GEOLOGICAL SURVEY OF ALABAMA

WALTER B. JONES, STATE GEOLOGIST

MUSEUM PAPER 33

A KEY TO THE AMPHIBIANS AND REPTILES OF ALABAMA

by

RALPH L. CHERMOCK

Honorary Curator of Herpetology, Alabama Museum of Natural History
Associate Professor, Department of Biology, University of Alabama

UNIVERSITY, ALABAMA

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LETTER OF TRANSMITTAL

University, Alabama
November 13, 1952

Honorable Gordon Persons
Governor of Alabama
Montgomery, Alabama

Sir:

I have the honor to transmit herewith the transcript of a report on "A Key to the Amphibians and Reptiles of Alabama", by Ralph L. Chermock. It is requested that this be printed as Museum Paper 33 of the Geological Survey of Alabama.

Respectfully,

WALTER B. JONES,
State Geologist

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INTRODUCTION

The purpose of this work is to provide a means for identifying the Amphibians and Reptiles found in the state of Alabama, and also to furnish suggestions for the preservation and care of specimens. In doing so, it is hoped that it will stimulate those who are interested in natural history, to study these groups of animals in this state.

In the past, only two significant studies have been made on these animals in Alabama. One of these was by Dr. H. P. Loding, who made numerous collections in the Mobile area, and published a report of his findings in 1922. W. L. Haltom, in 1931, published a volume on Alabama Reptiles which was based on his personal collection and that of Dr. Loding. Both of these works, although representing significant milestones in their time, are incomplete, and the nomenclature used is somewhat out of date. Fortunately, the collections on which their studies are based remain relatively intact, and are available for study in the Alabama Museum of Natural History on the University of Alabama campus in Tuscaloosa.

During the last four years, the author has been conducting a survey of the Amphibians and Reptiles of the state. This has resulted in the addition of many new species and subspecies to the state list, and the discovery of a salamander new to science. These have been incorporated in the following keys, along with recent nomenclatorial changes which have appeared in the literature, and new information on the distribution of the various species. Consequently, it is believed that the keys are as complete as present knowledge permits. However, errors and omissions are unavoidable, and the author apologizes for any mistakes which may occur in the succeeding pages.

The completeness and accuracy of this work has been dependent upon the availability of specimens for study. Fortunately, the two most extensive collections of Alabama Reptiles and Amphibians are available on the University of Alabama campus. The first of these is that of the Alabama Natural History Museum, which includes the Loding collection, and the author is indebted to Dr. Walter Jones, for

his kind cooperation in permitting access to the collection. The other collection is that of the University of Alabama, which has been built up during the last four years by the author and his students. The author is indebted to Dr. J. H. Walker, Head of the Dept. of Biology, for his cooperation in providing facilities for the maintainance of the collection, and his continued encouragement in the study of the natural history of the state. He is also indebted to the following students who have donated material to the collections: Mr. Herbert Boschung, University Center, Mobile; Mr. James Boyles; Prof. Jack Brown, Jacksonville State Teachers College; Mr. Luther Cooper, University Center, Gadsden; Mr. James H. Eads; Mr. Walter Herndon; Mr. Moody Jacobs; Prof. Charles Owens, Athens College; Miss Vivien Parsons; Miss Miriam Parsons; Prof. Hugh C. Rawls, Mississippi Delta College; Prof. Charles Segars, Mississippi Southern College; Mr. Thomas Taylor; and Mr. Barry Valentine.

THE COLLECTION OF SPECIMENS

There are many techniques which may be used for collecting specimens of Amphibians and Reptiles. However, there is no substitute for experience. A good collector will always note the particular habitat in which he finds a species, the time of year, and the weather conditions. This will usually enable him to be able to find the species again when similar conditions occur. A few general suggestions are offered here to provide a starting point for the beginning collector.

One of the best methods is to wander through the woods or fields during the daytime, turning over logs, stones, trash piles, or scraping leaves at the bases of trees. Many salamanders, snakes, and occasional frogs or lizards may be collected in this manner. The scattered lumber, sheets of roofing, and debris around abandoned houses, barns, or sawdust piles often yield interesting specimens; as do stones and logs in shallow streams or seepage areas around springs. Another productive method is to drive slowly along a road on a rainy night, and carefully watching the road in the beam of the

headlights. Numerous Amphibians and snakes will be found when the weather conditions are suitable.

Frogs and toads are most easily collected during the breeding season when these animals normally come to water and call. They are often found in swamps, around lakes or ponds, or in temporary puddles or ponds; these areas being most easily located by driving along the road at night until choruses of these Amphibia are heard. A little experience soon makes is possible to learn to recognize the species, because each have distinctive calls. They can usually be found in or near water, or on trees or bushes at the water's edge, with the use of a flashlight or lantern, and are usually fairly easy to catch. Since different species breed at various times of the year, some only during the winter months, others during the warmer season, they should be collected the year round in order to obtain a representative collection of the various species.

Lizards are active in the daytime, during the warmer months, and are often found in piles of logs, brush, around dead trees, etc. Some forms can be collected by hand. However, since many of them are extremely wary and quick, the use of dust shot in a 22 caliber rifle, is somewhat easier and will not damage the specimens to any great extent if not shot at too close a range.

Some turtles, such as the musk turtles and snapping turtles, can be collected by hook and line baited with rotten fish or meat. These lines can be left in the water overnight, and checked the following morning. Some of the large aquatic salamanders such as the hellbender, and occasionally water snakes may also be collected by this method. Some turtles, however, feed on plants and these can be most easily collected by using floating traps. Box turtles, musk and mud turtles are often found in the woods or along roads during the daytime.

Snakes are found in a variety of habitats, some living in or near water, others found under bark of dead logs and

stumps, some will be hiding under logs, boards or stones, while others will be found crawling on the ground or resting in open places. Any snake collector should become sufficiently familiar with the various species so that he can identify them on sight in the field. As a general rule, most small snakes are perfectly harmless (with the exception of the coral snake) and can be collected with ease. However, most large snakes, although harmless, can often inflict a painful bite and consequently should be handled with care. Their heads should be firmly pinned down with a strong stick or snake hook, and grasped behind the head with the other hand, and dropped into a large muslin sack. Poisonous snakes can be collected in the same way, but great care should be taken to avoid the fangs, and to hold the head firmly enough so that the snake cannot twist loose, or turn its head around to bite. Forked sticks are often suggested for this purpose, but their value is doubtful because they obstruct a firm grip on the neck, and also the snake may slip away if the prongs are too long. A noosed stick may be used, but is somewhat awkward to handle. A snake hook consisting of a flat hook about 4 inches long and made of quarter inch bar steel, which is attached to a long stick, is the most efficient tool for this purpose. It permits free access to the neck, and can be used for tearing logs apart, rolling logs or stones, etc.

Amphibians are usually placed in jars, with holes punched in the top, and some damp moss or leaves inside to prevent them from drying until they can be preserved. Lizards may also be kept in the same containers, or in deep sacks made of a heavy grade muslin, which are double-stitched. Snakes are normally collected in these latter containers. Care should always be taken not to leave living specimens in the sun or in the hot trunk of a car, because they will often die, and harden so that they make poor specimens.

THE PRESERVATION OF SPECIMENS

The following techniques for preserving specimens, although relatively simple, are used by most Herpetologists in

the country. Basically, two preservatives are used. One of these is 10% formalin, prepared by mixing one part of commercial formalin with nine parts of water. Formalin can be obtained from any pharmacy or biological supply house, and is relatively inexpensive. If specimens are to be stored permanently in this preservative, however, the solution should be changed every two or three years to prevent its loss of strength due to evaporation. The other preservative is 70% alcohol, prepared by mixing 7 parts of ethyl alcohol and 3 parts of water. Although this mixture is frequently preferred as a permanent preserving fluid, its use may be limited because of its greater cost.

It is frequently desirable to kill or anesthetize animals before preserving them. Ether is frequently used for this purpose. This is accomplished by placing the animal in an airtight container such as a jar or can, and dropping in a wad of cotton or a paper towel which has been soaked with ether. Chloretone is used for anesthetizing Amphibians. A saturated solution of this chemical in water is prepared, and the animal is placed in this mixture until it becomes completely inactive. The solution may be used repeatedly. Both of these chemicals can usually be obtained from a local druggist or a biological or chemical supply house. Occasionally a third killing agent is used, consisting of a weak solution of ethyl alcohol of a concentration of less than 50%. As soon as the animal is dead, it should be removed to a permanent preservative.

Since various kinds of animals require special treatment, the following discussion is divided into various parts. For best results, these directions should be followed carefully.

FROGS AND TOADS: These may be killed by placing them directly in 10% formalin. This solution may also be used as a permanent preservative, although it is desirable to transfer them to 70% alcohol after 24 hours for better color preservation. A small slit should be made on the abdomen of larger frogs and toads after they have been killed, to permit the preservative to reach

the internal organs more rapidly. A somewhat more complicated but preferred technique, is to kill the animals in 50% alcohol, and then to place them in a flat tray filled with 10% formalin, extending the limbs so that they can be studied more easily. After 8 to 24 hours, they may be transferred to the permanent preservative.

TADPOLES: Tadpoles, when collected, should be placed immediately in 10% formalin. After 24 hours, they are transferred to 70% alcohol for permanent storage.

AMPHIBIAN EGGS: The best method is to place the eggs in 10% formalin, and then transfer them to 4% formalin for permanent storage. These should never be stored in alcohol, because it results in a deterioration of the membranes, making them impossible to identify.

SALAMANDERS: The best method we have found is to kill these animals in a saturated solution of chloretone, and then transfer them to trays containing 10% formalin. At this time, they should be arranged in a normal position, with the body straight and the limbs extended. After 24 hours they can be placed in bottles for permanent preservation in either 10% formalin or 70% alcohol. A 50% solution of alcohol may be substituted for the chloretone solution. These animals also may be killed in 10% formalin, but care should be taken to prevent the twisting of the body into abnormal shapes.

TURTLES: These may be killed with ether, or by the injection of a 10% solution of formalin into the abdominal cavity with a hypodermic syringe. When the animal is dead, it should be thoroughly injected with 10% formalin. If this is not possible, the skin between the arms and the neck, and between the legs and the bridge should be slit deeply with a knife to permit the entry of the preservative. The mouth should be propped open with a cork or short stick, because the teeth are often used in identification. These animals may be stored permanently in 10% formalin or 70% alcohol.

LIZARDS AND ALLIGATORS: These are killed by using the same technique as that for turtles. When the animal is dead, it should be thoroughly injected with 10% formalin and left on a tray with the body straight and the legs extended, for about four hours. After this time, it may be placed in bottles for permanent preservation. If a hypodermic syringe is not available, a slit should be made on the abdomen and at the tail with a pair of scissors, and the animal should be extended on a tray and covered with 10% formalin where it is left until it hardens. These animals should then be placed in 10% formalin for at least a week and then it is desirable, although not necessary, to store them permanently in 70% or 75% alcohol.

SNAKES: These should be treated like lizards. However, they may be coiled flat on a tray with the head in the center and resting on the nearest coil, or they may be coiled springlike in a jar of appropriate size. If no hypodermic syringe is available, short slits should be made along the length of the abdomen and tail and, in large snakes, the viscera should be removed completely.

For a collection to have any scientific value, all specimens should be tagged. These tags should be made of some water resistant paper, preferably those furnished by a biological supply house, or available at most laundries. Writing on these tags should be with a permanent black ink such as Higgin's eternal ink. For small collections, these tags should contain information as to where the animal was collected, including the county and state names, the date when collected, and the name of the collector. In larger collections, frequently some numbering system is used which refers to a corresponding number in a catalogue where this information is recorded. If the latter method is used, great care should be taken to prevent the possible loss of the catalogue, so that this important data is not lost, thereby making the specimens of little scientific value. Tags should always be tied tightly on the animal, and if they become torn or otherwise mutilated, should be replaced immediately.

For permanent storage, the specimens are normally housed in jars. Mason jars are perfectly suitable for this purpose, the best type being those which have a glass top which is held in position by a spring, and sealed with rubber. Metal topped jars should be avoided because they rust very rapidly when formalin is used. To prevent this, however, the inside of the lid may be coated with paraffin. In many respects, the most desirable type of jar is a wide-mouthed, plastic capped, museum jar, which can be obtained from any biological supply house. However, their expense limits their use.

POISONOUS SNAKES AND THE TREATMENT OF SNAKE BITE

It is locally believed in Alabama that animals such as the "Redheaded scorpion" (Blue-tailed skink), and the congo-eel are poisonous. This idea is completely false, since no Amphibians, lizards or turtles found in the state are venomous. In fact, although we have a great variety of snakes found within Alabama, only the following are poisonous, and everyone who collects herpetological specimens or who spends much time in the woods, should learn to recognize them.

Common coral snake (Micrurus fulvius fulvius)

Eastern water moccasin (Agkistrodon piscivorous piscivorous) also called "Cotton-mouth"

Western water moccasin (Agkistrodon piscivorous leucostoma)

Southern copperhead (Agkistrodon mokeson austrinus) also called "Upland" or "Highland moccasin"

Northern copperhead (Agkistrodon mokeson mokeson)

Eastern Massasauga (Sistrurus catenatus catenatus) also called "Swamp rattler"

Ground rattlesnake (Sistrurus miliarius miliarius) also called "Pigmy rattler"

Florida ground rattlesnake (Sistrurus miliarius barbouri)

Eastern Diamond-back rattlesnake (Crotalus adamanteus)

Timber rattlesnake (Crotalus horridus horridus)

Canebrake rattlesnake (Crotalus horridus atricaudatus)

The coral snake is brilliantly colored with rings of red, black and yellow, and can be easily recognized. Although it is a relatively small and slender snake, its venom, which is neurotoxic and affects the nervous system, is extremely poisonous and results in a high percentage of deaths. The remainder of the poisonous snakes are all pit-vipers, characterized by the presence of a loreal pit on each side of the head between the nostril and the eye, by heavy bodies, and a single row of subcaudal scales. The venom of these snakes primarily affects the blood, and is said to be haemotoxic. In general, the bite of the copperheads, swamp and pigmy rattlesnakes is rarely fatal, except in small children and persons in poor health. The bite of the canebrake, timber and diamond-back rattlesnakes, along with that of the water moccasins, however, is highly dangerous. In all cases, the bites of any of these poisonous snakes should receive quick and proper treatment in order to prevent any possible fatal effects.

The victim of a snake bite can avoid considerable pain and serious complications, if he acts immediately, without the loss of a second, by making a cut with a sharp knife or razor at the site of the bite and as deeply as the fangs penetrated, being careful not to cut any large blood vessels, and sucking out all of the blood, lymph and venom. If this is done within a second or two after the bite, as much as 75% of the venom can be removed before it has a chance to diffuse into the tissues or blood stream. This swift action will

not only reduce the hazards and pain accompanying a bite, but may mean the difference between life and death if the snake was a large rattler or water moccasin.

The following first aid treatment for snake bite is recommended by most Physicians and Herpetologists, and is based on extensive experimentation. In all cases, this treatment should be started immediately, and the patient should be taken to a doctor as quickly as possible.

1. Do not run or do anything that will speed up circulation; do not use any form of alcoholic drink. Above all, keep calm.

2. Apply a tourniquet between the bite and the heart, being careful not to tie it too tightly. Soft rubber tubing, such as that furnished with the various snake-bite kits, makes the best tourniquet, but a shoe-string, handkerchief, or necktie will do.

3. Sterilize the skin over the area of the bite and with a sharp knife or razor blade which has also been sterilized, make cross cuts over each fang mark at least one-quarter of an inch deep. Any standard antiseptic such as iodine or mercurochrome may be used for sterilization. If an antiseptic is not available, use the flame of a match.

4. Apply suction to the incision. If the small rubber bulbs supplied with snake-bite kits are not available, the mouth may be used. There is no danger if there are no cuts or sores in the mouth or lips; and if the venom is swallowed, it will cause no ill affects.

5. Continue the suction, loosening the tourniquet every ten minutes for a few seconds. As swelling progresses, the tourniquet should be moved and kept just above it, and just tight enough to retard, but not obstruct the flow of blood in the veins. Great harm

may result if it is too tight. It should be loose enough to allow a finger to be slipped under it easily.

6. Get to a doctor or hospital as quickly as possible. Meanwhile continue suction.

7. If antivenin is available, after about one hour of suction, inject five ampouls (50 cc) directly into the bite and the surrounding areas. An amount smaller than this is of no practical value. Because of the sensitivity of some people to this serum, antivenin should be given only by a physician, except in cases of extreme emergency.

8. If antivenin has been given as above, wait one hour before resuming suction; otherwise, continue the active suction treatment. By this time, however, you should have reached a physician. If not, continue suction for at least 15 hours.

HOW TO USE A KEY

To one unfamiliar with a key, it seems to be an incomprehensible mixture of names and terms. However, with a little experience, reason soon replaces confusion, and the key becomes an extremely useful tool to aid in the identification of animals. A knowledge of anatomy is required for the successful use of a key. At the end of this work is a glossary and a set of illustrations which include all of the technical terms referred to in the keys, and should be referred to if the meaning of a word is not known.

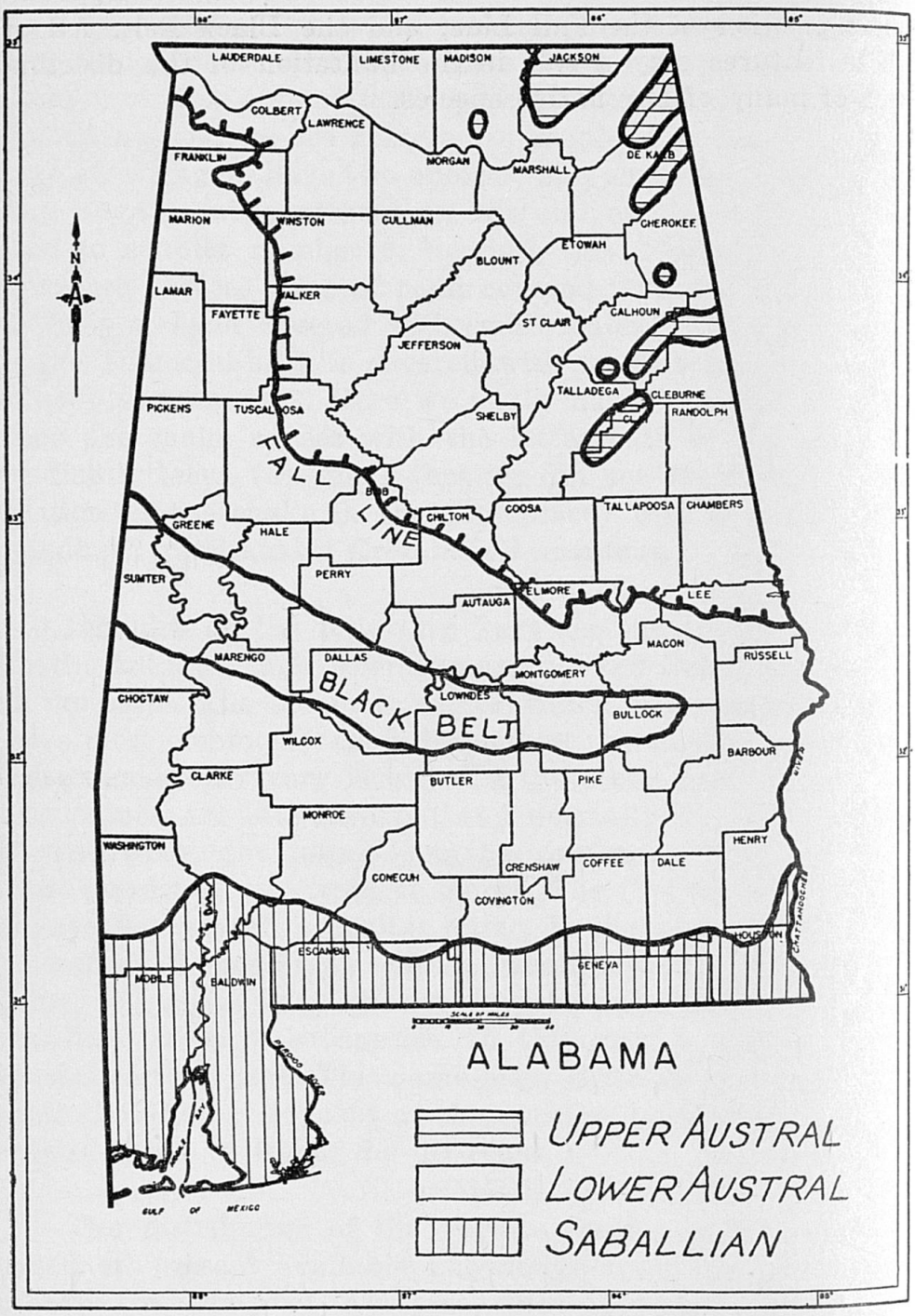
Technically, a key consists of a series of couplets, each of which is numbered, and each offering two choices of characters. Let us assume that we have a specimen of the Diamond-back rattlesnake, and wish to identify it by using the key to the snakes. Under couplet number 1, we have two choices "A pit between the eye and the nostril; elongate poison fangs in the front of the mouth; head distinct; a sin-

gle row of subcaudal scales" or "No pit between the eye and nostril; a double row of subcaudal scales." On examining a specimen of the snake, we find that it agrees with the first choice because it does have the loreal pit and other characters. This automatically places the snake in the Family Crotalidae, and we are referred to couplet number 2. In this couplet, we again have two choices, and since the rattlesnake does have a rattle present on the end of the tail, we proceed to couplet number 6. Reading this couplet, we again have two choices "Top of head covered with distinct plates" or "Top of head covered with small scales." Since the head of the Diamond-back is covered with small scales, we refer to couplet number 9. Here we again have two choices, and since the snake agrees with the latter half of the couplet, we finally learn (assuming that we did not know the identification of the snake in the first place) that it is the Diamondback rattlesnake, **Crotalus adamanteus.**

Included in the following keys are the common names for the animals, their scientific names, and their distribution in the state. The common names which are mentioned are those most commonly used throughout the country, although these names may vary locally. On the other hand, the scientific names are standardized and normally do not change. Consequently, the latter is to be preferred. The scientific name consists of two or three words. The first of these, which always begin with a capital letter, is the genus name. The second word, beginning with a small letter, is the species name. Occasionally a species may be subdivided into geographical races or subspecies. In this case, a third or subspecies name is used. This name may, if the subspecies represents the original concept of the species, be identical to the species name, or it may be different.

The distribution of the various species in the state is based on present available knowledge from the collections of the University of Alabama, the Alabama Museum of Natural History, and in some cases, on records in the literature. Since it is simpler to indicate the range of animals in terms of natural features of the environment, rather than

political boundaries, the reader is referred to the accompanying map which includes Merriam's Life Zones, the approximate position of the Fall Line, and the Black Belt. All of these features play a role in the limitation of the distribution of many of our native species.


LAUDERDALE
LIMESTONE
MADISON
JACKSON
COLBERT
LAWRENCE
FRANKLIN
MORGAN
MARSHALL
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MARION
WINSTON
CULLMAN
CHEROKEE
ETOWAH
BLOUNT
LAMAR
WALKER
FAYETTE
ST CLAIR
CALHOUN
JEFFERSON
TALLADEGA
CLEBURNE
PICKENS
TUSCALOOSA
SHELBY
RANDOLPH
FALL LINE
BIBB
CHILTON
COOSA
TALLAPOOSA
CHAMBERS
GREENE
HALE
PERRY
SUMTER
ELMORE
LEE
AUTAUGA
MACON
RUSSELL
MARENGO
DALLAS
MONTGOMERY
BLACK BELT
LOWNDES
CHOCTAW
BULLOCK
WILCOX
BARBOUR
CLARKE
BUTLER
PIKE
MONROE
WASHINGTON
HENRY
CRENSHAW
COFFEE
DALE
CONECUH
COVINGTON
HOUSTON
ESCAMBIA
GENEVA
MOBILE
BALDWIN
GULF OF MEXICO
ALABAMA
UPPER AUSTRAL
LOWER AUSTRAL
SABALLIAN

A KEY TO THE AMPHIBIA OF ALABAMA

The class Amphibia includes the salamanders, frogs and toads. Those found in Alabama are typical vertebrate animals, characterized by the absence of claws or nails on the fingers and toes; and the presence of a smooth skin, devoid of scales, hair or feathers. Two pairs of legs are normally present, although these may become degenerate or lost completely in some native salamanders, and are absent in the larval stages or tadpoles, of the frogs and toads. Most species undergo metamorphosis in which the larval stages are aquatic, while the adults are adapted for a terrestrial existance.

Key to the Orders

Adults with an elongate postanal tail; hind legs not modified for leaping, or lacking (Salamanders) ..... **Order Caudata**

Adults without a postanal tail; hind legs elongate and modified for leaping (Frogs and Toads) ..... **Order Salientia**

Key to the Salamanders
(Order Caudata)

1. Body eel-like; appendages are very small or absent 2

   Body not eel-like; appendages normal 7

2. With two pairs of small legs; a single pair of gill slits (Family AMPHIUMIDAE) 3

   With only the anterior pair of legs present, and the hind pair lost; external gills present (Family SIRENIDAE) 4

3. Two toes normally present on each leg; 57-60 costal grooves, average 58; length up to 35 inches; found

south of the Fall Line in the eastern part of the state (Two-toed Congo Eel) ..... **Amphiuma means means**

Normally three toes on each leg; 60-64 costal grooves; length up to 40 inches; found south of the Fall Line in the western part of the state (Three-toed Congo Eel) ..... **Amphiuma means tridactylum** 8

4. Four toes on each leg; 3 pairs of gills; body without longitudinal stripes 5

Three toes on each leg; a single pair of gills; body with longitudinal light lines or stripes; may be found in the southeastern corner of the state (Goin's Mud Siren) ..... **Pseudobranchus striatus spheniscus** 9

5. Size large, up to 36 inches; 36-39 costal grooves; color light gray, with sides lighter than the back and the venter bluish with many small dull yellow flecks; found in the Saballian Life Zone (Great Siren) ..... **Siren lacertina** 10

Size small, from 15 to 26 inches; 31-36 costal grooves 6

6. Costal grooves 31-34, usually 33; venter usually without light spots; found in the Saballian Life Zone (Eastern Dwarf Siren) ..... **Siren intermedia intermedia** 11

Costal grooves 34-36, usually 35; sides and venter often with light spots; found in Mobile County? (Texas Dwarf Siren) ..... **Siren intermedia nettingi**

7. A single pair of gill slits opening ventrally behind the head in adults; head and body strongly depressed and the tail compressed; a wrinkled fleshy fold on each side of the body; size up to 27 inches; found in the Tennessee River drainage system (Family

CRYPTOBRANCHIDAE) (Hellbender) ..... **Cryptobranchus alleganiensis**

No gill slits opening ventrally, although external gills may be present; never more than 17 inches long, usually much smaller 8

8. External gills present in adults, although these may be somewhat rudimentary; aquatic species 9

Adults fully transformed, never having external gills, gill rudiments or open gill slits 12

9. Costal grooves absent; gills reduced; five toes on legs (Family SALAMANDRIDAE) 13

Costal grooves well developed; four toes on legs; three pairs of well developed gills (Family PROTEIDAE) 10

10. Ground color above deep brown or russett with few or no large black spots or dots, sometimes with a few small dark spots on the sides of the body and tail; found in streams in Mobile County (Loding's Mudpuppy) ..... **Necturus punctatus lodingi**

Large dark spots present on the body, at least laterally 11

11. A well developed dark bar on the side of the head; large rounded blue-black spots usually scattered over the back and sides; found in the Tennessee River Drainage system (Mudpuppy) ..... **Necturus maculosus maculosus**

Dark bar on side of head poorly developed or absent; many small tan spots forming a reticulate pattern on the back; back, sides and tail with many small to large rounded black spots (Beyer's Mudpuppy) ..... **Necturus maculosus beyeri**

12. Costal grooves absent (Family SALAMANDRIDAE) 13

Costal grooves present 14

13. Olive green above, yellow beneath; a dorsolateral series of small red spots bordered by black present; found in the Upper and Lower Austral Life Zones (Common Newt) ..... **Diemictylus viridescens viridescens**

Yellowish-brown to olive green above; no dorsolateral red spots bordered with black; found in the Sabalian Life Zone (Louisiana Newt) ..... **Diemictylus viridescens louisianensis**

14. A nasolabial groove extending from the nostril to the lip; vomerine and parasphenoid teeth present (Family PLETHODONTIDAE) 20

Without a nasolabial groove; no parasphenoid teeth (Family AMBYSTOMIDAE) 15

15. Tongue with a median groove; 13-15 costal grooves; color deep brown to black with no sharply defined markings 16

Tongue without a median groove; costal grooves usually less than 13 17

16. Ground color black, with light gray fleckings which form a reticulated pattern on the back; costal grooves 13-14; found in the Saballian Life Zone (Bishop's Reticulated Salamander) ..... **Ambystoma cingulatum bishopi**

Ground color deep brown to black with dorsal and lateral surface blotched with grayish or yellowish lichen-like patches; costal grooves 14-15; length up to

six inches; found locally in the northwestern part of the state (Texas Salamander) ..... **Ambystoma texanum**

17. Marked above with 4-7 silvery gray or white cross bands, usually united to enclose a series of large, square to rectangular black spots which extend along the dorsal midline; usually 11 costal grooves; found throughout the state (Marbled Salamander) ..... **Ambystoma opacum**

No white or silvery crossbands 18

18. Costal grooves 10; body short and stout; upper surface deep brown, lighter on the tail; lateral and ventral surfaces gray, with numerous blotches on the sides; found locally south of the Fall Line (Mole Salamander) ..... **Ambystoma talpoideum**

Costal grooves usually 12; yellow or orange spots present 19

19. Black, with a dorsolateral series of rounded, well defined yellow or orange spots; sides of body dark gray, and ventral surface pale slate without markings; found locally south of the Fall Line, although it may be found throughout the state (Spotted Salamander) ..... **Ambystoma maculatum**

Ground color of back and sides, deep brown to dull black, while the ventral surface is yellow; numerous olive to brownish-yellow spots or blotches on back, sides and ventral surfaces; probably found throughout the state (Eastern Tiger Salamander) ..... **Ambystoma tigrinum tigrinum**

20. Tips of toes expanded and truncate; first toes of all legs very small, almost completely enclosed in webs so that superficially the front legs seem to have three toes and the hind legs four; ground

color black on back and sides, with yellow-green, irregular patches; belly light yellow to bluish gray; found north of the fall line (Bronze Salamander) ..... **Aneides aeneus**

Four toes on the fore-legs, and four or five on the hind legs; toes not expanded at the tips 21

21. Four toes on both the fore and hind legs ..... 22 26.
Four toes on the fore legs and five on the hind legs 23

22. Tail with a basal constriction; belly yellow with black flecks; 13-14 costal grooves; found locally in the northern part of the state (Eastern Four-toed Salamander) ..... **Hemidactylium scutatum** 27.

Tail without a basal constriction; belly yellow but without black spots; 15-16 costal grooves; found in the Saballian Life Zone (Dwarf Four-toed Salamander) ..... **Manculus quadridigitatus**

23. Tongue with a central pedicel, free all around 24

Pedicel of the tongue anterior, not central in position, so that the sides and posterior part of the tongue are free ..... 35 28.

24. A light line (Canthus rostralis) extending from the eye to the nares, bordered by black; ground color usually salmon 25

No canthus rostralis present; ground color yellow or red, but if the latter, with dark spots present on the back and sides 26

29.

25. Costal grooves 17, rarely 18; canthus rostralis bordered externally by gray; back strongly clouded or mottled a light-yellowish-brown, with reddish tints; sides with a darker reticulate pattern; found north of the Fall Line (Northeastern Purple Salamander) ..... **Gyrinophilus porphyriticus porphyriticus**

Costal grooves 18; canthus rostralis bordered externally by a wide, dark brown margin; ground color orange-yellow to light reddish; numerous brown flecks scattered over the dorsal and lateral surfaces; found on the slopes of Cheaha Mountain (Carolina Purple Salamander) ---- **Gyrinophilus danielsi dunni**

26. Costal grooves 14; body slender; ground color yellow or red ---- 30

Costal grooves 16-18; body stout; ground color red or reddish ---- 27

27. Dorsal ground color clear red to brownish-salmon, with dorsal and lateral small to large, round, well separated spots, snout short and normally strongly convex above; no suggestion of a canthus rostralis ---- 28

Dorsal ground color coral-red to dark purplish-brown; dorsal and lateral spots on young specimens small, but tending to fuse in adults; snout longer, less convex; a slight suggestion of a canthus rostralis present ---- 29

28. Ground color above light brownish-salmon; dorsolateral dark brown spots small and well distributed; found south of the Black Belt (Gulf Coast Red Salamander) ---- **Pseudotriton montanus flavissimus**

Ground color bright pink to red; dorsal dark spots large, well separated and sparse; found in the northwestern part of the state (Central Red Salamander) ---- **Pseudotriton montanus diastictus**

29. Ventral surface usually strongly spotted; found south of the Fall Line (Viosca's Red Salamander) ---- **Pseudotriton ruber vioscai**

Ventral surface without dark spots; found north of the Fall Line (Northern Red Salamander) ---- **Pseudotriton ruber ruber**

30. Ground color red, with black spots scattered on the back and sides; no definite longitudinal stripes; found in and around caves in the northern part of the state (Cave Salamander). ——— **Eurycea lucifuga**

Ground color usually yellow; a definite broad dorsal light band limited on either side by a series of large spots or a continuous band ——— 31

31. Three to five costal folds between appressed toes; tail slightly more than one-half the total length ——— 33

One to two costal folds between appressed toes; tail long and slender, two-thirds of the total length ——— 32

32. Ventral surface mottled with dark gray and dull yellow; a well developed black line extending down the middle of the back; found in most of the Lower Austral and Saballian Life Zones (Three Lined Salamander) ——— **Eurycea longicauda guttolineata**

Ventral surface immaculate; an irregular series of black spots extending down the midline of the back; found in the northern part of the state (Long Tailed Salamander) ——— **Eurycea longicauda longicauda**

33. With 14 costal grooves; lateral dark stripes extend to the tip of the tail; adult males with prominent cirri; found throughout most of the state (Southern Two Lined Salamander) ——— **Eurycea bislineata cirrigera**

With 15 costal grooves; lateral dark stripes not continuous to the tip of the tail; cirri of males small ——— 34

34. Lateral dark stripes heavy, black, with a straight upper edge, continuous on the basal half of the tail and broken into a series of spots towards the tip; sides below the lateral black stripes marked with defin-

ite black spots; found on Cheaha Mountain (Blue Ridge Two Lined Salamander) ..... **Eurycea bislineata wilderae**

Lateral stripes irregular, invaded by light areas; sides below this stripe grayish or mottled; found on the northeastern border of the state? (Northern Two-Lined Salamander) ..... **Eurycea bislineata bislineata**

35. A light bar extending from the posterior angle of the eye to the angle of the jaw; tail trigonal or circular in cross-section 37

No light bar extending from the eye to the angle of the jaw; tail always circular in cross-section 36

36. Bluish-black to black, with white spots on the back and sides, often fused into an interrupted band of white on the sides; 16 costal grooves; found throughout the state (Slimey Salamander) ..... **Plethodon glutinosus glutinosus**

Usually with a broad longitudinal red or reddish-brown band on the back; no sharply delineated white spots; usually 17 costal grooves; found north of the Fall Line (Southern Red Backed Salamander) ..... **Plethodon cinereus dorsalis**

37. Tail oval to circular in section; small species with a reddish-brown longitudinal broad band on the back; found locally north of the Black Belt (Alabama Pigmy Salamander) ..... **Desmognathus aeneus chermocki**

Tail trigonal in cross-section, often keeled above 38

38. With 13, rarely 14 costal grooves; vomerine teeth present in the adults; belly uniformly but lightly pigmented; found in the Upper Austral Life Zone (Seal Salamander) ..... **Desmognathus monticola monticola**

With 14 or 15 costal grooves; vomerine teeth absent in adults; belly usually mottled in color 39

39. Belly dark, sometimes bluish-black and mottled with white; back brown to black; found in the Saballian Life Zone (Southern Dusky Salamander) ..... **Desmognathus fuscus auriculatus**

Belly light, only lightly pigmented or mottled 40

40. Back with an irregularly margined dorsal longitudinal light band; sides normally without a series of small light spots; lower surface flesh-colored, tinged with bluish, and varied by small white fleckings; found north of the Black Belt (Northern Dusky Salamander) ..... **Desmognathus fuscus fuscus**

No longitudinal dorsal band, or at least a poorly defined one; usually a row of small light spots on the sides; found in the Black Belt and south to the Saballian Life Zone (Brimley's Salamander) ..... **Desmognathus fuscus brimleyorum**

Key to the Frogs and Toads

(Order Salientia)

1. Paratoid glands prominent on the back of the head 2

No Paratoid glands present 6

2. Paratoid glands round; no cranial crests; skin relatively smooth; pupil of eye vertical; found in the Saballian and Lower Austral Life Zones (Family PELOBATIDAE) (Spadefoot Toad) ..... **Scaphiopus holbrooki holbrooki**

Paratoid glands elliptical; cranial crests present; skin with warts; pupil of eye not vertical (Family BUFONIDAE) 3

3. Adults small, 19-32 mm. long; vocal sac sausage shaped; tympanum small; snout long; bright yellow stripe down the middle of the back; many red tubercles on the body; found in the Saballian Life Zone (Oak Toad) ..... **Bufo quercicus**

Adults large, 40-118 mm. long; snout short; mouth and tympanum large 4

4. Small uniform warts on back, with several warts in each dark dorsal spot; ventral surface usually unspotted; paratoids narrow, and normally in contact with the postorbital crest; usually a light line down the middle of the back; found throughout the state (Fowler's Toad) ..... **Bufo woodhousei fowleri**

Large dorsal warts, with usually only a single wart in each dark dorsal spot; ventral surface often with black spots; paratoid glands broadly oval, fairly close together, and separated from the postorbital crests; usually no light line on the back 5

5. Cranial crests large, with knobs in the rear; skin finely and evenly roughened with tubercles between the larger warts; found in the Saballian Life Zone (Southern Toads) ..... **Bufo terrestris terrestris**

Cranial crests low, with knobs absent or small; large, occasionally spiney warts on the back, between which are smaller irregular warts; found in the Upper and Lower Austral Life Zones (American Toad) ..... **Bufo terrestris americana**

6. With a transverse fold of skin across the head behind the eyes; no tympanum present; no webs on the toes; eyes small and depressed; length 19-41 mm. (Family MICROHYLIDAE) found throughout the state (Eastern Narrow Mouthed Toad) ..... **Microhyla carolinensis carolinensis**

Without a transverse fold of skin behind the eyes 7

7. Skin on belly granular; toes usually terminating with expanded adhesive disks (Family HYLIDAE) ---- 16

Skin on belly smooth; toes not expanded at the tips, and usually with extensive webbing (Family RANIDAE) ---- 8

8. Dorsolateral folds distinct and extending the full length of the body; regular black spots on the back; tympanum of the male smaller than the eye ---- 9

Dorsolateral folds absent, or incomplete and not extending the full length of the body; tympanum of the male larger than the eye ---- 13

9. Without a white line on the upper jaw; numerous small dark spots scattered over the back ---- 10

With a white line on the upper jaw; dark spots large, fewer in number and regularly arranged ---- 11

10. Head triangular in outline; dorsolateral folds high and narrow; numerous prominent warts on the back; ventral surface usually spotted from the chin to the middle of the body; dark bars on the rear of the hind limbs, separated by light interspaces which are never wider than the bars; found in Mobile County (Dusky Gopher Frog) ---- **Rana sevosa**

Head subtriangular; dorsolateral folds low and broad; back usually smooth or with small warts; dorsal spots well defined against a pale ground color; belly usually without spots; dark bars on the hind limbs separated by light interspaces which are wider than the bars; possibly found in the southeastern corner of the state (Florida Gopher Frog) ---- **Rana capito**

11. No orange on lower surfaces; dorsal spots round, with interspaces equal to, or wider than the diameter of the spots 12

Orange on lower surfaces; dorsal spots square and in regular rows, with the interspaces narrower than the diameter of the spots; found in the Upper Austral Life Zone (Pickerel Frog) ..... **Rana palustris**

12. Snout short (6.0 - 6.8 in L.); more lateral spots below the dorsolateral folds; tympanum usually without a light center; found in the Upper Austral Life Zone (Meadow Frog) ..... **Rana pipiens pipiens**

Snout long (5.23 - 6.3 in L.); fewer lateral spots below the dorsolateral folds; tympanum with a light center; found in the Lower Austral and Saballian Life Zones (Southern Meadow Frog) ..... **Rana pipiens sphenocephala**

13. Dorsolateral folds incomplete, present on the anterior end of the body, but disappearing posteriorly; cheek green with a mottled jaw; rear of femur with fine specklings; size 2-4 inches; found throughout the state (Green Frog) ..... **Rana clamitans**

No dorsolateral folds present 14

14. Rear of femur with alternating light and dark horizontal bands; edge of jaw uniformly colored 15

Rear of femur with light or white spots; edge of jaw mottled; found in the Saballian Life Zone (Hecksher's Frog) ..... **Rana hecksheri**

15. Alternation of color on rear of femur conspicuous; first finger generally shorter than the second; intertympanic space narrow; found in the Saballian Life Zone (Southern Bullfrog) ..... **Rana grylio**

Alternation of color on rear of femur not conspicuous; first finger normally equal in length to the second;

intertympanic space wide; found throughout the state (Bullfrog) ..... **Rana catesbeiana**

16. Vertical dark and light bars on margin of the upper jaw; tips of toes not expanded into disks, or very weakly so; parallel longitudinal dark and light bands on rear of femur; white margined triangle between eyes 17

No alternating light and dark vertical bars on jaws; tips of toes expanded; no parallel longitudinal dark and light bands on rear of femur; if a triangle between the eyes, it is not margined with white ..... 18 — 20.

17. Two prominent white tubercles below the vent; skin smooth; webbing on hind foot more extensive with toe one completely webbed, and 2-2½ phalanges of the fourth toe webbed; probably found throughout the state (Cricket Frog) ..... **Acris gryllus crepitans** — 21.

Tubercles below the vent absent or weak; skin more rugose; webbing of hind foot less extensive, with toe one being partly free, and three phalanges of the fourth toe being free; found in the Saballian Life Zone, although it may be more widespread (Southern Cricket Frog) ..... **Acris gryllus gryllus**

18. Toes on the hind legs not webbed or only slightly so, the web never extending beyond the basal segment of the longest toe; disks on toes less than half as wide as the tympanum; no cross on back; usually a triangle or spot between the eyes ..... 19 — 22.

Web extending beyond the basal segment of the movable portion of the longest toe on the hend leg; toes expanded into disks which are at least one-half as wide as the tympanum; a cross may be present on the back ..... 23 — 23.

19. Size very small, 11.5-17.5 mm. long; dorsal stripes usually absent; usually a stripe extending behind the eye;

hind legs almost twice the length of the body; found in the southeastern corner of the state (Least Chorus Frog) ..... **Pseudacris ocularis**

Size larger, 19-48 mm. in length; 4 or 5 dark stripes or rows of spots present on the back and sides, although these may be absent in **ornata**; hind legs only slightly longer than the body 20

20. Five rows of spots or stripes usually present on the back and sides; a dark triangle between the eyes 21

Two or four stripes or rows of spots on back and sides 22

21. Three distinct rows of elongate longitudinal spots on the back which usually fuse to form lines; found in the Upper and Lower Austral Life Zones (Three Lined Swamp Cricket Frog) ..... **Pseudacris nigrita triseriata**

Longitudinal stripes usually broken up into small round, rarely elongate spots; skin frequently rugose; found in the Saballian Life Zone (Swamp Cricket Frog) ..... **Pseudacris nigrita nigrita**

22. Broad dorsal spots often forming a cross on the back; found locally south to the Black Belt (Mountain Chorus Frog) ..... **Pseudacris brachyphona**

Broad dorsal spots usually lacking; lateral stripes broken into dark, well defined spots; a distinct mask present behind the eye; found in the Saballian Life Zone (Ornate Chorus Frog) ..... **Pseudacris ornata**

23. A dark brown or black stripe or band in front of, behind the eye, or both 26

No dark brown or black or plum colored stripe in front of, or behind the eye 24

24. No bar or stripe between the eyes; rear of femur purple; throat with green on either side 25

A bar between the eyes; throat not green on each side; rear of femur orange or ochre; back black, green or brown, usually spotted; found south of the Fall Line (Squirrel Tree Frog) ..... **Hyla squirrella**

25. Back smooth, green, with occasional small light spots irregularly placed; body slender; found in the Saballian and most of the Lower Austral Life Zones (Green Tree Frog) ..... **Hyla cinerea cinerea**

Back usually granular, green, evenly covered with round or elliptical dark spots, encircled with black; found in the Saballian Life Zone and locally in the Lower Austral (Barking Frog) ..... **Hyla gratiosa**

26. Rear of femur unspotted; usually a transverse bar between the eyes 27
Rear of thigh spotted or otherwise marked 28

27. Very few and indistinct spots on the chest; a stripe along the margin of the upper jaw; dorsal stripes narrow; found throughout the state (Spring Peeper) ..... **Hyla crucifer crucifer**

More or less pronounced spotting on the ventral surface; dark spots along the margin of the upper jaw; dorsal stripes or cross is broad; found in Houston County (Florida Spring Peeper) ..... **Hyla crucifer bartramia**

28. Rear of thigh brown, with no network of dark markings, and with distinct round to elliptical orange-yellow spots; a cross shaped spot on the back; no light spot below the eye; skin more or less smooth; found south of the Black Belt (Pine Woods Tree Frog) ..... **Hyla femoralis**

Rear of thigh with a dark network of markings; a light spot present below the eye; skin usually rough 29

29. Rear of thigh with green markings enclosed in a darker network; groin also green; crosslike marking on back in the center or towards the rear; back fairly smooth; found south of the Fall Line (Bird Voiced Tree Frog) ..... **Hyla avivoca**

Rear of thigh with orange markings instead of green; skin rough; dorsal cross located on the anterior half of the back; found throughout the state (Common Tree Frog) ..... **Hyla versicolor versicolor**

Key to the Eggs of Frogs and Toads

1. Eggs deposited singly 2

Eggs deposited in clusters, strings or masses 6

2. Eggs enclosed in two membranes; the outer membrane 1.4-2.0 mm. in diameter; the inner membrane 1.2-1.6 mm. in diameter; the vitellus 1.2 - 1.4 mm. in diameter ..... **Hyla squirrella**

Egg enclosed within a single membrane 3

3. Membrane 2.3 mm. or larger in diameter 4

Membrane 1.2 - 2.0 mm. in diameter 5

4. Membrane loose, indefinite in outline; a well developed vitelline membrane present; vitellus 1.0 - 1.8 mm. in diameter ..... **Hyla gratiosa**

Membrane well defined; vitelline membrane not delineated; vitellus 0.9 - 1.0 mm. in diameter ..... **Acris gryllus**

5. Vitellus small, 0.6 - 0.8 mm. in diameter ..... **Pseudacris ocularis**

Vitellus large, 0.9 - 1.1 mm. in diameter ..... **Hyla crucifer crucifer**

6. Eggs laid in bands or strings 7

Eggs laid in clusters or masses 11

7. Eggs attached together into beadlike strings, the sides of which are crenulate or scalloped 8

Eggs attached in strings, enclosed within a tube with parallel sides 9

8. Eggs in short beadlike strings of 4 to 8; vitellus 0.8 - 1.0 mm. in diameter ..... **Bufo quercicus**

Eggs in bands, changing into loose cylinders with poorly defined membranes; vitellus 1.4 - 2.0 mm. in diameter ..... **Scaphiopus holbrooki holbrooki**

9. Chain of eggs enclosed in a single tube; vitellus 1.0 - 1.4 mm. in diameter ..... **Bufo woodhousei fowleri**

Chain of eggs enclosed in a double tube, the membrane of the inner tube occasionally weakly defined 10

10. Membranous partitions present between the individual eggs; inner membrane of the tube well defined; vitellus 1.0 - 1.4 mm. in diameter ..... **Bufo terrestris americanus**

No partitions between the individual eggs; inner membrane of the tube may be poorly defined; vitellus 1.3 - 1.4 mm. in diameter ..... **Bufo terrestris terrestris**

11. Eggs floating free on the surface of the water 12
Eggs attached, normally submerged 18

12. Eggs enclosed in a single membrane; vitellus always black and white in color 13

Eggs enclosed in a double membrane, the outer usually poorly defined 14

13. The single egg flattened or truncate above; diameter of the outer membrane 2.8 - 4.0 mm.; vitellus 0.1 - 1.2 mm. in diameter; eggs laid in small films of 10-90 eggs ..... **Microhyla carolinensis carolinensis**

The single egg round, not flattened; outer membrane poorly defined, merging into the jelly-like film; diameter of vitellus 1.2 - 1.7 mm.; eggs laid in a large mass sometimes two feet in diameter ..... **Rana catesbiana**

14. Eggs black above and white below; egg masses large 15

Eggs brown above, cream or yellow below; egg masses small, normally less than 4 x 5 inches in diameter 16

15. Eggs in masses of 5 x 7-12 inches in diameter, and usually located on the edge of ponds; inner membrane 3.05 mm. in diameter ..... **Rana clamitans**

Eggs in masses of 12 x 12-25 inches in diameter; usually laid in mid pond; inner membrane averages 3.45 mm. in diameter ..... **Rana grylio**

16. Inner membrane large, 2.2 - 3.4 mm. in diameter; outer membrane 3.2 - 5.0 mm. in diameter; vitellus 0.8 - 1.6 mm. ..... **Hyla cinerea cinerea**

Inner membrane small, 1.4 - 2.0 mm. in diameter 17

17. Eggs laid in small groups of 30-40 eggs; vitellus 1.1 - 1.2 mm. in diameter ..... **Hyla versicolor versicolor**

Eggs in larger groups of 100-125 eggs; vitellus 0.8 - 1.2 mm. in diameter, averaging 0.95 mm. ..... **Hyla femoralis**

18. Eggs layed in masses; individual eggs enclosed in two well defined membranes 19

Eggs laid in loose, irregular clusters of usually 10-40 eggs, and often covered with sediment; egg usually encased in a single, poorly defined membrane, rarely two 22

19. Eggs brown above and yellow below; laid in a spherical mass of two to three thousand eggs ..... **Rana palustris**

Eggs normally black above and white below; usually laid in a mass in the form of a flattened sphere 20

20. Vitellus 1.8 - 2.4 mm. in diameter; inner membrane 3.1 -4.4 mm.; outer membrane 4.4-6.0 mm.; egg mass 6 x 8 inches ..... **Rana capito**

Vitellus 1.4 - 1.8 mm. in diameter 21

21. Outer membrane averages 5.1 (4.2 - 6.0) mm.; inner membrane averages 2.25 (1.5 - 3.4) mm.; vitellus averages 1.7 (1.3-2.0) mm. ..... **Rana pipiens pipiens**

Outer membrane smaller, averaging 3.8 (3.4 - 5.4) mm.; inner membrane varies from 2.4 - 3.2 mm.; vitellus averages 1.6 (1.4 - 1.8) mm. in diameter ..... **Rana pipiens sphenocephala**

22. Egg encased in two membranes, the inner well defined, the outer poorly defined; vitellus 0.9 - 1.2 mm. in diameter ..... **Pseudacris nigrita triseriata**

Egg encased in a single membrane 23

23. Vitellus small, 0.9 - 1.2 mm. in diameter ..... **Pseudacris nigrita triseriata**

Vitellus averages 1.6 mm. in diameter 24

24. Membrane 6.0 - 8.5 mm. in diameter ..... **Pseudacris brachyphona**

Membrane 3.2 - 4.2 mm. in diameter ..... **Pseudacris ornata**

Key to the Tadpoles

1. Mouth disk absent, with no labial teeth or horny beaks or mandibles; spiracle median in position, opening slightly anterior to the anus ..... **Microhyla carolinensis carolinensis**

Mouth disk present, with the upper and lower labial teeth and at least the upper horny beak present; spiracle opening on the left side of the body 2

2. Anus opening along the midline at the base of the tail; eyes dorsal, small, and usually fairly close together 3

Anus opening on the right side of the body at the base of the tail; eyes dorsal or lateral in position, medium to large in size 6

3. Five to six upper and lower labial tooth rows; papillae completely surrounding the lip except for a short gap on the upper lip; length 28 mm.; tail short and rounded ..... **Scaphiopus holbrooki holbrooki**

Two rows of upper labial teeth and three rows of lower labial teeth; papillae present only on the sides of the mouth 4

4. Median space between the lateral parts of the middle row of the upper labial teeth equal or longer than one-half the length of either part of the row of teeth 5

Median space between the lateral parts of the middle row of upper labial teeth less than one-half the

length of either of the lateral parts; length 27 mm. ---------- **Bufo woodhousei fowleri**

5. Mouth slightly longer than the distance between the eyes; mouth less than one and one-half times the distance between the nares; length 26 mm.; black in color ---------- **Bufo terrestris terrestris**

Mouth slightly shorter than the distance between the eyes; mouth more than one and one-half times the distance between the nostrils; length 27 mm.; dark, almost black in color ---------- **Bufo terrestris americana**

6. Lateral margins of mouth deeply indented ---------- 7
Lateral margins of the mouth not deeply indented ---- 14

7. Horny beaks with wide, heavy black edges; nostrils fairly large and well defined; skin on abdomen thin so that the viscera are plainly visible ---------- 8

Horny beaks with thin, narrow black edges; nostrils small, frequently poorly defined; skin on abdomen thick so that the viscera are normally not plainly visible ---------- 11

8. Belly strongly pigmented in living specimens, white in preserved specimens; tail covered with large prominent dark spots; length 84 mm.; greenish above, yellow beneath ---------- **Rana capito**

Belly not strongly pigmented in living specimens, appearing dark in preserved specimens; tail not covered with large prominent dark spots ---------- 9

9. Median space of inner row of upper labial teeth more than twice the length of either part of the remaining tooth row; tadpole 76 mm. in length; greenish in color; tail crests black or clouded, with the remainder of the tail covered with fine black dots; belly cream colored ---------- **Rana palustris**

Median space of inner row of upper labial teeth less than twice the length of either of the lateral parts 10

10. Nostril located midway between the snout and eye; tail crest with wide prominent dark spots; greatest length of tadpole is 74 mm. ..... **Rana pipiens sphenocephala**

Nostril closer to the eye than the tip of the snout; tail crest usually translucent, with fine spots; maximum length of tadpoles is 84 mm. ..... **Rana pipiens pipiens**

11. Tadpole with a prominent, continuous black margin around the tail, and a black muscular band; maximum length is 97 mm. ..... **Rana hecksheri**

Tadpole without the conspicuous band or margin on the tail 12

12. Tail less than twice as long as high; median space of inner row of upper labial teeth 2½ to 4½ times as long as either of the lateral parts; maximum length of 100 mm. ..... **Rana grylio**

Tail more than twice as long as high 13

13. Median space of inner row of upper labial teeth less than twice as long as either lateral part; tadpole olive in color, with fine black speckling; maximum length of 165 mm. ..... **Rana catesbeiana**

Median space of inner row of upper labial teeth more than six times as long as either lateral part; tadpole olive green in color, its tail mottled with brown; maximum length of 64 mm. ..... **Rana clamitans**

14. Two rows of lower labial teeth; eyes slightly dorsal and frequently not visible from the ventral view; tip of

tail usually jet black in color; maximum length of 45 mm. ---- **Acris gryllus**

Three rows of lower labial teeth; eyes lateral in position ---- 15

15. Outer row of lower labial teeth shorter than the horny beak and less than one-half as long as the inner row ---- 16

Outer row of lower labial teeth longer than the horny beak and more than one-half as long as the inner row ---- 21

16. Eye located midway between the spiracle and the tip of the snout; maximum length of 33 mm. ---- 17

Eye located nearer to the spiracle than to the tip of the snout; tadpoles with a maximum length of 50 mm. ---- 20

17. No distinct brown lateral band on the tail; no papillae on the lower lip outside of the outer lower labial row of teeth ---- **Hyla crucifer**

Tail with a distinct brown lateral band; papillae present below the outer lower labial row of teeth ---- 18

18. Black spots scattered over the dorsal surface; maximum length of 23 mm. ---- **Pseudacris ocularis**

No obvious black spots on the back ---- 19

19. Tail less than 2½ times as long as deep; distance between the nares twice as long as the width of the mouth; black-brown above, bronze-black beneath; maximum length of 25 mm. ---- **Pseudacris brachyphona**

Tail more than 2½ times as long as deep; distance between the nares less than twice as long as the width

of the mouth; dark black with bronze sides and venter; maximum length of 23 mm. ..... **Pseudacris nigrita**

20. Tadpoles green with a black saddle-shaped spot on the back near the base of the tail, and a light line extending from the eye to the tail ..... **Hyla gratiosa**

Tadpoles green, without a black spot on the back, but with a light line extending from the eye to the tail ..... **Hyla cinerea cinerea**

21. Dorsal crest of the tail extends to the level of the eyes; body greenish, with the tail sprinkled with distinct black dots; maximum length of 32 mm. ..... **Hyla squirrella**

Dorsal crest of tail does not extend to the level of the eyes 22

22. Tail with 3 to 5 longitudinal bands; body olive-black; tadpole 33 mm. in length ..... **Hyla femoralis**

Tail without longitudinal bands, instead being orange to red in color, with black blotches near the margins of the crests; maximum length of 50 mm. ..... **Hyla versicolor versicolor**

A KEY TO THE REPTILES OF ALABAMA

The Class Reptilia includes the turtles, snakes, lizards, alligators and crocodiles. The members of this group found in Alabama are characterized by the presence of scales on the body, and claws on the legs. Two pairs of legs are present in most forms, although they are lost in the snakes and glass snakes. These animals undergo no metamorphosis, and are permanently adapted for a terrestrial existance, breathing by means of lungs, although some forms living in water may have accessary respiratory organs.

Key to the Suborders

1. Body enclosed in a boney or leathery shell (Turtles, Terrapins and Tortoises) ..... **Order Testudinata**

   Body not enclosed in a boney or leathery shell 2

2. Anal opening a longitudinal slit (Alligators and Crocodiles) ..... **Order Loricata**

   Anal opening a transverse slit **(Order Squamata)** 3

3. Legs usually present, but if absent, an external tympanum is present; abdomen covered with many rows of scales (Lizards and Glass Snakes) ..... **Suborder Sauria**

   Legs absent; no external tympanum; abdomen with a single row of undivided transverse scales anterior to the vent (Snakes) ..... **Suborder Serpentes**

Key to the Alligators and Crocodiles
(Order Loricata)

Snout broad; fourth tooth in the lower jaw not exposed when the mouth is closed; found south of the Fall Line (Alligator) ..... **Alligator mississippiensis**

Snout narrow; fourth tooth in the lower jaw exposed when the mouth is closed; found along the coast in Mobile and Baldwin Counties, but now probably extinct (Crocodile) ..... **Crocodilus acutus**

Key to the Turtles
(Order Testudinata)

1. Limbs modified to form paddles, with the toes not normally separate; the wrist and ankle joints rigid; marine species 2

Limbs not modified to form paddles, the fingers normally distinguishable although they may be connected by membranes; wrist and ankle joints movable 6

2. Shell covered with a leathery skin; found in the Gulf of Mexico (Family DERMOCHELIDAE) (Atlantic Leatherback Turtle) ..... **Dermochelys coriacea coriacea**

Shell covered with horny plates or scales (Family CHELONIIDAE) 3

3. Four costal plates on each side of the carapace 4
More than four costal plates on each side of the carapace 5

4. A single pair of prefrontal scales on the head; the plates of the carapace smooth, not keeled; color predominantly brownish; found along the Gulf of Mexico (Atlantic Green Turtle) ..... **Chelonia mydas mydas**

Two pairs of prefrontal scales on the top of the head; the vertebral plates of the carapace keeled; found along the Gulf of Mexico (Atlantic Hawksbill Turtle) ..... **Eretmochelys imbricata imbricata**

5. Four enlarged plates, in addition to numerous small ones, at the juncture of the bridge to the carapace; color grey to olive-green; from along the Gulf of Mexico (Atlantic Ridley) ..... **Lepidochelys kempii**

Three enlarged plates, in addition to numerous small ones, at the juncture of the bridge to the carapace; color brown or reddish-brown; found along the Gulf of Mexico (Atlantic Loggerhead) ..... **Caretta caretta caretta**

6. Carapace soft and flexible, covered with a leathery skin; snout projected into a narrow, soft proboscis;

found in the Lower Austral and Saballian Life Zones (Family TRIONYCHIDAE) (Southern Spiny Soft-shelled Turtle) ..... **Amyda ferox aspersa**

Carapace hard and covered with horny plates; snout not projected into a soft proboscis 7

7. Plastron small, narrow, cross-shaped, and composed of four pairs of plates exclusive of the bridge; tail more than half the length of the shell (Family CHELYDRIDAE) 8

Plastron larger, not cross-shaped, and composed of 5 or 6 pairs of plates exclusive of the bridge 9

8. Head covered with smooth symmetrical plates; underside of the tail covered with numerous rounded scales; the costal and vertebral plates of the carapace strongly keeled; an extra row of plates (The supramarginals) between the marginal and costal plates; found south of the Fall Line (Alligator Snapping Turtle) ..... **Macrochelys temminckii**

Head covered with soft skin; the underside of the tail with large plates more or less arranged in a double row; no supramarginal plates; plates of the carapace at most only slightly keeled; found throughout the state (Common Snapping Turtle) ..... **Chelydra serpentina serpentina**

9. Plastron composed of five pairs of plates, usually preceded by an unpaired one; pectoral plates of the plastron are not in contact with the marginals (Family KINOSTERNIDAE) 10

Plastron composed of 6 pairs of plates exclusive of those of the bridge; pectoral plates normally in contact with the marginals 14

10. Pectoral plates quadrangular in shape; the anterior part

of the plastron shorter than the posterior part, and not, or weakly hinged 12

Pectoral plates of the plastron are triangular in shape; the anterior and posterior parts of the plastron are of nearly equal length and movable on a transverse hinge 11

11. Side of the head spotted with yellow, the spots more or less arranged in two rows; found throughout the state (Common Mud Turtle) ..... **Kinosternon subrubrum subrubrum**

Side of head with two yellow lines; found in Mobile and Baldwin Counties (Mississippi Mud Turtle) ..... **Kinosternon subrubrum hippocrepis**

12. Usually two light stripes on each side of the head, if these are absent, the head is uniformly dull black; found throughout the state (Common Musk Turtle) ..... **Sternotherus odoratus**

No light stripes on the side of the head, although light spots or dark lines may be present 13

13. Dark stripes on the head; no keels on the costal plates of the carapace; found north of the Black Belt (Tennessee Musk Turtle) ..... **Sternotherus carinatus peltifer**

Head without dark stripes, but with dark spots; the costal plates of the carapace are normally keeled; found south of the Black Belt (Loggerhead Musk Turtle) ..... **Sternotherus carinatus minor**

14. Hind limbs are stump-shaped and the toes do not have webbing; the forelimbs are large and modified for digging; 24 marginal plates; found in the Saballian Life Zone (Family TESTUDINIDAE) (Gopher Tortoise) ..... **Gopherus polyphemus**

Limbs not as above, the toes more or less webbed (Family EMYDIDAE) 15

15. A transverse hinge between the pectoral and abdominal plates of the plastron; the carapace is strongly arched 16

The plastron is not hinged; the carapace normally low 18

16. Three claws on the hind foot; plastron is usually yellow and without markings; small yellow or orange spots on the anterior surface of the fore legs; found in the Lower Austral Life Zone south of the Fall Line (Three-toed Box Turtle) ..... **Terrapene carolina triunguis**

Normally four claws on each hind leg; usually no light spots on the front of the fore legs; color of the plastron variable, frequently with dark brown or black markings 17

17. Posterior margin of the carapace flaring; the sides of the head are often unspotted; plastron often nearly black with broad broken radial lines or no markings; carapace elongate; found in the Saballian Life Zone (Gulf Coast Box Turtle) ..... **Terrapene carolina major**

Posterior margin of the carapace not flaring; carapace usually marked with yellow-orange spots or stripes; plastron usually with dark brown to black spots or blotches; found north of the Black Belt (Common Box Turtle) ..... **Terrapene carolina carolina**

18. Plates of the carapace with concentric, well developed and deep growth rings; the vertebral plates are keeled; head and neck without longitudinal stripes 19

Plates of the carapace smooth, or with only shallow growth rings; the vertebral plates may or may not be keeled; head and neck normally with longitudinal stripes ---- 20

19. The plates of the carapace with well defined yellow or orange centers; found along the coastal area of the state (Florida Diamond-back Terrapin) ----
---- **Malaclemys terrapin macrospilota**

The carapace is usually black or dark brown in color; found along the coastal area of the state (Mississippi Diamond-back Terrapin) ----
---- **Malaclemys terrapin pileata**

20. Neck extremely long, with the distance between the tip of the snout and the shoulder equal to the length of the plastron; hind surface of the thigh usually with conspicuous vertical stripes; found in the Saballian Life Zone (Chicken Turtle) ----
---- **Deirochelys reticularia**

Neck comparatively short, with the distance between the tip of the snout to the shoulder usually about half as long as the plastron. ---- 21

21. Crushing surface of the upper jaw smooth, without a ridge or tubercles; hind margins of the carapace strongly serrate or toothed ---- 22

Crushing surface of the upper jaw with a median ridge or row of tubercles running parallel to its margin; hind margin of the carapace is usually smooth, or only moderately serrate ---- 25

22. A broad yellow stripe on the top of the head between the eyes, connected to broad yellow patches behind each eye ---- 23

Only narrow yellow lines on top of the head between the eyes, with the medial line extending from the

snout, not connected to the line or patch behind the eye 24

23. Costal plates with thin, U-shaped marks; a thin yellow stripe extends posteriorly from each broad patch behind the eye; found in the southeast corner of the state (Barbour's Sawback Turtle) .....
.....**Graptemys barbouri**

Carapace with a reticulate pattern of light lines which intersect each other at right angles on each plate; a broad yellow stripe extends posteriorly from each patch behind the eye; found in central, and possibly western Alabama between the Fall Line and the Saballian Life Zone (Alabama Sawback Turtle) ....
.....**Graptemys pulchra**

24. A crescent-shaped yellow mark behind each eye; the posterior margin of the carapace is strongly toothed; young animals with a complex pattern on the plastron; found in the southwestern part of the state (Mississippi Sawback Turtle) .....
.....**Graptemys pseudogeographica kohnii**

Without a crescent-shaped yellow mark behind the eye; often with a longitudinal broad yellow patch some distance behind each eye; the posterior margin of the carapace is not deeply serrate; found along the northern border of the state (Common Map Turtle)
.....**Graptemys geographica**

25. Carapace smooth, not wrinkled, and without a keel; hind margin of the carapace smooth, not serrate; a notch at the top of the upper jaw, with a protuberance on each side 26

Carapace with longitudinal wrinkles, or with a more or less complete keel; carapace with a serrate or toothed hind margin; tip of the upper jaw without a notch flanked on each side by a protuberance .. 28

26. A dark, regular figure along the midline of the plastron; the costal plates of the carapace alternate with the vertebrals; found in the northern part of the state (Midland Painted Turtle) ..... **Chrysemys picta marginata**

Plastron yellow, without spots 27

27. A broad yellow stripe on the midline of the carapace; the sutures between the second and third vertebral plates alternating with the sutures of the costals; found in the southwestern part of the state (Southern Painted Turtle) ..... **Chrysemys picta dorsalis**

A narrow, sometimes incomplete yellow stripe on the midline of the carapace; the vertebral and costal plates often margined with yellow; the sutures between the costals are continuous or almost continuous with the sutures between the vertebral plates; found in the southeastern part of the state (Eastern Painted Turtle) ..... **Chrysemys picta picta**

28. Edges of both jaws smooth, without teeth at the tip, or at most only weakly serrate; underside of the mandible rounded; grinding surface of the upper jaw usually narrows anteriorly 29

A strong tooth usually present at the tip of the lower jaw; grinding surface is rough or tuberculate, usually of equal width throughout its length; underside of the mandible flat 31

29. Side of the head with a broad, oblong to triangular yellow patch immediately behind the eye; the carapace is rough and highly arched; found south of the Black Belt (Yellow-bellied Turtle) ..... **Pseudemys scripta scripta**

Side of the head with lines extending posteriorly from the eye, and without the yellow patch as above 30

30. Under surface of the neck and legs light colored, with dark stripes; eye spots on the lower surface of the marginal plates are single; only a small amount of dark coloration on the bridge; found in the northeastern part of the state (Cumberland Turtle) ..... **Pseudemys scripta troosti**

Undersurface of the neck and legs dark, with light stripes; eye spots on the lower surface of the marginals double; the bridge is predominantly dark in color; found north of the Black Belt (Red-eared Turtle) ..... **Pseudemys scripta elegans**

31. Plastron yellow or orange-yellow and without dark markings; upper jaw smooth, without a notch; the spots on the lower surface of the marginal plates with light centers; found in the southeastern part of the state (Coastal Plain Turtle) ..... **Pseudemys floridana floridana**

Plastron with a small to extensive dark pattern, at least in juveniles or young adults 32

32. Four or more lines on the outer surface of the fore leg; the outer surface of the hind limb also striped; the carapace is light to dark brown in color, with yellowish markings; ground color of the soft parts brown or black; found in the Saballian Life Zone (Mobile Turtle) ..... **Pseudemys floridana mobiliensis**

Lines on the fore legs usually thin or indistinct; ground color of the soft parts light to dark brown; ground color of the carapace is brown and usually has conspicuous light markings 33

33. The grinding surface of the lower jaw is narrow, and without conical teeth on the median ridge; fore and hind legs, and tail normally striped above; found in the Lower Austral Life Zone in the eastern part of the state (River Turtle) ..... **Pseudemys floridana concinna**

The grinding surface of the lower jaws is relatively broad, and with a few isolated conical teeth on the median ridge; fore and hind legs and tail striped; found in the Lower Austral Life Zone in the western part of the state (Hieroglyphic Turtle) ---------- **Pseudemys floridana hieroglyphica**

Key to the Lizards

(Suborder Sauria)

1. Legs absent; ear opening present; a well defined fold along each side of the body; found in the Lower Austral and Saballian Life Zones (Family **ANGUIDAE)** (Glass Snake) ---------- **Ophisaurus ventralis**

Legs present ---------- 2

2. Toes expanded at, or towards the tip ---------- 3

Toes not expanded ---------- 4

3. Eyelids absent, the eyes permanently open; large keeled scales on the back; dark spots or irregular lines on the back; found in the vicinity of Mobile (Family GEKKONIDAE) (Reef Gecko) ---------- **Sphaerodactylus notatus**

Eyelids present; body covered with small, granular scales; color on the back more or less uniformly green to brown; found throughout the state Family IGUANIDE) (Carolina Anolis) ---------- **Anolis carolinensis**

4. All scales on the body perfectly smooth, usually shiny in appearance; flat, rounded, overlapping, and more or less equal in size; (Family SCINCIDAE) ---------- 8

Scales on the back either keeled, or granular in appearance, not flat and smooth ---------- 5

5. Belly scales large, arranged in eight longitudinal series; six well-defined, narrow, longitudinal yellowish lines on the body; the scales on the dorsal surface are granular; found throughout the state (Family TEIDAE) (Six-lined Racerunner) _____ **Cnemidophorus sexlineatus**

Dorsal scales large and keeled; belly scales are small; no thin, longitudinal lines on the back (Family IGUANIDAE) _____ 6

6. Head with a series of horns on the back of the head; tail is short and stubby; no blue on the ventral surface; found in the vicinity of Tuscaloosa (Texan Horned Lizard) _____ **Phrynosoma cornutum**

Head without a series of horns on the back of the head; tail normal; iridescent blue coloring normally present on the ventral surface _____ 7

7. Dorsal scales 31-40 (Average 34); markings more brilliant, especially in males where the black is more intense, occasionally almost completely covering the ventral surfaces; found south of the Black Belt (Southern Fence Lizard) _____ **Sceloporus undulatus undulatus**

Dorsal scales usually 35-49 (Average 42); blue and black markings less extensive; dorsal color usually grayish-brown; found north of the Black Belt (Northern Fence Lizard) _____ **Sceloporus undulatus hyacinthus**

8. No supranasal plates; no light longitudinal stripes; light brown above and with a dark brown lateral stripe extending along each side of the body to the tip of the snout; the lower eyelid is partly transparent; found throughout the state (Brown Skink) _____ **Scincella laterale**

Supranasal plates present; eyelids scaly throughout; longitudinal light stripes usually present, but occasionally may be absent 9

9. Three supraocular scales present; the dorsolateral light stripe involves the second scale row (Counting from the mid-dorsal line); tail, both above and below, orange-red; found in the Saballian Life Zone (Striped Red-tailed Skink) ..... **Eumeces egregius**

Four supraocular scales present; dorsolateral stripes either absent or not involving the second scale row; tail not orange-red, but may be frequently blue ..10

10. Postnasal plate absent; one postmental plate present 11

A postnasal plate present; two postmental plates present 12

11. Young specimens without stripes, or very dimly marked, being almost uniformly black in color with red marks about the head; a median dorsal light stripe is usually present in adults; found in the vicinity of Mobile (Western Coal Skink) ..... **Eumeces anthracinus pluvialis**

Adults and young are olive-brown above, with a broad, lateral, dark brown band on each side bordered by whitish lines; no longitudinal medial light line present on the back; found north of the Fall Line (Northern Coal Skink) ..... **Eumeces anthracinus anthracinus**

12. Subcaudal scales near the base of the tail are as wide as they are long; the dorsolateral light stripes, when present, are thin and never include the third scale row; found south of the Fall Line (Florida Five-lined Skink) ..... **Eumeces inexpectatus**

Subcaudal scales, throughout the length of the tail, are much wider than long; the dorsolateral stripes, when present; frequently involve the third scale row 13

13. No postlabial plates (Or 1 or 2 of very small size); eye located above the sixth upper labial; dorsolateral light stripes usually do not involve the third scale row, and are not directed straight through the ear; found throughout the state (Greater Five-lined Skink) ..... **Eumeces laticeps**

Two relatively large postlabial plates present; the eye is located above the fifth upper labial plate; the dorsolateral light stripe usually involves the third scale row and passes directly through the middle of the ear; found throughout the state (Common Five-lined Skink) ..... **Eumeces fasciatus**

Key to the Snakes
(Suborder Serpentes)

1. A pit between the eye and the nostril, elongate poison fangs present in the front of the mouth; a single row of subcaudal scales; head distinct (Family CROTALIDAE) 2

No pit between the eye and the nostril; a double row of subcaudal scales present 11

2. No rattle present at the end of the tail 3

A rattle present at the end of the tail, or at least a button 6

3. Loreal plate absent; 25 dorsal scale rows at the middle of the body; two posterior parietal plates present; no subocular scales 4

Loreal plate present; 23 dorsal scale rows at the middle of the body; no posterior parietal plates present; subocular scales present 5

4. The end of the snout dark; cross-bands more clearly defined in adults; found in the southwestern part of the state (Western Water Moccasin) ---------- **Agkistrodon piscivorous leucostoma**

   The end of the snout light in color; contrast between crossbands more evident in young specimens; probably found throughout the state (Eastern Water Moccasin) ---------- **Agkistrodon piscivorous piscivorous**

5. Cross-bands narrow at the dorsal midline, two to three scales wide; belly pale and not heavily marked; found south of the Fall Line (Southern Copperhead) ---------- **Aghistrodon mokeson austrinus**

   Cross-bands wider at the dorsal midline, three to five scales in width; belly darker and more or less mottled with gray or black; found north of the Fall Line (Northern Copperhead) ---------- **Agkistrodon mokeson mokeson**

6. The top of the head covered with distinct plates ---------- 7

   The top of the head covered with small scales ---------- 9

7. Upper preocular scale in contact with the postnasal plate; known only from Bibb County (Massasauga) ---------- **Sistrurus catenatus catenatus**

   Upper preocular scale not in contact with the postnasal plate ---------- 8

8. Dorsal scale rows at the middle of the body usually 21: ground color is gray; found in the Lower Austral Life Zone south of the Fall Line (Ground Rattlesnake) ---------- **Sistrurus miliarius miliarius**

   Dorsal scale rows usually 25 at the middle of the body; ground color is dark gray to black, with the markings on the head normally obscure; found in the Saballian Life Zone (Florida Ground Rattlesnake) ---------- **Sistrurus miliarius barbouri**

9. Two large scales posterior to the supraoculars; markings on the back are not diamond shaped 10

Only small scales posterior to the supraoculars; markings on the back are diamond shaped; found south of the Fall Line (Eastern Diamond Back Rattlesnake) ..... **Crotalus adamanteus**

10. A distinct postocular dark stripe present; ground color pale; 25 dorsal scales at the middle of the body; found in the Lower Austral and Saballian Life Zones (Canebrake Rattlesnake) ..... **Crotalus horridus atricaudatus**

Postocular dark stripe not distinct; ground color darker; 23 dorsal scales at the middle of the body; found in the Upper Austral Life Zone (Timber Rattlesnake) ..... **Crotalus horridus horridus**

11. Dorsal scales keeled 12

Dorsal scales not keeled 38

12. Anal plate entire, not divided 13

Anal plate divided by an oblique groove 17

13. Usually 14 lower labial plates, and four prefrontal plates 14

Nine or ten lower labial plates, and two prefrontal plates 15

14. Uniformly glossy black above and slate gray below (Small individuals may show several large gray blotches faintly outlined with white towards the tail); found in the area of Mobile (Black Pine Snake) ..... **Pituophis melanoleucus lodingii**

General coloration is rusty-brown, with dark blotches often blending with the ground color; found in the

southeastern part of the state (Florida Pine Snake) ..... **Pituophis melanoleucus mugitus**

15. A lateral stripe on the third and fourth scale rows counting from the dorsal midline 16

A lateral stripe of the second and third scale rows; found throughout the state (Common Garter Snake) ..... **Thamnophis sirtalis sirtalis**

16. Seven upper labial plates; a dorsal stripe usually present; found in the Upper and Lower Austral Life Zones (Eastern Ribbon Snake) ..... **Thamnophis sauritius sauritius**

Usually with eight upper labial plates; dorsal stripe usually absent; found in the Saballian Life Zone (Florida Ribbon Snake) ..... **Thamnophis sauritius sackeni**

17. The rostral plate at the tip of the nose is enlarged, sharp edged, and turned upwards 18

The rostral plate not turned up at the tip 19

18. Prefrontals in contact, at least posteriorly; rostral plate only slightly turned up at the tip; found throughout the state (Common Hog Nozed Snake) ..... **Heterodon contortrix contortrix**

Prefrontals separated by several small scales; the rostral plate sharply turned up at the tip; found south of the Fall Line. (Southern Hog Nozed Snake) ..... **Heterodon simus**

19. Preocular scale absent, with the prefrontal scale in contact with the eye 20

Preocular scale present, so that the prefrontal scale is not in contact with the eye 21

20. Six lower labial plates; two postoculars and two internasals 47

Five lower labial plates; grayish to reddish brown in color, with the lower surface usually pink; one postocular scale and usually only one internasal; found throughout the state (Ground Snake) ..... **Haldea striatula**

21. Loreal plate present 24

Loreal plate absent 22

22. Seven upper labial plates; seventeen dorsal scale rows at the middle of the body; found throughout the state (Wright's Brown Snake) ..... **Storeria dekayi wrightorum**

Five or six upper labial plates; fifteen dorsal scale rows at the middle of the body 23

23. A light ring, two scale rows wide, around the neck; top and sides of the head are black; found in the Saballian Life Zone (Southern Red Bellied Snake) ..... **Storeria occipitomaculpata obscura**

No light ring around the neck, instead, there are three light spots present; found in the Upper and Lower Austral Life Zones (Northern Red Bellied Snake) ..... **Storeria occipitomaculata occipitomaculata**

24. Two or more anterior temporal plates in contact with the postocular scale; the nasal plate completely divided 25

Only one anterior temporal in contact with the postocular; a single nasal plate, although it may be incompletely divided 26

25. General dorsal color is black, with obscure white crossbands or lines, and mostly white between the scales;

possibly found in the Upper Austral Life Zone (Pilot Black Snake) ..... **Elaphe obsoleta obsoleta**

Dorsal pattern light, with clearly defined dark patches; found in the Lower Austral and Saballian Life Zones (Gray Rat Snake) ..... **Elaphe obsoleta confinis**

26. Seventeen dorsal scale rows at the middle of the body; eight lower labial plates; uniformly green above; found throughout the state (Rough Green Snake) ..... **Opheodrys aestivus**

Nineteen or more dorsal scale rows; six to twelve lower labials 27

27. Nineteen scale rows at the middle of the body; usually seven upper labial plates 28

More than 19 dorsal scale rows; usually 8 upper labials 30

28. Seven lower labial plates; a single preocular; known only from Tuscaloosa County (Kirtland's Water Snake) ..... **Natrix kirtlandii**

Nine to eleven lower labial plates, usually two preoculars 29

29. Usually 11 lower labials; no ventral-lateral light stripes; found south of the Black Belt (Striped Water Snake) ..... **Natrix rigida**

Usually 10 lower labials; light stripes present on the sides of the belly; found north of the Black Belt (Queen Water Snake) ..... **Natrix septemvittata**

30. 27 to 33 dorsal scale rows at the middle of the body (Rarely 25 in **rhombifera**); 11 to 13 lower labial plates 31

21 to 25 dorsal scale rows; usually ten lower labials ---- 33

31. Two anterior temporal plates; a middorsal row of 21 to 25 isolated quadrate spots on the back, exclusive of the tail; found in the Saballian Life Zone (Brown Water Snake) ---- **Natrix taxispilota**

A single anterior temporal plate present ---- 32

32. Eye in contact with the upper labial plates; 11 lower labials; ground color of the back is brown, with black bands forming diamonds; found in the western part of the state (Diamond-backed Water Snake) ---- **Natrix rhombifera rhombifera**

Eye separated from the upper labials by a series of subocular scales; usually 12 lower labials; found in the Saballian Life Zone (Green Water Snake) ---- **Natrix cyclopium cyclopium**

33. Back normally with crossbands or stripes ---- 35

Back uniformly dark brown or black (or spots faintly visible in young specimens); belly yellow to red; underside of the tail without markings ---- 34

34. Belly yellow; found in the western part of the state (Yellow Bellied Water Snake) ---- **Natrix erythrogaster flavigaster**

Belly orange to red; found in the eastern part of the state (Red Bellied Water Snake) ---- **Natrix erythrogaster erythrogaster**

35. A median row of light spots on the belly; four longitudinal dark stripes on the back; tail flattened at the base; found along the coast in Mobile and Baldwin Counties (Clark's Water Snake) ---- **Natrix sipedon clarkii**

Crossbands or spots on the back; tail not flattened at the base 36

36. The dorsal pattern consisting entirely of 19 to 33 transverse bands, rarely with a few alternating spots; 126 to 137 ventral scales; found south of the Fall Line (Southern Banded Water Snake) ..... **Natrix sipedon fasciata**

A dorsal pattern of 3 to 15 anterior transverse bands, posterior to which are a series of median dorsal blotches alternating with a series of lateral spots; 128 to 155 ventral scales 37

37. Usually five to fifteen transverse anterior bands and a total of fewer than 30 bands and dorsal spots combined; 128 to 145 ventral scales; found in the Lower Austral Life Zone north of the Fall Line (Midwest Water Snake) ..... **Natrix sipedon pleuralis**

Usually 3 to 10 anterior transverse bands and a total of more than 30 bands and dorsal spots on the body; 135 to 155 ventral scales; found in the Upper Austral Life Zone; (Common Northern Water Snake) ..... **Natrix sipedon sipedon**

38. Anal plate divided 39

Anal plate entire, not divided 55

39. A single nasal plate present 40

A double nasal plate present 45

40. Color green above and yellow beneath; fifteen dorsal scale rows at the middle of the body; of doubtful occurence in the state (Smooth Green Snake) ..... **Opheodrys vernalis**

Color not green 41

41. Thirteen dorsal scale rows at the middle of the body; opalescent chestnut brown above, with the ventral surface pink 42

Nineteen dorsal scale rows at the middle of the body 43

42. Internasals and prefrontals usually united into two large plates; found in the northwestern part of the state (Central Worm Snake) ..... **Carphophis amoena helenae**

Internasals and prefrontal plates are usually separate; found in the northeastern part of the state (Eastern Worm Snake) ..... **Carphophis amoena amoena**

43. Two internasal plates; ground color bluish-black with three longitudinal red stripes and lateral yellow stripes; found south of the Fall Line (Rainbow Snake) ..... **Abastor erythrogrammus**

A single internasal plate; no longitudinal dorsal stripes, but with transverse red bands on the ventral surface 44

44. Anterior ventral light bars not terminated abruptly laterally; light bars in the neck region separated medially by about 3 to 4 scale rows; found in the eastern part of the state south of the Fall Line Eastern Mud Snake) ..... **Farancia abacura abacura**

Anterior ventral light bars terminating abruptly laterally; light bars in the neck region separated medially by 8 to 9 scale rows; found in western part of the state south of the Fall Line (Western Mud Snake) ..... **Farancia abacura reinwardtii**

45. Eleven lower labial plates; the dorsal surface yellowish-brown, with a medial row of red spots bordered

with black; found throughout the state (Corn Snake) ..... **Elaphe guttata**

Seven to nine lower labial plates 46

46. The preocular plate absent, so that the prefrontal is in contact with the eye; six upper labial plates 47

The preocular plates present so that the prefrontal is not in contact with the eye 48

47. Seventeen dorsal scale rows at the middle of the body; scales usually keeled; found in the western part of the state (Western Ground Snake) ..... **Haldea valeriae elegans**

Fifteen dorsal scale rows at the middle of the body; scales less extensively keeled; found north of the Fall Line (Eastern Ground Snake) ..... **Haldea valeriae valeriae**

48. The loreal plate absent 49

The loreal plate present 50

49. Fewer than 190 ventral scales; a light brown color with a light band on the back of the head; no red markings; found south of the Fall Line (Crowned Snake) ..... **Tantilla coronata coronata**

More than 200 ventral scales; colored with alternating bands of red, black and yellow; found south of the Fall Line (Coral Snake) ..... **Micrurius fulvius fulvius**

50. A single preocular scale present; seven upper labial plates and nine lower labials; a rich golden brown above and uniform yellow beneath; found in the Saballian Life Zone (Yellow Lipped Snake) ..... **Rhadinea flavilata**

Two or three preocular scales present 51

51. A single anterior temporal scale present; the lower preocular scales are small; color black above with a yellow ring around the neck 53

Two or more anterior temporal scales; the lower preocular scales of moderate size 52

52. Fifteen dorsal scale rows immediately in front of the vent; color uniformly black, with a white chin; found throughout the state (Common Black Snake) ..... **Coluber constrictor constrictor**

Eleven to thirteen dorsal scale rows immediately in front of the vent; color dark brown to black, becoming progressively lighter towards the tail; found in the Lower Austral and Saballian Life Zones (Eastern Coachwhip) ..... **Masticophis flagellum flagellum**

53. Belly without black spots; the ring around the neck normally complete; found in the Upper Austral Life Zone (Northern Ring Necked Snake) ..... **Diadophis punctatus edwardsii**

Belly with black spots; the ring around the neck either complete or broken 54

54. Belly marked with a series of large, half circular black spots on the midline; the ring around the neck is usually incomplete, being broken at the dorsal midline; found in the eastern part of the state south of the Fall Line (Southern Ring Necked Snake) ..... **Diadophis punctatus punctatus**

Belly conspicuously marked with numerous small black spots which have a tendency to fuse into a single row; the ring around the neck is usually complete, not broken; found in the northern and western parts of the state (Mississippi Ring Necked Snake) ..... **Diadophis punctatus stictogenys**

55. More dorsal scale rows at the middle of the body than at a point immediately anterior to the vent 57

The number of dorsal scale rows at the middle of the body are the same as that at a point immediately anterior to the vent 56

56. Color is shiny black, except for a reddish-brown chin; found in the Saballian Life Zone (Indigo Snake) ..... **Drymarchon corais couperi**

Bright red blotches on the back, surrounded by black bands, between which are yellow bands; no markings on the belly; found throughout the state (Scarlet Snake) ..... **Cemophora coccinea**

57. Color consisting of bright red, yellow and black rings which completely encircle the body; found throughout the state (Scarlet King Snake) ..... **Lampropeltis elapsoides elapsoides**

Color not as above 58

58. Ground color tan to light brown, with dorsal blotches of brown or red-brown, with dark borders 59

Ground color black, with pale yellow or white spots or bands 61

59. A pattern of 48 to 65 small rounded reddish-brown blotches down the middle of the back, with an alternating row of irregular smaller spots on each side of the body (in adults, this pattern becomes obscure); probably found throughout the state (Mole Snake) ..... **Lampropeltis calligaster rhombomaculata**

Dorsal blotches not as above, or extending lower than the fifth row of scales counting from the dorsal midline, and contrasting sharply with the ground color 60

60. The dorsal pattern consisting of red or brown saddles or blotches, and with usually more than 25 whitish crossbands; found throughout the state (Milk Snake) ---------- **Lampropeltis triangulum triangulum**

The dorsal pattern consisting of incomplete rings, with 18 to 30 whitish crossbands; found in the southwestern part of the state (Cope's Milk Snake) ---------- **Lampropeltis triangulum amaura**

61. Pattern consisting of narrow yellow-white dorsal crossbands; found south of the Fall Line in the eastern part of the state (Common King Snake) ---------- **Lampropeltis getulus getulus**

No definite pattern of dorsal crossbands; scales black with yellow spots ---------- 62

62. The majority of the scales on the back with small white spots; found south of the Fall Line in the western part of the state (Speckled King Snake) ---------- **Lampropeltis getulus holbrooki**

The majority of the scales on the back, without small white spots, although those on the sides of the body may have these spots; found north of the Fall Line (Black King Snake) ---------- **Lampropeltis getulus niger**

NOTE

It has recently been discovered that the scientific names which have been used for many of the common snakes found in eastern United States have been misapplied. The resultant attempt to correct this error has resulted in additional confusion in recent literature. In this work, those names which have been used for almost a century and have become well established in the literature, have been utilized. However, their equivalents are listed below, with that name used in this paper listed first.

Agkistrodon mokeson mokeson — Agkistrodon contortrix mokeson

Agkistrodon mokeson austrinus — Agkistrodon contortrix contortrix

Thamnophis sirtalis sirtalis — Thamnophis ordinatus ordinatus

Thamnophis sauritius sauritius — Thamnophis sirtalis sirtalis

Thamnophis sauritius sackeni — Thamnophis sirtalis sackeni

Heterodon contortrix contortrix — Heterodon platyrhinos platyrhinos

Lampropeltis triangulum triangulum — Lampropeltis doliata triangulum

Lampropeltis triangulum amaura — Lampropeltis doliata amaura

Lampropeltis elapsoides — Lampropeltis doliata doliata

GLOSSARY

ABDOMINAL PLATES (Turtle): one of the pair of plates comprising the plastron. See illustration.

ANAL PLATE (Snake): the ventral scale immediately in front of the vent.

ANTERIOR: Towards the front, or head end of an animal.

ANTERIOR TEMPORAL PLATE (Snake): one or more scales immediately behind the postocular scales on the head. See illustration.

APPENDAGES: the limbs of an animal.

APPRESSED TOES (Salamanders): when the fore limbs are pressed backwards along the sides of the body, and the hind limbs, forward. The costal groove count between appressed toes, refers to those grooves not covered by the limbs.

BRIDGE (Turtle): the connection between the plastron and the carapace.

CANTHUS ROSTRALIS (Salamander): a light bar extending from the nostril to the eye, bordered by darker bars. See illustration.

CARAPACE (Turtle): the hard covering on the back.

CIRRI: small protrusions at the nostrils of certain salamanders.

COMPRESSED: Flattened from side to side.

COSTAL GROOVES (Salamanders): A series of vertical grooves located laterally along the body. In counting these, begin with the one immediately behind the fore limb, counting posteriorly to, and including the last one (Often incomplete) immediately above or before the hind limb.

COSTAL PLATES (Turtle): located on the carapace. See illustration.

CRANIAL CRESTS (Toad): raised, ridge-like protrusions on the top of the head. See illustration.

CRENULATE: With a scalloped edge.

DEPRESSED: Flattened dorso-ventrally.

DORSAL: referring to the back, or top of an animal.

DORSAL SCALE ROWS (Snake): These are counted in a circle from the ventral scale on one side of the body, to

the ventral scale on the other side of the body in a diagonal row. The count is usually expressed as three figures such as 21-17-13. This means that there are 21 dorsal scale rows in a count taken one head length behind the head; 17 scale rows around the middle of the body; and 13 scale rows slightly before the vent. If only one number is given, it usually refers to the number of scale rows taken at the middle of the body.

DORSOLATERAL: Referring to the sides of the back.

DORSOLATERAL FOLDS (Frog): a raised fold of skin extending posteriorly from the rear of the head in some species.

FEMUR (Frog): the thigh of the hind leg.

INTERNASAL PLATE (Snake): a scale found on the top of the head. See illustration.

INTERTYMPANIC SPACE (Frog): the area between the tympani.

JUNCTURE: Point of union.

KEELED: Referring to a raised, longitudinal ridge on the scale or plates of certain reptiles.

LABIAL TEETH (Tadpole): rows of teeth bordering the mouth. See illustration.

LATERAL: pertaining to the sides of an animal.

LONGITUDINAL: Extending lengthwise on the body.

LOREAL PLATE (Snake): A scale on the side of the head. See illustration.

LOWER LABIAL PLATES: A series of plates bordering the lower jaw. When these are counted, the mental is not

included, and the count is restricted to only one side of the head. See illustration.

MANDIBLE: The lower jaw of an animal.

MEDIAL: Along the midline.

MEDIAN: Along the midline.

NARES: Nostrils.

NASAL PLATE (Snake): The scale encircling the nostril. If divided by a vertical groove, the section before the nostril is called the anterior nasal plate, while that behind the nostril is the posterior nasal. See illustration.

NASOLABIAL GROOVE (Salamander): A groove extending from the nostril to the lip. See illustration.

PAPILLAE: Fleshy protuberances, often found on the edge of the mouth of tadpoles. See illustration.

PARATOID GLANDS (Toad): Elevated glandular structures found behind the head. See illustration.

PECTORAL PLATES (Turtle): Located on the plastron. See illustration.

PEDICEL (Salamander): A stalk supporting the tongue.

PHALANGES: The segments of the fingers or toes.

PLASTRON (Turtle): The hard shell covering the ventral surface.

POSTERIOR: Towards the rear, or tail end of an animal.

POSTERIOR PARIETAL PLATES (Snake): Enlarged plates behind the parietal plates.

POSTLABIAL PLATES (Lizard): Scales on the head. See illustration.

POSTMENTAL PLATE (Lizard): Scales on the lower surface of the head. See illustration.

POSTNASAL PLATE: Scales on the head of reptiles. See illustrations.

POSTORBITAL CREST (Toad): A raised crest on the top of the head. See illustration.

PREFRONTAL SCALES: Scales on top of the head of reptiles. See illustrations.

PREOCULAR SCALES: Scales located before the eye of reptiles. See illustrations.

PROBOSCIS: A soft, protruding nose.

ROSTRAL PLATE (Snake); A scale at the tip of the snout. See illustration.

RUDIMENTARY: Not fully developed.

SERRATE: With a toothed or saw-like edge.

SNOUT: The area of the upper jaw anterior to the eye.

SPIRACLE (Tadpole): A respiratory opening usually located along the midline or slightly to one side of the body on the ventral surface.

SUBCAUDAL SCALES (Snake): These are located on the ventral surface of the tail, posterior to the vent, and may be in a single row or a double row. If in a single row, they are counted from the scale immediately behind the vent, to the tip of the tail. If they are in a double row, they are counted on one side only, starting with the first completely exposed scale, to the tip of the tail.

SUBOCULAR SCALES (Snake): Scales located immediately beneath the eye. See illustration.

SUPRAMARGINAL PLATES (Turtle): A series of plates on the carapace, located between the marginals and the costals.

SUPRANASAL PLATES (Lizard): Located on the head. See illustration.

SUPRAOCULAR SCALES: Scales above the eye of reptiles. See illustrations.

TAIL CREST (Tadpole): The finlike projections on the tail.

TRANSVERSE: At right angles to the longitudinal axis of the body.

TRIGONAL: Roundly triangular.

TRUNCATE: Abruptly terminated, or square at the tip.

TUBERCLE: A small, wart-like protuberance of the skin.

TUBERCULATE: Covered with tubercles.

TYMPANUM: The ear. Usually a round membrane on the sides of the head of a frog; or a hole on the side of the head of lizards.

UPPER LABIAL PLATES (Snake): Scales on the margin of the upper jaw. When they are counted, the rostral is not included, and the count is limited to only one side of the head.

VENT: The posterior opening of the digestive and urinogenital system.

VENTER: The belly, or lower surface.

VENTRAL: Referring to the belly or lower surface.

VENTRAL SCALES (Snake): A series of scales along the belly. These are counted from the first ventral scales

under the chin which is wider than long, to, but not including, the anal plate.

VERTEBRAL PLATES (Turtle): Plates located along the midline of the carapace. See illustration.

VITELLUS: The opaque, living portion of a frog egg.

HEAD OF A TOAD

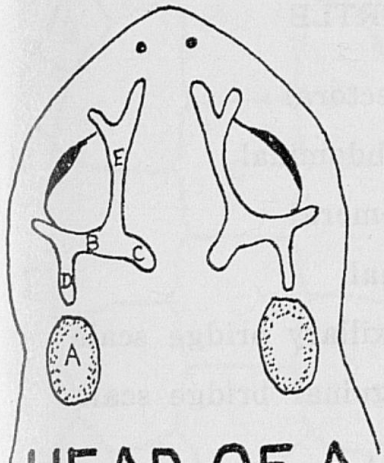
A. Paratoid Gland
B. Postorbital Crest
C. Parietal Crest
D. Preparatoid Crest
E. Supraorbital Crest

HEAD OF A SALAMANDER

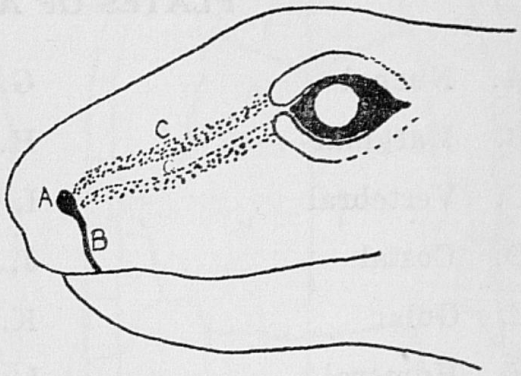
A. Nostril, Nares
B. Nasolabial Groove
C. Canthus Rostralis

MOUTH OF A TADPOLE

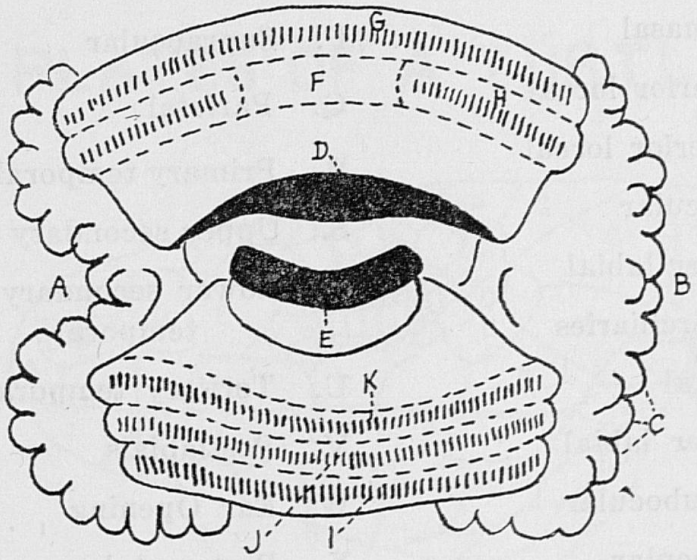
A. Lip infolded laterally
B. Lip not infolded
C. Papillae
D. Upper mandible
E. Lower mandible
F. Median space in inner row of upper labial teeth
G. Outer row of upper labial teeth
H. Inner row of upper labial teeth
I. Outer row of lower labial teeth
J. Middle row of lower labial teeth
K. Inner row of lower labial teeth



HEAD OF A TOAD



HEAD OF A SALAMANDER



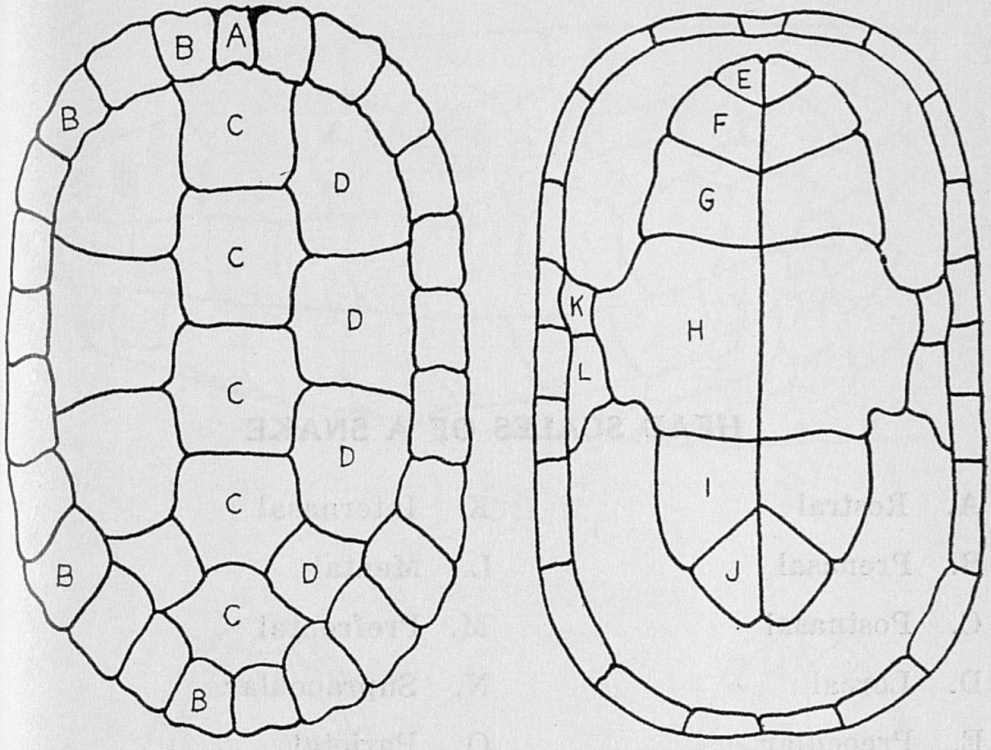
MOUTH OF A TADPOLE

PLATES OF A TURTLE

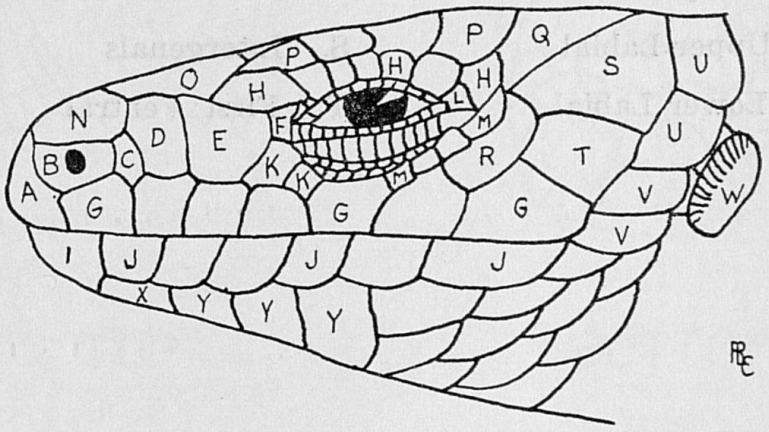
A. Nuchal
B. Marginal
C. Vertebral
D. Costal
E. Gular
F. Humeral
G. Pectoral
H. Abdominal
I. Femoral
J. Anal
K. Axillary bridge scale
L. Inguinal bridge scale

HEAD SCALES OF A LIZARD

A. Rostral
B. Nasal
C. Postnasal
D. Anterior loreal
E. Posterior loreal
F. Preocular
G. Upper labial
H. Superciliaries
I. Mental
J. Lower labial
K. Presubocular
L. Postocular
M. Postsubocular
N. Supranasal
O. Prefrontal
P. Supraocular
Q. Parietal
R. Primary temporal
S. Upper secondary temporal
T. Lower secondary temporal
U. Tertiary temporals
V. Postlabials
W. Ear Opening
X. Postmental
Y. Chin shield



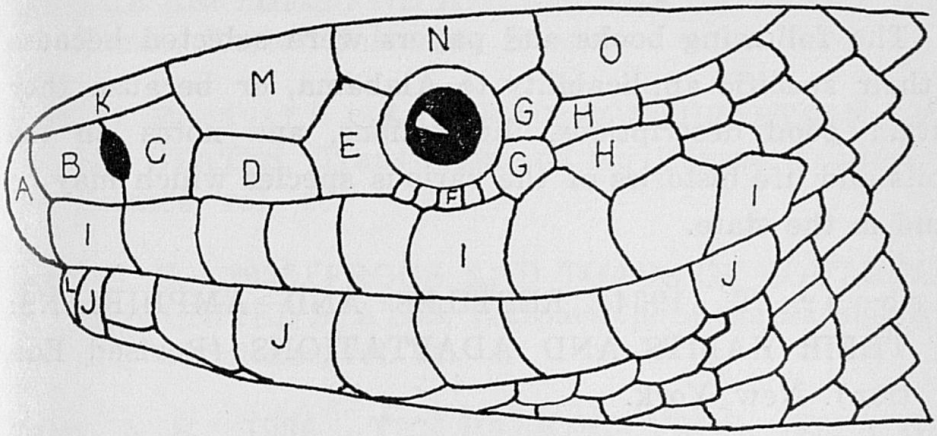
PLATES OF A TURTLE



HEAD SCALES OF A LIZARD

HEAD SCALES OF A SNAKE

A. Rostral
B. Prenasal
C. Postnasal
D. Loreal
E. Preocular
F. Subocular
G. Postocular
H. Temporal
I. Upper Labial
J. Lower Labial
K. Internasal
L. Mental
M. Prefrontal
N. Supraocular
O. Parietal
P. Frontal
Q. Anterior Chin Shields
R. Posterior Chin Shields
S. Intergenals
T. First Ventral



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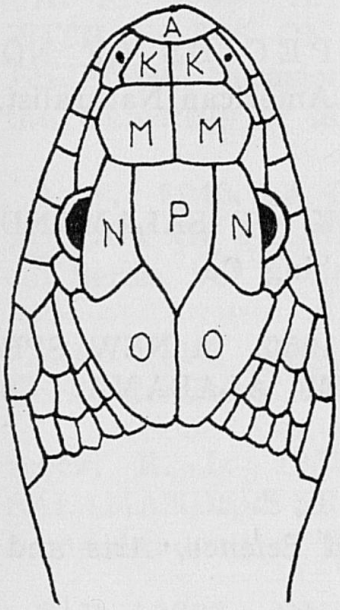

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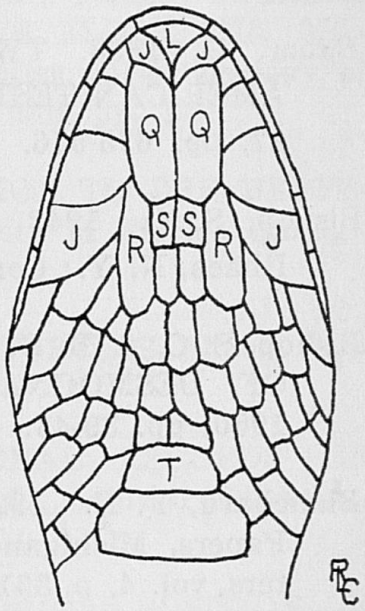

BOTTOM

HEAD SCALES OF A SNAKE

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