnaeus
- 6a. Plastron lacking well developed hinge; carapace not
highly domed, greatest height less than 43 percent
of length 7
- 7(6a). Apical notch in upper jaw flanked by tooth-like
projections; marginals marked with red (Painted
Turtle) Chrysemys picta marginata
Agassiz X C. p. dorsalis Agassiz
- 7a. Apical notch in upper jaw, if present, without
adjacent "teeth"; marginals not marked with red . 8
- 8(7a). Alveolar surfaces of upper jaw smooth; apex of
lower jaw rounded 9
- 8a. Alveolar surfaces of upper jaw with median ridge or
tooth-like projections; apex of lower jaw
pointed 10

- 9(8). Yellow spots under each eye and each side of the chin; middorsal spines prominent (Ouachita Map Turtle) Graptemys pseudogeographica ouachitensis Cagle*
- 9a. No yellow spots under each eye and each side of chin; middorsal spines not prominent (Map Turtle) Graptemys geographica Le Sueur
- 10(8a). Light C-shaped figure present on second costal scute; shell pinched inward in front of hind legs (Slider). Pseudemys concinna hieroglyphica Holbrook*
- 10a. No light C-shaped figure present on second costal scute; shell not pinched inward in front of hind legs (Red-eared Turtle). Pseudemys scripta elegans Wied

Key to the Adult Sauria of Montgomery County, Tennessee

1. Dorsal and lateral scales strongly keeled (Family Iguanidae, Northern Fence Lizard) Sceloporus undulatus hyacinthinus Green
- 1a. Dorsal and lateral scales not keeled 2
- 2(1a). Ventral scales large, arranged in eight longitudinal rows; dorsum with six longitudinal light stripes (Family Teiidae, Six-lined Racerunner). Cnemidophorus sexlineatus Linnaeus
- 2a. Ventral scales small, not arranged in eight longitudinal rows; dorsal light stripes not six in number (Family Scincidae) 3
- 3(2a). Supernasal scales present; eyelids without a large transparent scale 4
- 3a. Supernasal scales absent; eyelids with a large transparent scale (Ground Skink). Lygosoma laterale Say
- 4(3). Large postlabial scales present; usually four labial scales anterior to subocular (Five-lined Skink). Eumeces fasciatus Linnaeus

- 4a. Large postlabial scales absent (or one or two very small ones); usually five labial scales anterior to subocular (Broad-headed Skink).
 Eumeces laticeps Schneider*

Key to the Adult Serpentes of Montgomery County, Tennessee

1. Facial pit present; pupil of eye vertically elliptical in good light; those ventral scales posterior to anus in a single row (Family Crotalidae). . . 2
- 1a. Facial pit absent; pupil of eye round; those ventral scales posterior to anus in two rows (Family Colubridae) 4
- 2(1). Rattle present at tip of tail (Timber Rattlesnake) Crotalus horridus horridus Linnaeus
- 2a. No rattle at tip of tail. 3
- 3(2a). Loreal scale present; upper labials in contact with orbit; head a coppery-red color (Copperhead). . .
Agkistrodon contortrix mokeson Daudin X A. c. contortrix Linnaeus
- 3a. Loreal scale absent; upper labials not in contact with orbit; head a dark brown or black (Western Cottonmouth). . Agkistrodon piscivorus leucostoma Troost
- 4(1a). Anal plate single 5
- 4a. Anal plate divided 11
- 5(4). Dorsal scales keeled, at least on uppermost scale rows at midbody (if uncertain use hand lens). . 6
- 5a. Dorsal scales not keeled anywhere along the length of the body 8
- 6(5). Dorsum with a pattern of prominent, longitudinal stripes; two prefrontal scales present on each side. 7
- 6a. Dorsum without a pattern of prominent longitudinal stripes; four prefrontal scales present on each side (Northern Pine Snake)
 . . Pituophis melanoleucus melanoleucus Daudin

- 7(6). Lateral stripes confined to scale rows two and three, not involving row four (Eastern Garter Snake). . . . Thamnophis sirtalis sirtalis Linnaeus
- 7a. Lateral stripes confined to scale rows three and four, not involving row two (Eastern Ribbon Snake) . . . Thamnophis sauritus sauritus Linnaeus
- 8(5a). Dorsal pattern consisting of distinct dark blotches or crossbands on light ground color 9
- 8a. Dorsal pattern not consisting of distinct dark blotches or crossbands on light ground color. . . 10
- 9(8). Dorsal crossbands extending down sides to first or second scale rows; dark borders on dorsal crossbands almost as wide as the length of one scale (Red Milksnake). . . Lampropeltis dolia syspila Cope
- 9a. Dorsal crossbands not extending down sides to first or second scale rows; dark borders on dorsal crossbands narrower than half a scale length (Prairie Kingsnake).
. . . Lampropeltis calligaster calligaster Harlan
- 10(8a). Dorsal pattern of white dots, often arranged in crossbands, on black ground color (Black Kingsnake)
. . . Lampropeltis getulus niger Yarrow
- 10a. Dorsal pattern not of white dots on black ground color (Prairie Kingsnake, dark phase)
. . . Lampropeltis calligaster calligaster Harlan
- 11(4a). Dorsal scales keeled, at least on uppermost scale rows at midbody (if uncertain use hand lens). . . 12
- 11a. Dorsal scales not keeled anywhere along the length of the body 20
- 12(11). Rostral scale upturned and keeled (Eastern Hognose Snake). Heterodon platyrhinos Latreille
- 12a. Rostral scale normal, not upturned and keeled . . 13
- 13(12a). Dorsal scales at midbody in nineteen or more rows. 14

- 13a. Dorsal scales at midbody in seventeen or fewer rows. 49
- 14(13). Dorsal scales, at least those on the middle of the back, only weakly keeled; ventral pattern consisting of a series of distinct dark squarish markings; belly meeting sides of body at an angle (body in cross section shaped like a loaf of bread) (Gray Rat Snake). 17
Elaphe obsoleta spiloides Dumeril, Bibron, and Dumeril
- 14a. Dorsal scales strongly keeled; ventral pattern not consisting of a series of distinct squarish markings; belly not meeting sides of body at an angle. 15
- 15(14a). Dorsal scales at midbody in nineteen rows; a longitudinal yellow stripe extending along each side of body on first and second scale rows (Queen Snake). . . Natrix septemvitta Say
- 15a. Dorsal scales at midbody in more than nineteen rows; no longitudinal stripes present 16
- 16(15a). Ventral pattern consisting of many black or reddish half-moons; dorsal pattern consisting of nineteen or more dark crossbands (Northern Water Snake).
. Natrix sipedon sipedon Linnaeus
- 16a. Ventral pattern not consisting of many black or reddish half-moons; dorsal pattern of adult without dark crossbands (Northern Copperbelly).
. Natrix erythrogaster neglecta Conant
- 17(13a). Loreal scale present. 18
- 17a. Loreal scale absent 19
- 18(17). Upper labials usually 7+7; tail length more than 30 percent of total length; total length up to 32 inches (Rough Green Snake)
. Opheodrys aestivus Linnaeus
- 18a. Upper labials 6+6; tail length less than 30 percent of total length; total length less than 13 inches (Western Smooth Earth Snake).
. Haldea valeriae elegans Kinnicott

- 19(17a). Dorsal scales in seventeen rows; dark vertical streak on side of head behind eye; venter white, yellowish or light pink (Midland Brown Snake)
 Storeria dekayi wrightorum Holbrook
- 19a. Dorsal scales in fifteen rows; no dark vertical streak on side of head behind eye; venter bright red or orange-red, usually darker posteriorly (Northern Red-bellied Snake).
Storeria occipitomaculata occipitomaculata Storer
- 20(11a). Dorsal scales in thirteen rows (Midwest Worm Snake)
 Carphophis amoenus helenae Linnaeus
- 20a. Dorsal scales in fifteen or more rows 21
- 21(20). Dorsal scales in seventeen rows (Northern Black Racer). . Coluber constrictor constrictor Linnaeus
- 21a. Dorsal scales in fifteen rows 22
- 22(21a). Loreal scale present; dorsum uniformly dark except for light neck ring; venter usually with a median row of dark spots (these sometimes completely absent) (Ringneck Snake).
Diadophis punctatus edwardsi Merrem X D. p. stictogenys Cope
- 22a. Loreal scale absent; dorsal and lateral aspects of head distinctly darker than rest of body; venter without a median row of spots (Southeastern Crowned Snake).
 . . Tantilla coronata coronata Baird and Girard*

APPENDIX B

AN ANNOTATED CHECK LIST OF THE AMPHIBIANS AND REPTILES OF MONTGOMERY COUNTY, TENNESSEE

This section is an annotated list of the amphibians and reptiles of known or presumed occurrence in Montgomery County, Tennessee, and includes all of the forms mentioned in the preceding key. Scientific names of taxa above the genus level are arranged in phylogenetic order; genus and species names are listed alphabetically within each family. Based on the suggestion of Osgood (1939), I have omitted the use of parentheses around names of authors of specific names when these names have been transferred from one genus to another.

CLASS AMPHIBIA

ORDER CAUDATA

Cryptobranchidae

Cryptobranchus alleganiensis alleganiensis Daudin.

Hellbender. Hellbenders are frequently taken by commercial fishermen on trotlines in the Cumberland and Red Rivers, and probably occur in all the permanent streams of the county. Some of the individuals secured during this study possess dark, dorsal blotches similar to those of C. a. bishopi.

Proteidae

Necturus maculosus maculosus Rafinesque. Mudpuppy. Several were collected from the Cumberland River in February on a trotline baited with minnows. Their occurrence in the area should closely approximate that of the hellbender.

Sirenidae

Siren intermedia nettingi Goin. Western Lesser Siren. Although none were taken during this study, concerted collecting efforts in floodplain sloughs along the Cumberland River should yield this species.

Ambystomidae

Ambystoma maculatum Shaw. Spotted Salamander. Based on eggs observed, this species is widely distributed in Montgomery County, chiefly in wooded areas. Sexually active adults and recently deposited eggs were collected from a woodland pond cluttered with dead leaves and branches on the evenings of February 11 and 28, 1966.

Ambystoma opacum Gravenhurst. Marbled Salamander. Adults were taken in both northern and southern parts of the county. In October, two adult females were uncovered on their nest among the leaves of a dry woodland pond.

Ambystoma talpoideum Holbrook. Mole Salamander. Both normal adults and neotenic larvae were collected in breeding condition from the same pond as the spotted salamanders mentioned above. They were the dominant species

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in the pond, but could not be located in abundance in any other ponds nearby.

Ambystoma texanum Matthes. Small-mouthed Salamander. Only two specimens were taken during this study, both from the more level northern sector of the county. One, a female, was collected in a shallow pond located in an open field. The other, a sexually active male, was taken from a road during a rain on the evening of December 8, 1966. Gentry (1955) also mentions a specimen from northern Montgomery County.

Ambystoma tigrinum tigrinum Eastern Tiger Salamander. Several individuals were taken throughout the county, usually in open areas. Sexually active adults were observed in December, January, and February.

Salamandridae

Diemictylus (Notophthalmus) viridescens viridescens Rafinesque. X D. v. louisianensis Wolterstorff. Red-spotted X Central Newt. This very common salamander is found throughout the county in shallow, fish-free ponds as a larvae and adult, and on land as a terrestrial elf. Breeding in this species was observed in February.

Plethodontidae

Desmognathus fuscus conanti Rossman. Spotted Dusky Salamander. This very common salamander of rocky streams was considered as part of the D. f. fuscus complex until

Rossman (1958) described it from Livingston County, Kentucky and found it in two counties bordering Montgomery County to the south and east. This identification was confirmed by Dr. Douglas Rossman and Dr. Roger Barbour.

Eurycea aquatica Rose and Bush. No common name. Although this newly described salamander (Rose and Bush, 1963) has not been collected in Montgomery County, Ashton (1966) predicts its range to include all of Middle Tennessee and possibly parts of southern Kentucky. If present, this species will be found in small permanent streams as a completely aquatic inhabitant.

Eurycea bislineata rivicola Mittleman. Midwest Two-lined Salamander. This salamander can be taken easily during early spring from under stones at the edge of small intermittent and permanent streams throughout the county. Although Conant (1958) shows only E. b. bislineata in Middle Tennessee, none were collected in Montgomery County.

Eurycea longicauda longicauda Green. Long-tailed Salamander. Common throughout the county. Specimens were frequently collected from under rocks at or near the edge of small streams.

Eurycea lucifuga Rafinesque. Cave Salamander. The cave salamander was taken from a variety of habitats, usually in moist areas of limestone outcrops. Some were collected from paved roads during or after rains.

Hemidactylium scutatum Schlegel. Four-toed Salamander. Collecting efforts failed to produce any specimens of this species. However, it is to be expected around ponds or swampy areas that have an abundance of moss at their borders.

Plethodon dorsalis dorsalis Cope. Zigzag Salamander. Specimens of both the dark and zigzag phases were taken throughout the county in moist wooded habitats from under various types of debris. After heavy rains, many were observed on roads in forested areas.

Plethodon glutinosus glutinosus Green. Slimy Salamander. Specimens were consistently taken throughout the county from under decaying logs near streams.

Pseudotriton ruber ruber Sonnini. Northern Red Salamander. Four separated collection sites indicate a widespread population in Montgomery County. Most specimens were found under rocks and moist leaves in or near cool, spring-fed streams.

ORDER SALIENTIA

Pelobatidae

Scaphiopus holbrooki Harlan. Eastern Spadefoot Toad. One adult specimen was collected in August from a newly plowed field. Although no breeding populations were observed, they are to be expected in low areas during or after warm-weather thunderstorms.

Bufonidae

Bufo americanus americanus Holbrook. American Toad. In early spring and late summer this species is very conspicuous throughout the county.

Bufo woodhousei fowleri Hinkley. Fowler's Toad. In contrast to the American toad, this species is commonly encountered only during the summer months. Apparent hybrids between these two species were occasionally collected.

Hylidae

Acris crepitans blanchardi Harper. Blanchard's Cricket Frog. During the summer months, this is probably the most conspicuous frog in the county. Breeding choruses can be observed in shallow weedy pools of water throughout the county.

Hyla avivoca avivoca Viosca. Bird-voiced Treefrog. Several specimens were collected from calling perches three to six feet above the water in shrubs at the periphery of a slough in the Cumberland River floodplain west of Clarks-ville. Further collecting along the Cumberland and Ohio Rivers may reveal that the Montgomery County population is continuous with the population of the Mississippi Embayment.

Hyla crucifer crucifer Weid. Northern Spring Peeper. This species is commonly encountered in small ponds and temporary pools from February to July.

Hyla gratiosa Le Conte. Barking Treefrog. Three

specimens were collected during May in the northeastern part of the county. At first glance this species might remind one of Hyla cinerea, but it can be distinguished by its larger, more robust appearance, and by the presence of dorsal rounded spots (sometimes obscure).

Hyla versicolor versicolor Le Conte. Eastern Gray Treefrog. Quite common in all parts of the county from late spring until late summer. Most specimens were taken from temporary pools and drainage ditches during wet weather. Calling males were heard from May until August.

Pseudacris triseriata feriarum Baird. Upland Chorus Frog. During the spring months this is the most conspicuous frog in the county. Breeding choruses were observed from January to June in practically all types of temporary bodies of water. The dorsal pattern of many specimens is suggestive of P. t. triseriata.

Microhylidae

Gastrophyrne carolinensis Holbrook. Eastern Narrow-mouthed Toad. Five collection sites indicate a widespread distribution in Montgomery County north of the Cumberland River. Except for several specimens taken from under an old board in an open field, most individuals were collected from the roads.

Ranidae

Rana catesbeiana Shaw. Bullfrog. This species is

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found in or about all types of permanent aquatic habitats and is probably the most common of the true frogs in Montgomery County.

Rana clamitans melanota Rafinesque X R. c. clamitans Latreille. Green Frog X Bronze Frog. Several were found under rocks along small streams in the eastern part of the county. Furthur collecting in similar habitats should prove it to be widely distributed in Montgomery County.

Rana palustris Le Conte. Pickerel Frog. Found to be fairly common in the northern half of the county, occupying habitats similar to those of Rana clamitans.

Rana pipiens sphenoccephala Cope. Southern Leopard Frog. Although it occurs along small and large streams, it is most common around farm ponds and lakes where it is found in abundance with the bullfrog.

Rana sylvatica Le Conte. Wood Frog. Although none were taken during this study, breeding groups were observed in the neighboring counties of Cheatham and Dickson and should be present in Montgomery County. Conant (1958) lists "moist wooded areas" as its habitat.

CLASS REPTILIA

ORDER CHELONIA

Chelydridae

Chelydra serpentina serpentina Linnaeus. Common

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snapping Turtle. Common in ponds, lakes, and larger streams throughout the county.

Kinosternidae

Kinosternon subrubrum subrubrum Lacepede. Eastern Mud Turtle. One specimen was taken on land immediately following a thunderstorm, in the southern part of the county. Old ponds and sloughs should yield others.

Sternothaerus odoratus Latreille. Stinkpot. This species is quite common in sloughs along the Cumberland River.

Emydidae

Chrysemys picta marginata Agassiz X C. p. dorsalis Agassiz. Midland X Southern Painted Turtle. These intergrades were taken from floodplain sloughs and small farm ponds throughout the county.

Graptemys geographica Le Sueur. Map Turtle. According to Conant (1958) and Gentry (1956), it is typically a turtle of larger bodies of water. The only specimen taken during this study was collected from the shallow water of Ringgold Creek.

Graptemys pseudogeographica ouachitensis Cagle. Ouachita Map Turtle. Expected in Montgomery County, but was not collected. If present, it will most likely be found in the Cumberland and Red Rivers.

Pseudemys concinna heiroglyphica Holbrook. Slider.

Collecting efforts also failed to reveal the presence of this species in Montgomery County. However, it should be found in the Cumberland and Red Rivers.

Pseudemys scripta elegans Weid. Red-eared Turtle. Very common in ponds, permanent streams, and rivers throughout the county.

Terrapene carolina carolina Linnaeus. Eastern Box Turtle. Common in wooded areas throughout the county.

Trionychidae

Trionyx muticus Le Sueur. Smooth Softshell. Although not collected, it is to be expected in the Cumberland and Red Rivers.

Trionyx spinifer spinifer Le Sueur. Spiny Softshell. Specimens have been taken from both the Red and Cumberland Rivers. Many of the local inhabitants consider these turtles to be excellent food.

ORDER SAURIA

Iguanidae

Sceloporus undulatus hyacinthinus Green. Northern Fence Lizard. This species was frequently collected among debris at old homesites and on fallen trees and logs in dry situations throughout the county.

Teiidae

Cnemidophorus sexlineatus Linnaeus. Six-lined

Racerunner. One population was discovered occupying dry habitats along the Tennessee Central Railroad about four miles west of Clarksville. Where similar habitats exist, this species should be found.

Scincidae

Eumeces fasciatus Linnaeus. Five-lined Skink.

Abundant in the city of Clarksville where it is found under debris in vacant lots. It is also found throughout the county under logs and stones in wooded habitats, usually near streams.

Eumeces laticeps Schneider. Broad-headed Skink.

Although none were collected, it is to be expected in Montgomery County. More arboreal than the five-lined skink, it is to be looked for around holes of hollow trees and among bare branches of dead trees (Conant, 1958).

ORDER SERPENTES

Colubridae

Carphophis amoenus helenae Kinnicott. Midwest

Worm Snake. Fairly common under stones and logs in wooded habitats throughout the county.

Coluber constrictor constrictor Linnaeus. Northern

Black Racer. This species is probably the most frequently encountered snake in Montgomery County. Most specimens taken during this study were collected in open areas.

Diadophis punctatus edwardsi Merrem X D. p. stictogenys Cope. Northern X Mississippi Ringneck Snake. Several specimens were collected from under logs and stones in both open and wooded areas. Searching through debris at old homesites also yielded some specimens.

Elaphe obsoleta spiloides Dumeril, Bibron, Dumeril. Gray Rat Snake. Locally this snake is known as the chicken snake and is frequently encountered around farm and rural dwellings. Although Conant (1958) shows only E. o. obsoleta in Montgomery County, none were collected. All specimens taken are considered to be E. o. spiloides because of the retention of body pattern into adulthood.

Haldea (Virginia) valeriae elegans Kinnicott. Western Smooth Earth Snake. Three specimens were taken from wooded habitats in the northeastern part of the county, two from the roads and one from under a piece of tin. Further collecting in wooded areas should prove this species to be widely distributed in Montgomery and surrounding counties.

Heterodon platyrhinos Latreille. Eastern Hognose Snake. The only specimen taken during this study was found in a wooded area along the Cumberland River at Clarksville. However, judging from local reports of "spreading adders", this snake is probably fairly common in most parts of the county.

Lampropeltis calligaster calligaster Harlan.

Prairie Kingsnake. Several specimens were found dead on the roads during late spring and early summer. Live specimens were taken from open areas.

Lampropeltis doliata sypila Cope. Red Milk Snake.

One immature individual is the only known record of this species in Montgomery County. According to Conant (1958) its "habitats vary from woodlands and rocky hillsides to open farming country."

Lampropeltis getulus niger Yarrow. Black Kingsnake.

This species is no doubt the rarest of the two Montgomery County kingsnakes. One specimen was taken dead on the road in the southern part of the county.

Natrix erythrogaster neglecta Conant. Northern

Copperbelly. One population was found inhabiting a slough along the Cumberland River, about five air miles southeast of Clarksville. At first glance, these snakes bear a marked resemblance to the cottonmouth. Concentrated collecting along the Cumberland River downstream from Clarksville may prove this population to be continuous with the Ohio Valley population.

Natrix septemvittata Say. Queen Snake. In Montgomery County, as in other parts of its range, this species is a frequent inhabitant of small rocky streams that support an abundance of crayfish.

Natrix sipedon sipedon Linnaeus. Northern Water Snake. This is the most common and widely distributed water snake in the county, and is found in or near almost all types of permanent bodies of water. Many laymen confuse this snake with the copperhead.

Opheodrys aestivus Linnaeus. Rough Green Snake. Several specimens were taken from small trees and shrubs, usually near streams. They are very docile and make good pets.

Pituophis melanoleucus melanoleucus Barbour. Northern Pine Snake. Evidently this species is quite rare in Montgomery County. The only specimen taken during this study was collected from a gravel road in an open area.

Storeria dekayi wrightorum Trapido. Midland Brown Snake. Very common in the city of Clarksville, where it is found under debris in backyards and vacant lots. Specimens were also taken in rural areas, usually near farm buildings.

Storeria occipitomaculata occipitomaculata Storer. Northern Red-bellied Snake. Two specimens were collected, one near Southside from under a board near a tobacco barn, the other from a wooded area in the Austin Peay State College farm.

Tantilla coronata coronata Baird and Girard. Southeastern Crowned Snake. Although no specimens were taken,

it is to be expected in a variety of habitats as a secretive inhabitant. Specimens taken in neighboring counties were found in dry wooded areas in decaying logs.

Thamnophis sauritus sauritus Linnaeus. Eastern Ribbon Snake. Probably rare in Montgomery County. One specimen was taken from leaf litter near a woodland pond in the northeastern part of the county.

Thamnophis sirtalis sirtalis Linnaeus. Eastern Garter Snake. In contrast to the ribbon snake, this species is quite common throughout the county, especially among rubble and debris in vacant lots in the city of Clarksville.

Crotalidae

Agkistrodon contortrix mokeson Daudin X A. c. contortrix Linnaeus. Northern X Southern Copperhead. This snake is fairly common throughout the county in areas of rocky hillsides. Many encounters with these snakes have been reported in residential areas.

Agkistrodon piscivorus leucostoma Troost. Western Cottonmouth. Found to be rather common in sloughs along the Cumberland River southeast of Clarksville. The largest population was found inhabiting a marshy spring-fed stream.

Crotalus horridus horridus Linnaeus. Timber Rattlesnake. One specimen was taken in July from the Blooming Grove Creek area. Others are to be expected in forested areas that support an abundance of small mammals.