# Pennsylvania Amphibians & Reptiles

*by Larry L. Shaffer*

***Massasauga Rattlesnake***

*front cover- Common Snapping Turtle*

# PENNSYLVANIA AMPHIBIANS & REPTILES

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Major funding for this book came from a grant made possible by the
Wild Resource Conservation Fund, **Frank Felbaum,** *Executive Director*


Published by the
Pennsylvania Fish and Boat Commission
Bureau of Boating and Education
Educational Media Section
P.O. Box 67000
Harrisburg, PA 17106-7000
Printed in the United States of America
Third Edition, Revised


ISBN 1-930369-00-X

# Foreword

In 1939, the Board of Fish Commissioners (now the Pennsylvania Fish and Boat Commission) published its biennial report for 1936-1938. Included in the document were earlier published works and a new contribution on Pennsylvania amphibians and reptiles by M. Graham Netting, the curator of herpetology at the Carnegie Museum in Pittsburgh. A revised and annotated list of species prepared by Dr. Netting was subsequently published by the Board in 1946 under the title "The Amphibians and Reptiles of Pennsylvania," and reprinted in 1949.

An article (picture story) on salamanders in the April 1949 *Pennsylvania Angler* was the first of a series of similar monthly *Angler* articles about Pennsylvania reptiles and amphibians by Hal H. Harrison that concluded with an article on lizards in October 1950. Each article was edited and approved by M. Graham Netting. Subsequently, these separate articles were assembled in a single reprint issue entitled "Pennsylvania Reptiles and Amphibians," which reached its third edition in 1957.

In 1974, this edition was printed for the seventh time. The illustrations and species accounts were revised and updated by M. Graham Netting, director, and Neil D. Richmond, curator of amphibians and reptiles, of the Carnegie Museum. In 1974, the Pennsylvania Fish and Boat Commission sought and received official jurisdiction for all amphibians and reptiles in the Commonwealth, including those species that could be considered endangered, threatened, or of other special concern status. New regulations were promulgated to provide for the better protection and management of this resource.

"Pennsylvania Reptiles and Amphibians" was reprinted again in 1976 and a new page was added that replaced the picture story entitled "Hunting Rattlesnakes." The new page featured illustrations and brief text concerning the distribution of our three venomous snakes and physical characteristics useful in distinguishing venomous and nonvenomous snakes in Pennsylvania. Until recently, this 1976 edition was reprinted without change at two- to three-year intervals.

Thus, for nearly 50 years the Commission has published and reprinted several contributions concerning the identification, composition, distribution and ecology of Pennsylvania amphibians and reptiles.

In addition, pursuant to goals embodied in its "Endangered and Threatened Wildlife Species" project, the Commission provided financial support for preparation of a manuscript by Clarence J. McCoy, curator, Section of Amphibians and Reptiles of the Carnegie Museum, entitled "Amphibians and Reptiles in Pennsylvania." Published by the Carnegie Museum as Special Publication No. 6 in 1982, this work treats the taxonomy, status, distribution and bibliography of each species of amphibian and reptile known or suspected to occur in Pennsylvania.

Larry Shaffer has drawn on the information compiled and published in these and other contributions to assemble the information presented in this publication. This blend of long-standing and more recent information was prepared with the non-specialist in mind, but specialists should also find it a useful compilation. Embodied in the preparation and production of every publication are certain expectations about the purposes and needs that the publication will fulfill. There are continual needs for easily understandable

and available information about amphibians and reptiles that are current and technically correct. Like its predecessors, this publication meets those needs.

Appropriately, Larry Shaffer addresses this need to know as much as we can about amphibians and reptiles in his concluding remarks in the *Preface,* because only through this knowledge can biased or erroneous information about these animals be dispelled. Possession of current information, however, may become an end in itself for many people. Mere knowledge or awareness, though a necessary part of the process, cannot bring about actions required to manage, enhance and protect these animals properly for their benefit and ours. As Larry Shaffer points out, our lack of understanding about their ecological roles and loss of habitat are problems facing them. These require the mobilization of a variety of human resources if they are to be solved. The fact that these problems continue to exist is perhaps pathetic testimony to the length of time we have been merely content to "raise awareness" or receive information about amphibians and reptiles.

Fortunately, the level of "environmental awareness" is as high today as it has ever been, and increasing numbers of people are actively seeking and acting on a growing body of new information about the status of our physical environment and the other living things we share with it. This publication is ultimately most useful as a tool for the furtherance of amphibian and reptile conservation in Pennsylvania.

***Clark Shiffer***
*Former Herpetology and Endangered Species Coordinator*
*Pennsylvania Fish and Boat Commisison*

# Preface

In researching material for this book, it became apparent that amphibians and reptiles, compared with many plants, birds and numerous mammals, have not received the attention many other animals have, even though their ancestries can be traced back millions of years. They are among the earliest animals known to inhabit our planet. Why, then, does there seem to be such a lack of in-depth information?

Perhaps in years gone by, reptiles and amphibians, regarded as "lower forms of life," were thought to be not as important nor as interesting as the "higher" animals and thus did not warrant large-scale and detailed study. Perhaps their secretive nature made it too difficult for scientists and others to spend a great deal of time observing and studying them. Perhaps sufficient funds have not been available, earmarked instead to study animals and plants considerably more conspicuous, or thought to be more attractive and possibly more respected.

Fortunately, this idea is changing as more scientists observe and study these creatures. In Pennsylvania, as elsewhere, several current studies seek to learn more about our amphibians and reptiles, their life history, habits and habitat requirements. Special emphasis is given to species listed as endangered or threatened and to those whose status is unknown. Several of these studies are funded by grants from the Pennsylvania Wild Resource Conservation Fund.

*Pennsylvania Amphibians and Reptiles* compiles many facts that currently are known about the amphibians and reptiles indigenous to the state. Though it presents technical material, it is not intended to be a scientific journal. The purpose of the book is to increase awareness of these fascinating animals and to promote a better understanding of them and their special needs. Scientific language is kept to a minimum, and many words or terms that might be unfamiliar to readers are explained in the text. The book includes a glossary for further reference.

*Pennsylvania Amphibians and Reptiles* contains enough information for readers to become familiar with the species' natural history, functions and demographic features and to aid identifying species that may be seen near homes or encountered while pursuing outdoor activities. To avoid entering into a complex scientific discussion, I chose at times not to include absolutely or specifically all the data that might be known about certain amphibians and reptiles. In rare instances where opinions differ regarding descriptions or habits, I have attempted to sort out the best possible answers.

This book's bibliography lists the references consulted. Numerous books have been written on the subject of herpetology, the study of amphibians and reptiles. Readers are encouraged to check their local libraries to expand their knowledge further about lizards, snakes, turtles, frogs and salamanders.

It's important to learn as much as we can about these animals so that we can intelligently address the problems they face and can better appreciate the niche they fill in our complex ecosystem. We need to know more about their precise role in the environment, including their relationship with the human race. Loss of habitat is probably the single most important issue confronting these delicate creatures, and we need to address that question now. For some species, it may already be too late.

People caused many of the problems facing these creatures today, and people can make the difference in their survival. We need to spur interest in these fascinating animals so that more people will become involved in doing what they can to help ensure their well-being. Perhaps more than anything else, amphibians and reptiles need to be understood and to be given the respect they deserve. And so if this book can spark one individual to become involved ... or help a student better understand ... or instill in even one person the desire to pursue herpetology as a lifelong ambition, it has been well worth the effort.

## *Acknowledgements*

Numerous people helped produce this book. Our expressed appreciation goes to Dr. Clarence J. McCoy, curator of amphibians and reptiles at Pittsburgh's Carnegie Museum of Natural History and former chairman of the Pennsylvania Fish and Boat Commission's Herpetological Advisory Board. He took special care in reviewing the scientific data. In so doing, he helped ensure that the author's translation of sometimes complex statements into simpler terms was accurate and that it did not sacrifice detail for the sake of brevity and simplicity. Dr. McCoy's contributions to the study of herpetology are recognized nationwide, and his assistance in producing this book has been vital to its production. Special thanks goes to Clark Shiffer, former Pennsylvania Fish and Boat Commission biologist and coordinator of the Commission's Herpetology and Endangered Species programs. His review of the manuscript and technical expertise helped keep me on target. Appreciation is extended to Charlene Seifert whose accurate and expedient word-processing produced readable copy.

A book such as this can only be as good as the illustrations depicting the various animals, so I gratefully acknowledge Tom Duran for his accurate color renditions of each amphibian and reptile, produced in painstaking detail. Thanks, too, to George Lavanish who produced a number of informative sketches and to Ted Walke whose design and layout brought all the material together in an attractive and readable form.

Credit is due to the following who furnished or helped obtain photographs used throughout the book: Stanley Hastings, Pennsylvania Fish and Boat Commission waterways conservation officer; Gary Brown, Commission deputy waterways conservation officer; Randy Flamant, ardent outdoor photographer; and high school science teachers Harold E. Wingert and Randy W. Cassell. Also, Dr. Gilbert L. Twiest, professor of biology and science education, Clarion University of Pennsylvania; and John D. Groves, curator of amphibians, reptiles and birds, Zoological Society of Philadelphia, both of whom also serve on the Commission Herpetological Advisory Board.

Finally, I thank members of the Wild Resource Conservation Board who, convinced of the need for this book as an important informational and educational tool, had the foresight to grant funds to the Pennsylvania Fish and Boat Commission to help defray the costs of publication.

***Larry L. Shaffer***

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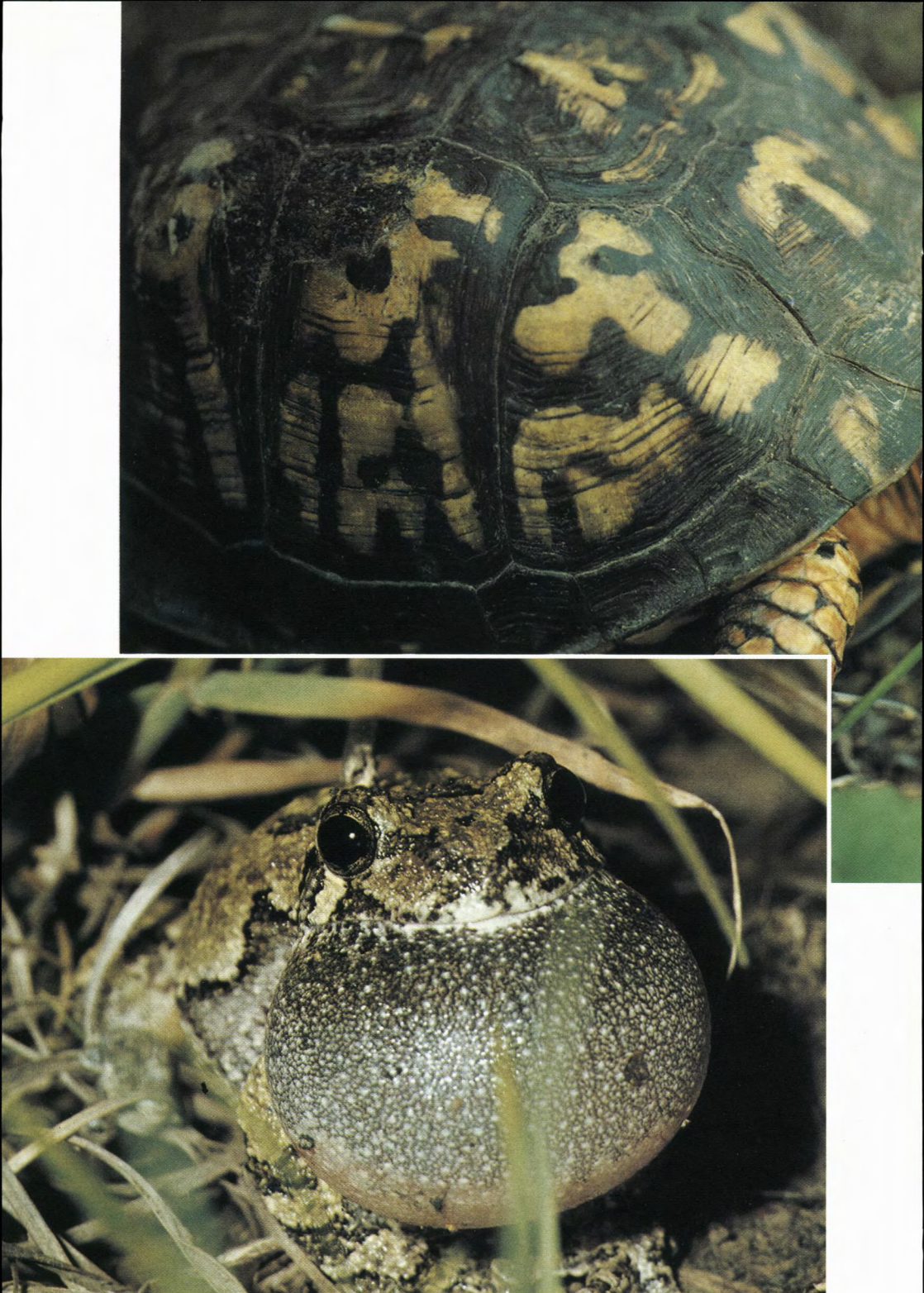


*Figure I-2, With its single, bubble-like throat sac inflated, the eastern gray treefrog trills its song on a warm spring evening.*

*Figure I-1, Mainly terrestrial, the eastern box turtle is a frequent visitor around homes and gardens.*

*Figure I-5,Marsh marigolds are indicative of the moist habitat required by numerous amphibians and reptiles.*

*Figure I-4, Its rattles a moving blur, this timber rattlesnake extends its fork-tipped tongue to sample airborne particles.*

## *Chapter I*

# INTRODUCTION

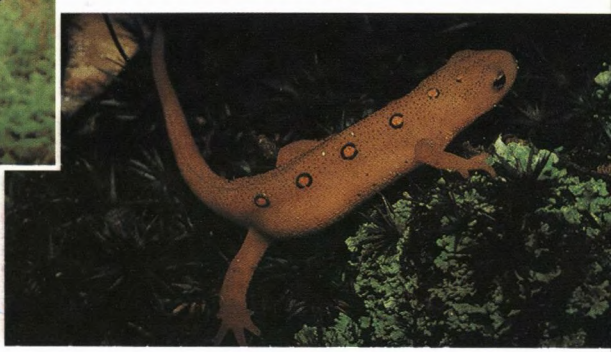


*Figure I-3, The red eft is the land-dwelling sub-adult of the aquatic red-spotted newt.*

# Endangered Species

Of all living things on earth, only humans are able to dramatically change their environment, and unfortunately, do so too many times for selfish reasons. In the name of progress, we have drained wetlands, cut down trees, dug up the land, used rivers to carry away our wastes, dammed rivers and straightened streams, paved this and that. We've destroyed habitat, fouled water supplies, spread chemicals and contaminated the air. It's no wonder we've lost forever in the United States 17 mammals, 28 birds, 12 fish and three amphibians in just over 100 years.

We seem to forget that all forms of life and their environment share a close and necessary relationship. Whatever affects a living thing or its environment ultimately can affect all others, either directly or indirectly. Therefore, as thinking and responsible human beings, it is incumbent upon us that we be stewards of the land and its inhabitants. Only then can we be assured that the extinction of any species is a natural occurrence (that's been going on for millions of years) and not as a result of our indifference.

Fortunately, there has been some help in recent years in the form of federal and state legislation. Congress has declared that "various species of fish, wildlife, and plants in the United States have been rendered extinct as a consequence of economic growth and development untempered by adequate concern and conservation." The Federal Endangered Species Act of 1973 established "a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species."

In 1974 and again in 1978, the Pennsylvania Legislature amended the Fish Law to provide the Pennsylvania Fish and Boat Commission jurisdiction over amphibians and reptiles as well as fish and other aquatic organisms. Endangered species were a special concern. These important pieces of legislation are designed to prevent, or at least slow down, the rate of extinction to natural levels.

Fortunately, federal and state endangered species programs are beginning to change things. Some species have been restored. For others, the rate of decline has at least been slowed, if not reversed. Still, we have a long way to go.

The Act of 1973 defines an endangered species as "... any species which is in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as "... any species which is likely to become an endangered species within the foreseeable future." And the Commission recently adopted a list of "candidate species." These are animals that could become endangered or threatened in the future. They are uncommon, have restricted distribution and may be at risk due to certain aspects of their biology.

In Pennsylvania, the bog turtle *(Clemmys muhlenbergii)* was the first of the amphibians and reptiles to be classified as endangered. Scientists believe we've already lost one turtle and one salamander, extirpated from the state. Today, one turtle, one salamander, two frogs and two snakes are listed as in danger of becoming extinct. In addition, one salamander, one turtle and one snake are listed as threatened. And one each turtle, lizard and snake are included as candidates of special concern. For some of these species, it may already be too late. Their survival is up to us.

**How can you become involved?**

- Learn as much as you can about endangered species and their special needs.
- Report any activities adversely affecting fish and wildlife to the proper authorities.

• Let your legislators know you want and expect good endangered species programs, proper funding and stringent enforcement.
• Join an organization and become personally involved with the preservation of natural habitat.

The future of endangered, threatened and candidate species, in fact, the very future of us all, may depend on how we, as concerned individuals, react today.

Pennsylvania's species of special concern include the following:

## *Endangered Species*

Bog turtle
New Jersey chorus frog
Coastal plain leopard frog
Massasauga rattlesnake
Kirtland's snake
Eastern mud salamander
Rough green snake
Northern cricket frog
Blue-spotted salamander
Eastern mud turtle

## *Threatened Species*

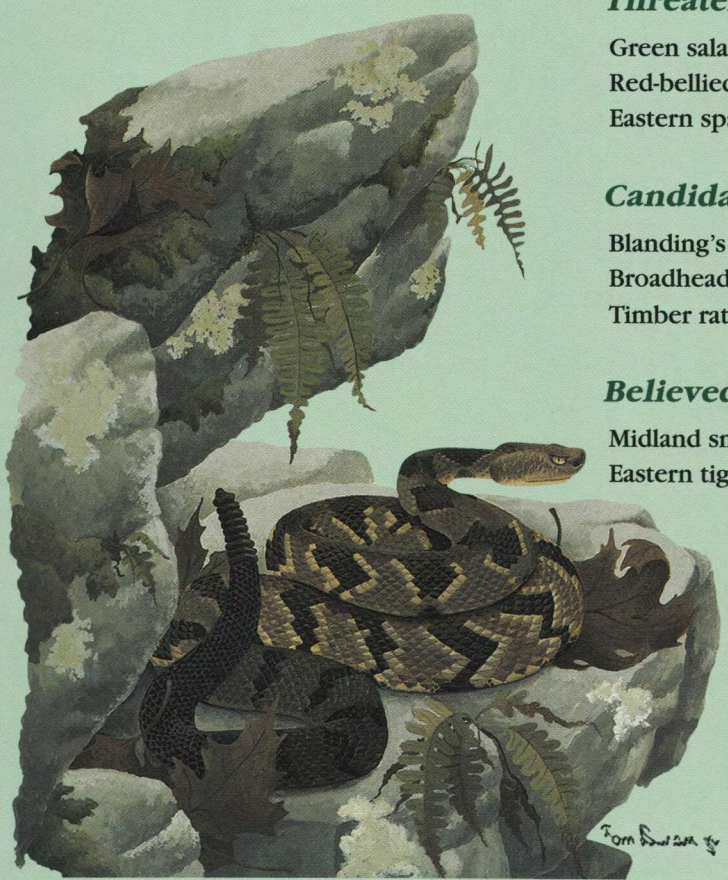
Green salamander
Red-bellied turtle
Eastern spadefoot

## *Candidate Species*

Blanding's turtle
Broadhead skink
Timber rattlesnake

## *Believed Extirpated*

Midland smooth softshell turtle
Eastern tiger salamander



*The timber rattlesnake is one of several reptiles and amphibians facing problems because of loss of habitat.*

Figure I-6a

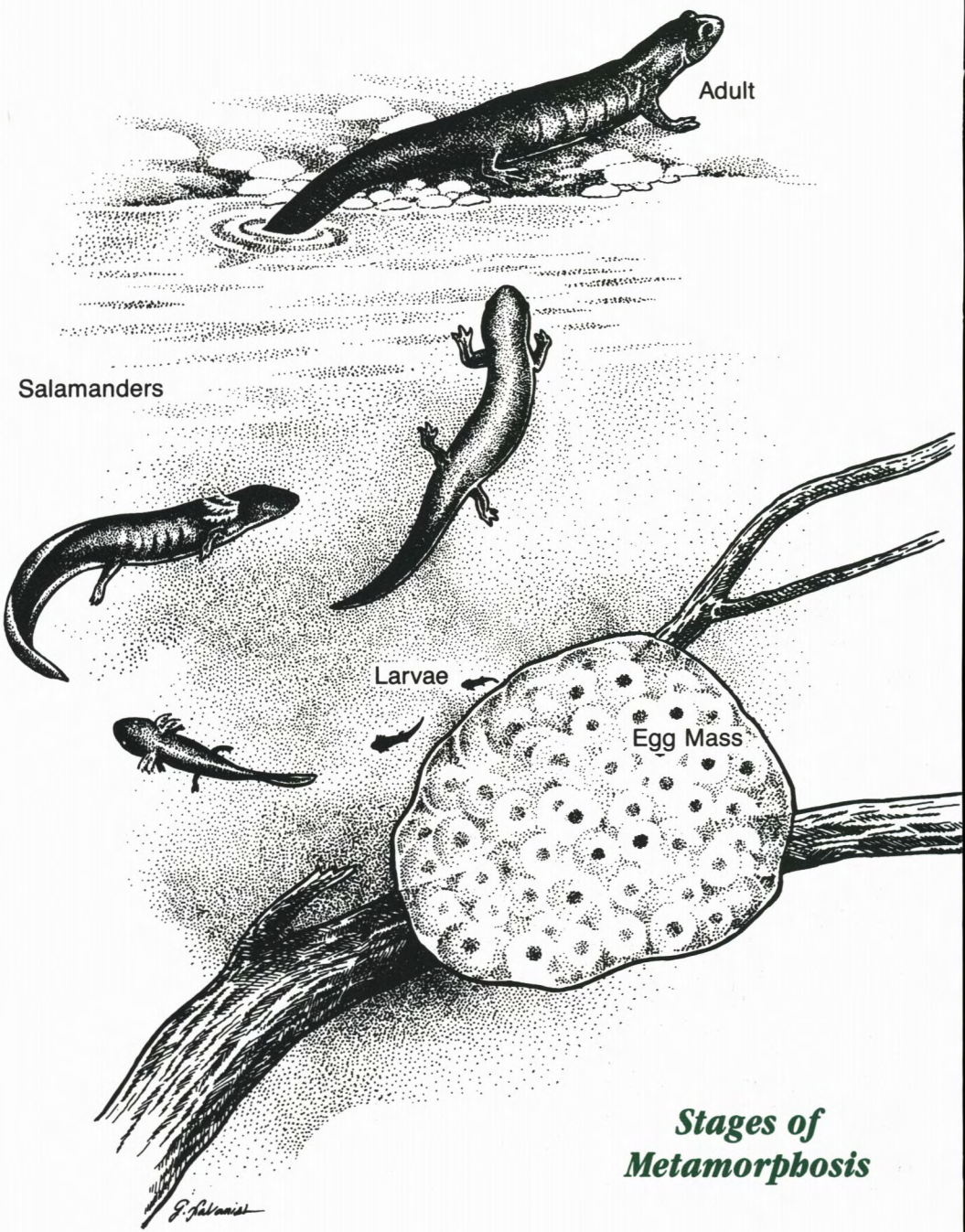
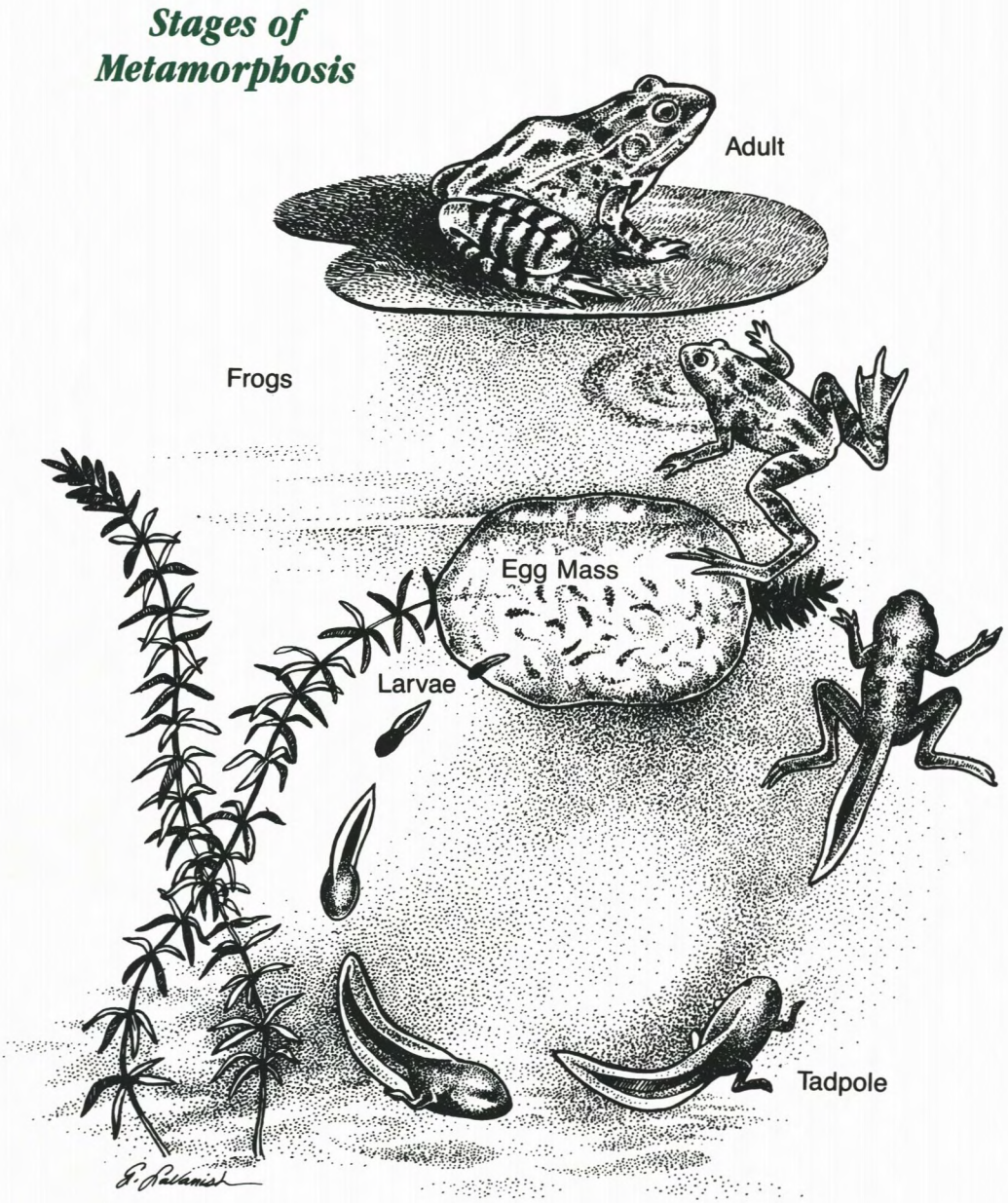

Adult
Salamanders
Larvae
Egg Mass
Stages of Metamorphosis

Figure I-6b


Stages of Metamorphosis
Adult
Frogs
Egg Mass
Larvae
Tadpole

Except for fish, the amphibians and then the reptiles represent the oldest living vertebrates (animals with backbones) as we know them today. Like fish, amphibians and reptiles are "cold-blooded" (ectothermic) animals. This simply means that the animal's body temperature is not regulated internally, but changes with the temperatures surrounding it. Thus, if the ambient temperature reaches a level either too high or too low, these animals seek relief and attempt to regulate their body temperatures to a more tolerable level by moving to another area. In the winter, this may mean going into hibernation below ground level, or during hot summer weather, seeking a cooler spot beneath a shaded patch of damp moss.

Reptiles, although placed below the birds and mammals in the hierarchy of vertebrates, are considered the first in the series of higher vertebrates. Unlike fish, considered the lowest form in the series, and amphibians which follow next, reptiles never breathe with gills at any point in their life cycle. Fish, of course, do rely on gills to obtain oxygen, and amphibians also use gills in at least some portion of their life.

Because of their two-stage life cycle, scientists long ago chose to call them "amphibians." Taken from the Greek *amphi* meaning *double* and *bios* meaning *life,* the name is quite apropos. These animals do indeed live a double life. Emerging from eggs usually laid in the water, most amphibians begin life as gill-breathing larvae and change later in form and structure from totally aquatic to, in most cases at least, a partially terrestrial form. This transformation is commonly referred to as metamorphosis. Reptiles, whether hatched from eggs or born directly as living young, are miniatures of their parents and do not go through a metamorphic stage.

# Metamorphosis

One of the most interesting and unique characteristics of the amphibians is their ability to change from one form to another. Referred to as metamorphosis, the transformation occurs as the amphibian progresses from the larval stage to the juvenile stage. Of all our four-legged animals, it occurs only among the amphibians. The change is more pronounced among the frogs and toads than it is among the salamanders. The salamanders' transformation from one physical form to another is less dramatic (See Figure I-6).

As a salamander transforms, it undergoes relatively simple changes because the young salamander appears as a miniature of the adult. External gills that accent the neck region of the young salamander are lost and breathing takes on a new form. Lateral line organs, a series of cells sensitive to waterborne vibrations located along each side of the body, also disappear as the skin under-

Figure I-7

*A black cloud of tadpoles almost obscures the soft bottom of this shallow breeding site of the eastern American toad.*

goes slight changes in its structure. There are also some changes to the muscles and skeleton.

Not all salamanders transform completely. Some salamanders retain their external gills, even though they become adults capable of reproducing after the metamorphosis is completed. The mudpuppy is an example of a Pennsylvania salamander that retains its external gills even as an adult.

The salamander larva is considered a carnivore, feeding mostly on tiny organisms it finds in its aquatic habitat.

The frogs and toads undergo a much more dramatic change when metamorphosis takes over. The eggs deposited by the female hatch to produce larvae we commonly call tadpoles (See Figure I-7). They bear little resemblance to the adult frog or toad into which they will later develop. These larvae for the most part are herbivorous, using a series of fine teeth to take vegetative matter into an equally small mouth. Minute forms of animal life can also be taken.

Viewed up close, the tadpole appears to be not much more than a tail and an abdomen, a bulging sac supported between the mouth and tail. The tail is long and is the primary means of locomotion in the water. Sometime after hatching, small hind feet become visible, but they are not used at this stage of life. They do, however, become large and important appendages as the adult stage is reached.

There are forelegs, but they are not seen in the tadpole stage. They develop later in the chamber housing the gills. As the transformation progresses, these legs emerge, passing through the body wall just before metamorphosis. While all this is going on, the mouth increases in width, the tongue develops and the eyes increase in size and become elevated, protruding above most of the head.

There are changes occurring internally as well, especially in the digestive system. Here, the intestines become somewhat shortened from the length required for the tadpole to feed on vegetable matter. As an adult, the frogs and toads feed entirely on animal matter.

The tail is absorbed into the body, aiding the development of new internal organs. Finally, the lateral lines (vibration-sensing organs common to fish and other aquatic-dwelling animals) are lost, and this unique amphibian finally reaches the adult stage, able to spend at least a portion of its life on land.

In some species, transformation can occur after only a few days as a larva. In others, tadpoles may survive perhaps a year or more before magically becoming an adult frog or toad.

# Origin

The early amphibians were the first step in the evolution of forms that were to lead to higher vertebrates. The amphibians bridged the gap from the totally aquatic existence of the ancient fishes to the reptiles that were destined to adapt to a life totally on land, even to arid rather than moist conditions required by the amphibians.

Although there are some discrepancies in theories of when the ancestors of our amphibians first appeared on earth, it's generally believed to have been about 300 million years ago, give or take a few million years. This would have occurred during the late Devonian Period to the Carboniferous Period, when much of our coal was formed. Reptiles evolved about 50 million years later as these animals became adjusted to an existence without water.

Scientists generally agree that ancient amphibians evolved from early fish known as lobe-finned fish. These fish of the warm Devonian swamps had fins supported by bone, rather than cartilage as other fish had. Their structure of limbs was similar to that of land-form vertebrates. They also had

lungs. Some scientists believe that these fish began leaving their aquatic homes as waters receded, areas dried up and land masses emerged. Thus, they progressed from a total life in the water to spending at least a portion of their time on land and were the first to become true amphibians. Reptiles took the next step, taking millions of years to develop. They left the water to live a life totally on land, even to breed and lay eggs. Today, amphibians still must return to water or moist areas to breed and deposit their eggs.

Amphibians were the first to solve several problems that let them leave the water for at least some portion of their life cycle. The most obvious obstacles they had to overcome included the need to breathe air, that is, to take oxygen from the air instead of absorbing dissolved oxygen from the water using gills. With their development of limbs into legs and feet, amphibians also met the challenge of moving about on land as opposed to moving through the water with the help of fins. Still, with their moist skin, they could not completely leave the water. Restricted by the dehydrating effects of life on land, they were, and continue to be, unable to exist in many areas. Unlike birds and mammals, most amphibians are unable to travel great distances quickly or tolerate very dry habitats.

The reptiles that followed the ancient amphibians solved the effects of "drying out" with the development of body scales and dry skin. Even the eggs of these reptiles were better protected from the loss of moisture, encased in toughened shells rather than having to be surrounded by moist jelly-like masses immersed in water. Thus protected, and with other adaptations that were to follow, reptiles were able to move inland away from the water and expand their distribution.

The early amphibians dominated life on land, the Age of the Amphibians lasting millions of years. Slowly, however, the amphibians gave way to the reptiles. But even as the reptiles became more predominate, the amphibians continued to make subtle changes. Finally, as the Age of the Dinosaurs reached its peak, amphibians as we know them today had evolved. During the peak of their reign, reptiles were large in number and varied in size. They included animals that ranged in size from small reptiles which dwelled in trees to the huge dinosaurs stretching to more than 100 feet. Some weighed as much as 50 tons. Of all the ancient lizard-like reptiles called dinosaurs that once ruled the land, only the crocodilians remain today.

# Classification

To study and become better acquainted with animals, it is helpful to have at least a basic understanding how each fits into the orderly set of rules regarding classification and subsequent assignment of scientific names (referred to as *taxonomy*). The scientific name of an animal is comprised of two or three Latin or Latinized words.

Aside from the kingdoms (animal and plant), the uppermost level and the broadest grouping in the classification of all living things is the phylum (phyla—plural). Taxonomists (scientists involved in classification, or taxonomy) have assigned all fishes, amphibians, reptiles, birds and mammals to the phylum Chordata, meaning animals having backbones. Several levels follow, each subdividing certain characteristics, until the basic unit of classification, the species and the subspecies, is reached. The subspecies represents the narrowest, most detailed separation of living or fossil animals (or plants).

Figure I-8

# CLASSIFICATION OF THE NORTHERN SPRING PEEPER FROG

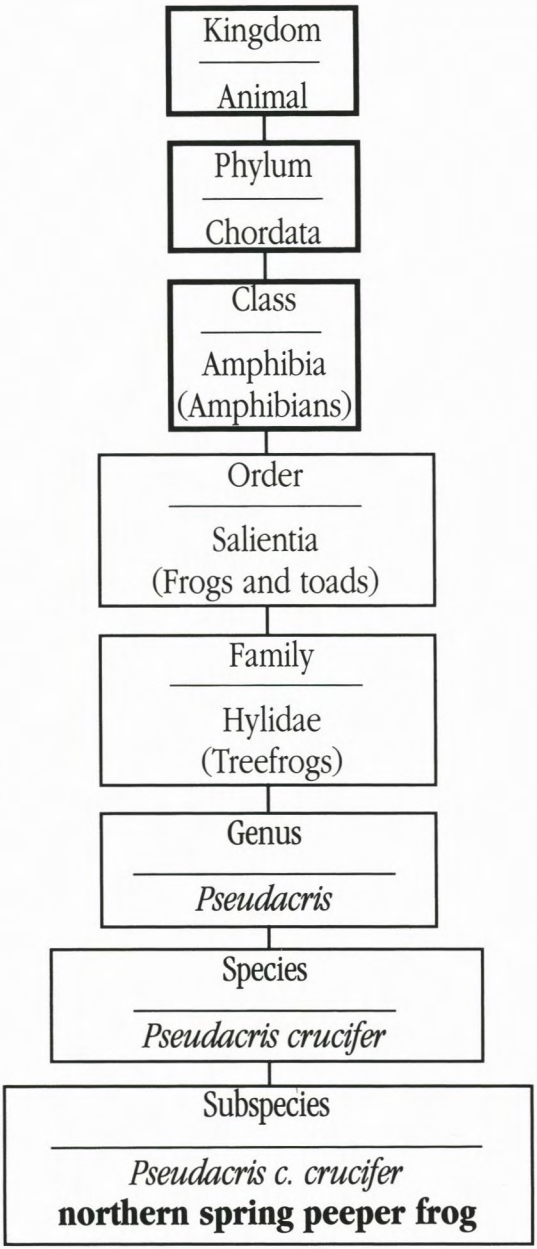


Figure I-9

# TAXONOMY OF PENNSYLVANIA'S AMPHIBIANS AND REPTILES SHOWING NUMBERS OF FAMILIES, GENERA AND SPECIES

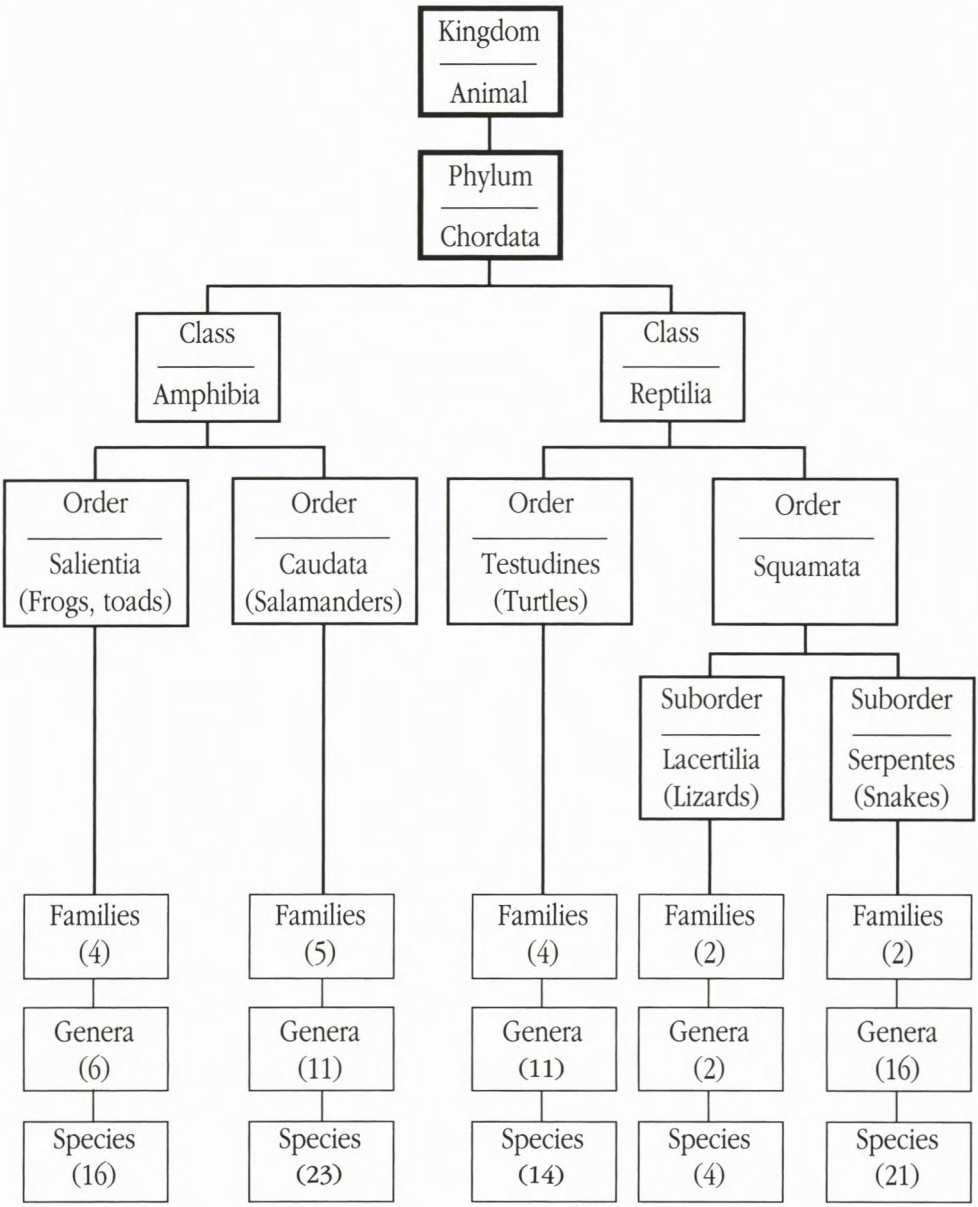


Figure I-8 illustrates how a particular animal, in this case the northern spring peeper frog, is classified through the various levels.

The scientific name of each animal is comprised first of the genus to which it belongs (animals sharing several but *not* all common characteristics), followed by the species name, and in some cases, a subspecies designation. This lowest unit, or division, designates those animals that normally breed among each other.

For example, the northern spring peeper frog, the common name for this species, belongs to the genus *Pseudacris.* Its scientific species name is *Pseudacris crucifer.* Further breakdown of a species, in this case, a geographical and morphological variation, is denoted with a third scientific name, the subspecies. Thus, its full scientific name is *Pseudacris crucifer crucifer.*

The fact that the last two names are identical indicates this subspecies occupies a geographical area from which the species was initially described. Subspecies from other areas yield a different third name. In addition, the name of the person (or persons) who first described and named a species or subspecies is often placed after the scientific name.

As noted in the chart in Figure I-9, amphibians, the class Amphibia, are further divided into orders: Caudata (salamanders), Salientia (frogs and toads), and Caecilians (tropical wormlike amphibians not found in Pennsylvania).

The class Reptilia includes both lizards and snakes in the order Squamata, because they share numerous characteristics. They are further defined by two suborders: Lacertilia (lizards) and Serpentes (snakes). The order Testudines (turtles) completes the list of reptiles in Pennsylvania. The order Crocodylia, which includes in the United States the American crocodile, the American alligator and the spectacled caiman, is not found in Pennsylvania. Similarly, the tropical worm-lizards belonging to the suborder Amphisbaenia do not inhabit the Commonwealth. And finally, the tuatara, the sole survivor of the order Rhynchocephalia, is found only on several small New Zealand islands.

Further breakdown of the amphibian and reptile classes by families, genera and species is discussed in each of their respective sections of this book. The names used in this book were taken from the *Standard, Common and Current Scientific Names for North American Amphibians and Reptiles,* third edition (1990).

# Populations

Pennsylvania has a diverse population of amphibians and reptiles, although the number of different genera and species is not as great as may be the case in more southerly areas of the country. The inability of these animals in general to withstand colder temperatures limits their distribution in parts of North America where winter temperatures commonly dip to low levels. Pennsylvania's geographic location puts it on the northern fringe of the range of several species, while eliminating many of them altogether.

This book discusses the 38 species and subspecies of amphibians found in Pennsylvania. Representing nine families and 16 genera, they are only a part of some 3,000 species of amphibians in the world. And although they may have once "ruled the land," amphibians today make up less than 10 percent of the world's known vertebrates. They are its smallest group.

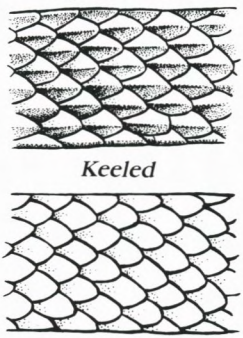
Now only a remnant of a formerly large group, reptiles today number just about 6,000 species worldwide, much less than during the time when reptiles dominated life on this planet. There are some 3,300 species of lizards, more than there are of snakes, which total about 2,200 species. Our oldest group of remaining reptiles, the turtles, is comprised of far fewer numbers, less than 250 species. Of the five major groups of reptiles worldwide, only the three just mentioned—turtles, lizards and snakes—are represented in Pennsylvania. Thirty-eight species, divided among eight families and 28 genera, are discussed in this book.

# Characteristics

Even though amphibians and reptiles share a few traits and characteristics, there are many more that differ, some dramatically. It is not a difficult matter to distinguish the amphibians from the reptiles. Each species account later in the book helps identify the various animals within each order and family, but consider several items that separate the two classes, the amphibians from the reptiles.

Figure I-10

*Reptile Scales*



*Keeled*

*Smooth*

First, amphibians generally have soft, smooth skin. It is moist, glandular and permeable to water. This permeability to water is vital in many cases so that the animal is able to breathe. The skin becomes a respiratory organ allowing oxygen to enter the body while expelling carbon dioxide.

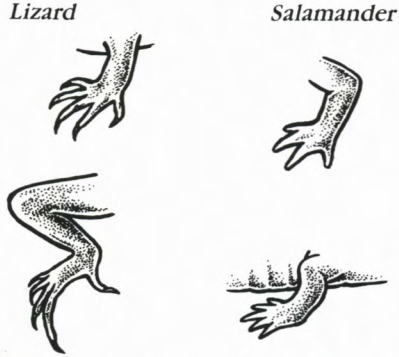
On the other hand, reptiles have skin that is dry, does not absorb water and in most cases is protected with a covering of scales. The larger scales may be called shields, plates or scutes. The scales, keeled on some reptiles, smooth on others, can help distinguish between certain species (See Figure I-10).

Pennsylvania's amphibians do not have claws on their feet, although some species may have pads or discs on the underside of the toes. Among our reptiles, the turtles and lizards have claws and this can be a distinctive feature in distinguishing a salamander from a lizard (See Figure I-11).

Amphibians must lay their eggs in water or a damp environment for them to develop properly and safely. There is no shell, but instead a protective capsule or jelly-like substance surrounds the eggs until they hatch.

Figure I-11

*Lizard* *Salamander*



In most cases, the young hatch into a larval or gill-breathing stage that is spent in the water. Depending on several factors, days, even years, may pass before the larva transforms (called metamorphosis) into the adult form. Young reptiles, however, do not enter a larval stage, but emerge as a miniature replica of the parent. In most cases, reptiles are oviparous, a term used to indicate they produce eggs that hatch outside the

body. Unlike the amphibian's eggs, the eggs of the reptile are hard-shelled or nearly so. This toughened shell allows the young to develop even in a drier environment.

Some reptiles are viviparous. This means that the young develop directly within the body of the female, without the benefit of a shelled egg and are subsequently born alive. In all cases, the young reptiles do not experience a gill-breathing stage awaiting metamorphosis.

# Species Descriptions

The descriptions of the various species discussed in this book have been arranged according to their scientific classification. This can help one become acquainted with the scientific treatment of these animals, but it also serves to put related species in sequence as an aid to their study and identification. Amphibians appear first, the salamanders and frogs and toads. The reptiles follow with turtles, lizards and snakes in that order. Within each order the families are presented where the genera and species are each arranged alphabetically.

General information about each order appears in the beginning of that section, preceding the species descriptions.

Colors and patterns can be helpful in identifying various species and are included in the descriptions. Still, these characteristics can vary—sometimes dramatically—from one specimen to the next. Therefore, while helpful and very important, these factors cannot always be a completely foolproof method in identifying a particular species, and other features may have to be used to confirm accurately any decision reached.

The sizes given within each species account provide an average minimum to maximum adult length. Variations can occur and larger or smaller specimens may be found. In the case of the salamanders, snakes and lizards, the length accounts for a total straight-line measurement from the tip of the snout to the end of the tail. Frogs and toads include straight-line measurement of the body only. The legs are not included. Sizes for turtles are taken as straight-line measurements of the carapace, or upper shell, from front to rear margins. The tail and head are not included in measuring the turtles (Refer to Figures II-6, III-7, III-11, IV-5, V-5 and VI-6).

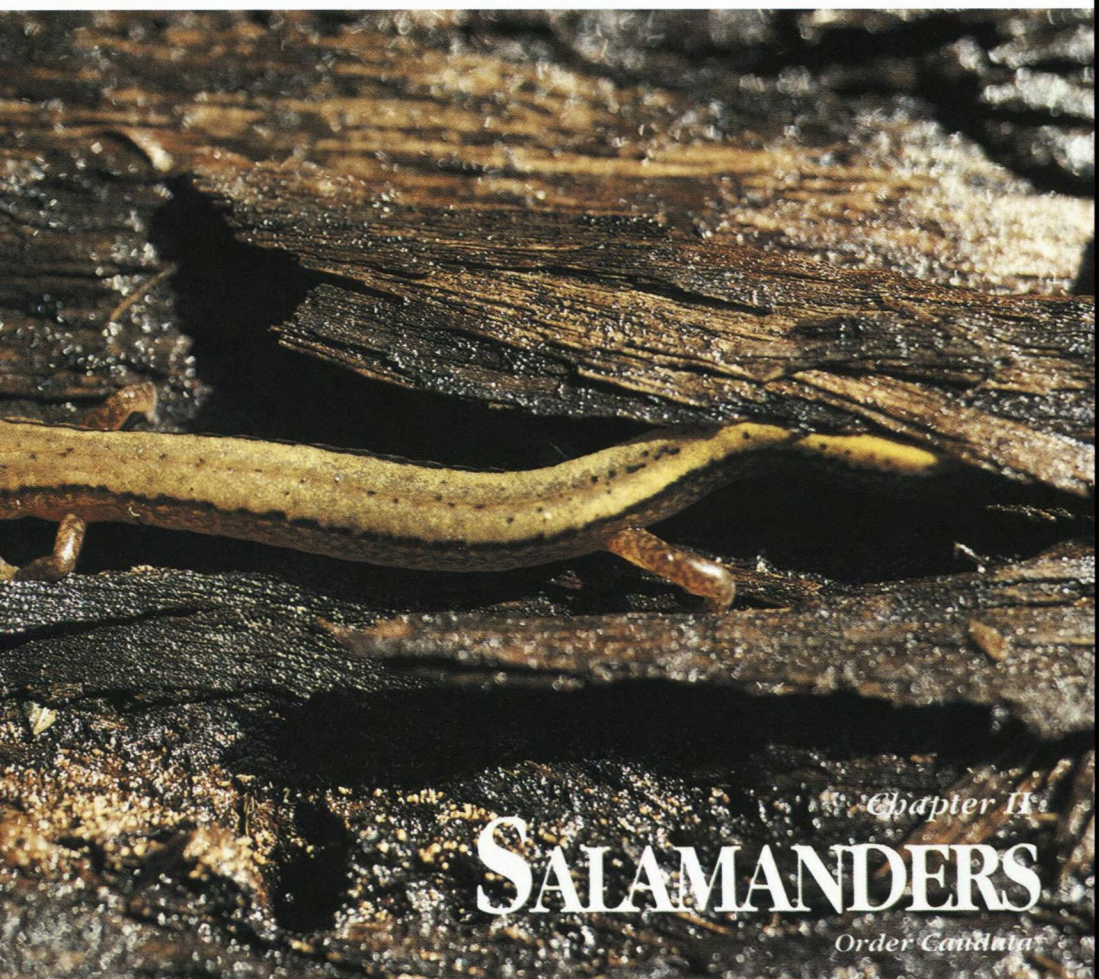
Also included in the description of each species is information about its range (including maps) and habitat, breeding habits, and the food it eats, and in the case of the frogs and toads, its call. Other information that may be interesting or necessary to understand each animal better is included under "General Characteristics."

*Figure II-4, A Jefferson salamander explores its icy retreat following a late spring snowfall.*

*Figure II-3, The redback salamander sometimes is found in this dark (lead-backed) phase without the red stripes.*

*Figure II-1, Jack-in-the-pulpit spreads his message of spring as several species of salamanders begin their search for a mate.*

*Figure II-5, Longer than its body, the lengthy tail of the longtail salamander continues the color begun at the head. Note the dark marks look more chevron-like on the tail, however.*



Chapter II

# SALAMANDERS

Order Caudata

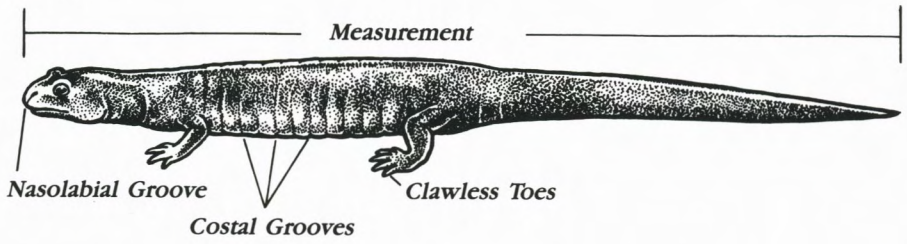
*Figure II-2, The northern two-lined salamander is a statewide resident.*

# Chapter II—The Salamanders

Pennsylvania has 22 species of salamanders representing five families and 11 genera. There are seven different families of salamanders in North America.

As a group, salamanders are secretive and nocturnal. All need moisture to survive. Their skin is smooth and must remain moist. Even the so-called terrestrial species can live only in areas that are moist or damp. Salamanders sometimes can be confused with lizards because of their slender bodies, long tails and similar body shape. But on close examination, it is obvious that salamanders lack the claws, scales and external ear opening of the lizards (See Figure II-6).

Figure II-6




Help in identifying various species of salamanders is available by counting the costal grooves. These narrow vertical grooves in the skin are found along the sides of certain species (See Figures II-6 and II-7).

Figure II-7
*Costal grooves are apparent on these spotted salamanders.*

Although some salamanders have a tendency to inflict a bite if picked up, they are not poisonous. Like many other amphibians, however, they do secrete a toxic substance from the skin glands that can be irritating even to humans, especially if it should come in contact with the mucous membranes. Always wash the hands carefully after handling salamanders and several of the frogs and toads.

In Pennsylvania, salamanders may breed from spring to autumn, and except for the hellbender, fertilization is internal. Copulation is not used, however. Instead, following courtship, the male deposits a small capsule referred to as a spermatophore. It is a gelatinous substance and its cap contains many, perhaps thousands, of tiny sperm. The female then takes up this packet with her cloacal lips and draws it into her body, where it is retained within the cloaca. The cloaca is a chamber into which the reproductive, digestive and urinary systems empty before they are discharged through the vent. Internal fertilization of the eggs takes place as the jelly-like eggs pass through the cloaca.

Salamanders are carnivores and feed on small living invertebrates.

## Giant salamanders (Family Cryptobranchidae)

**Eastern hellbender**—*Cryptobranchus alleganiensis alleganiensis*

Only a single species of this family is found in Pennsylvania. In fact, the hellbender, plus a subspecies, represents the single genus of the giant sala-

mander family occurring in all of North America. It has relatives in the Far East, however, where the Japanese salamander approaches five feet in length and is the largest known living salamander.

The family lives its entire life in the water. Unlike our other salamanders, the giant salamanders fertilize their eggs externally.

# Mudpuppy salamanders (Family Proteidae)

**Mudpuppy**—*Necturus maculosus maculosus*

This family is small with less than 10 recorded worldwide, one of which occurs in Pennsylvania. It is nocturnal most of the time and aquatic. The mudpuppy is a permanent larva, and retains gills throughout its entire life. Fertilization is internal and the female protects the nest until the eggs hatch.

# Mole salamanders (Family Ambystomatidae)

**Jefferson salamander**—*Ambystoma jeffersonianum*

**Spotted salamander**—*Ambystoma maculatum*

**Marbled salamander**—*Ambystoma opacum*

**Eastern tiger salamander**—*Ambystoma tigrinum tigrinum*

The mole salamanders spend most of their lives underground, hence their name is taken from the small mammal that leads the same kind of life. They are terrestrial salamanders that use animal burrows and other natural underground openings or passages. Robust bodies and limbs are common to the family, and all have short, blunt heads. Mole salamanders do not have a nasolabial groove (See Figure II-6) between the lip and nostrils. The lungless salamanders have this groove, and thus it can be used as an aid in distinguishing between members of these two families.

Figure II-8
*Counted among our largest salamanders, the eastern tiger salamander is now believed extirpated from Pennsylvania.*

Mole salamanders are carnivorous in both the larval and adult stages. Members of this family breed from late winter to early spring, usually in ponds, and fertilization is internal as the male deposits his spermatophore for the female to retrieve. One genus with five species is recorded in Pennsylvania.

One other member of the family originally resided in a small portion of Pennsylvania. Eastern tiger salamander *(Ambystoma tigrinum tigrinum)*—Now thought to be extirpated in Pennsylvania, the eastern tiger salamander originally occurred in the southeast corner of the state (See Figure II-8). Forestland adjacent to woodland pools provides suitable habitat. This salamander uses animal burrows and other underground passages as damp and protected retreats.

The eastern tiger salamander was our largest terrestrial salamander, reaching adult sizes of six to 13 inches. Its small eyes are set within a broad head. Its back and sides are unusually dark brown to dull black and sprinkled with olive spots in a variety of shapes.

Breeding occurs in early spring with egg masses deposited in temporary pools, usually in or near woodland, where they attach to underwater structures or plants. Transformation occurs by late August.

Continuing research into the genetic makeup of our native salamanders may yield some interesting new information. Pennsylvania may actually contain one or two additional species of mole salamanders. The blue-spotted salamander *(Ambystoma laterale)* is very closely related to the Jefferson's salamander. Biologists suspect that hybrids between the two species and/or the blue-spotted salamander may occur in certain areas of the Commonwealth. Some salamanders assumed to be Jefferson's have been found in the northwest corner of Pennsylvania and could be hybrids of, or the full species of, the smallmouth salamander *(Ambystoma texanum)*. This species' distribution has been officially recorded to extend to areas just over the border in Ohio. Analysis of DNA from each species and the suspected intergrades should provide additional insights and further refine the Pennsylvania species list.

# Newts

**Eastern red-spotted newt**—*Notophthalmus viridescens viridescens*

The skin of the newts is rougher than that of most other salamanders, and does not have the smooth, slimy feel common to other families. The newts are primarily aquatic animals, although they leave the water after the larval stage to live up to three years as efts, or sub-adults, on land. They return to the water to become full adults and live out the rest of their lives.

# Lungless salamanders (Family Plethodontidae)

**Green salamander**—*Aneides aeneus*
**Northern dusky salamander**—*Desmognathus fuscus*
**Seal salamander**—*Desmognathus monticola*
**Allegheny mountain dusky salamander**—*Desmognathus ochrophaeus*
**Northern two-lined salamander**—*Eurycea bislineata*
**Longtail salamander**—*Eurycea longicauda longicauda*
**Northern spring salamander**—*Gyrinophilus porphyriticus porphyriticus*
**Four-toed salamander**—*Hemidactylium scutatum*
**Eastern redback salamander**—*Plethodon cinereus*
**Northern slimy salamander**—*Plethodon glutinosus*
**Valley and ridge salamander**—*Plethodon hoffmani*
**Northern ravine salamander**—*Plethodon electromorphus*
**Wehrle's salamander**—*Plethodon wehrlei*
**Eastern mud salamander**—*Pseudotriton montanus montanus*
**Northern red salamander**—*Pseudotriton ruber ruber*

This is the largest salamander family with more than 300 species. Fifteen species occur in Pennsylvania representing seven genera. One member of this family, the green salamander, is on Pennsylvania's List of Threatened Species.

These amphibians do not have lungs, so their common family name is quite descriptive. Instead of breathing with lungs as do most animals, they use a process called "cutaneous respiration." This long, complex phrase, reduced to more simple terms, means that they take in most of the oxygen they need to survive through the skin. For this to work, the skin is thin and well supplied with blood vessels. Also, the skin is moist and permeable to water, and simply stated, behaves similar to the way gills take dissolved oxygen from the water.

The lungless salamanders have the nasolabial grooves that the mole salamanders do not have. This small, narrow, gland-lined slit extends upward from the upper lip to each nostril (See Figure II-6). This organ searches the ground where it picks up water-borne odors and conveys them to the nose.

The costal grooves (Figure II-6) are easily detected on members of this family. Most lungless salamanders are terrestrial, although a few are fully or partially aquatic. Some of these salamanders lay eggs on land, not in the water, as do most other amphibians. In these cases the young do not go through a free-living larval stage, but develop fully within the egg and hatch as miniature replicas of the adults.

There are three other members of the lungless salamander family residing in at least a portion of Pennsylvania. Valley and ridge salamander *(Plethodon hoffmani)*—Found in southcentral Pennsylvania, the valley and ridge salamander's range is in the mountains east of the Allegheny mountains portion of the Susquehanna River Valley, extending south and west to the New River in Virginia. It prefers well-drained soils. It is nocturnal and most active in the spring and fall.

The valley and ridge salamander is a small, slender salamander from about three to five inches in length. Its back is dark brown, speckled with tiny flecks of silver white or bronze; the belly is dark with white markings. There are 21 costal grooves.

Breeding occurs in May or June when three to eight eggs are laid. The eggs hatch in late summer or early fall.

Ravine salamander *(Plethodon richmondi)*—This lungless salamander inhabits several counties in the western and southwestern portion of the state. Wooded ravines and tree-covered hillsides as they slope to the valleys are favorite habitats. The ravine salamander never enters water, but forages throughout its forest home. It is more active during the cooler months of spring and fall than it is during the summer months.

This salamander is 3 to 4½ inches long as an adult. It is slender and has short legs; the head is narrow. Small white or yellow blotches mark the lower sides, and very small brass or silvery irregular dots accent a brown to blackish back. Costal grooves vary in number from 19 to 22.

The ravine salamander lays its eggs in a cavity beneath the ground. Usually about six eggs are deposited in the spring, and they incubate until late summer before they hatch. There is no aquatic larval stage. Eastern mud salamander *(Pseudotriton montanus montanus)*—This is a salamander of muddy springs and swamplands. It also likes the muddy areas commonly found around springs and seeps and finds refuge buried in the muck. It inhabits only a small portion of extreme southcentral Pennsylvania and its range then jumps to states east and south of Pennsylvania. In Pennsylvania, the eastern mud salamander is on the List of Endangered Species.

Reaching adult sizes of three to seven inches, the eastern mud salamander has a short tail and short legs. Its general coloration is bright red, pinkish or salmon and it has scattered black spots on the back, sides and belly. The belly is reddish or yellowish and lighter than the colors on the back and sides. The costal grooves number 16 or 17.

The female lays 75 to nearly 200 eggs in late fall or early winter. The larvae hatch during late winter and transform in one to three years.

# Species Descriptions

## Eastern Hellbender

*Cryptobranchus alleganiensis alleganiensis*

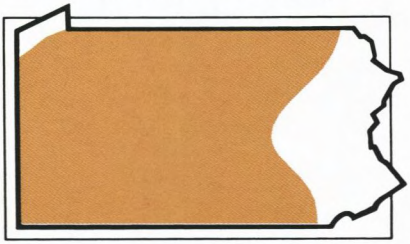
***General characteristics.*** The hellbender, a member of the Giant Salamander family, is one of two large salamanders inhabiting Pennsylvania. The other is the mudpuppy, although it belongs to a different family than the hellbender. Hellbenders attain adult sizes of just over 11 inches to as much as 20 inches in length. The hellbender is a harmless amphibian; it does not inflict a poisonous bite as many people believe. In fact, this bizarre-looking creature is seldom seen except by anglers who might catch a hellbender while bottom fishing. It can easily and safely be removed from the hook. It is a completely aquatic animal, nocturnal in its habits and hides under rocks or submerged logs where, again, anglers searching for bait may encounter this large salamander.

Although something less than attractive in appearance—some would say downright ugly—Indians once used the hellbender for food. Even though it is no longer a food source for man, the hellbender nonetheless continues to fill an important niche in the aquatic ecosystem.

***Identification.*** The hellbender is more commonly gray, but some specimens could be an olive brown to almost black above. Some dark mottling over the back and upper sides also is possible. The belly is lighter. Though not always present, irregular, scattered black spots sometimes pepper the back and sides. The body and head of the hellbender are flattened. Several

loose flaps of thick, wrinkled skin hang along the lower sides. Tiny eyes are almost missed in proportion to the large, broad head.

The hellbender loses its external gills by the time it reaches four or five inches in length, although gill openings may be seen on each side of the neck. The legs are short and stout with four toes on the hindlegs. The tail is flat and rudderlike, useful in navigating around the hellbender's aquatic environment.



***Range.*** The eastern hellbender is found in Pennsylvania's Susquehanna and Ohio River watersheds; it does not reside in the Delaware River drainage. Outside of Pennsylvania, its range extends southwestward to southern Illinois, continuing to the northern edges of Mississippi, Alabama and Georgia.

***Habitat.*** The hellbender favors fast-moving, mid-sized streams and the channels of rivers with clear water. The hellbender prefers habitat with plenty of bottom shelter in the form of boulders, large stones, snags and other large, loose debris. It takes refuge beneath this cover by day, coming out to forage for food at night.

***Reproduction.*** The hellbender breeds in August or September when the male prepares a saucer-shaped cavity on the stream bottom. Normally dug out under a rock or submerged log, most of the work preparing the nest is done at night. The female settles over the nest and deposits from 200 to 500 eggs. The eggs are fertilized by the male as they emerge from the female and settle into the nest. This external fertilization of the eggs by the hellbender is rare and unique among Pennsylvania's salamanders. The eggs are yellowish and are contained in long strings. The male guards the nest and eggs until the larvae hatch in eight to 10 weeks.

***Food.*** The hellbender has a particular fondness for crayfish and snails. It also eats aquatic insects. Worms, when they can be found, add variety to the diet of this large carnivorous amphibian.

# Mudpuppy

*Necturus maculosus maculosus*

***General characteristics.*** Only one other salamander in Pennsylvania, the hellbender, grows to a larger size than the mudpuppy. As an adult salamander, the mudpuppy reaches an impressive eight to 13 inches. It is a large, permanent larva, using external gills through its entire life. The mudpuppy is thoroughly aquatic and nocturnal, although it may be active even during the day in muddy or turbid water.

In certain locales this amphibian is also known as the waterdog, a colloquial name that on the surface would appear to lend at least a certain amount of credibility to the mistaken belief that it barks; it does not. Nor is it poisonous as some people suppose. It often is caught on hook and line by anglers and is completely harmless.

***Identification.*** The most striking characteristic of this salamander other than its size, or perhaps because of it, is the large, feathery set of reddish gills billowing out from behind each side of the head (See Figure II-9); the entire effect is almost incongruous. The size and physical appearance of the gills vary somewhat with the water in which the particular specimen resides. Cold, clear water with ample dissolved oxygen requires less surface area of the gill material, so the gills may become less conspicuous, are held back and may shrink in length. On the other hand, a mudpuppy living in water that is warmer and contains less oxygen tends to retain gills that are large and bushy, the thick plume-like breathing apparatus providing a more effective organ for absorbing scarce oxygen from its less-than-ideal aquatic home.

Figure II-9
*The mudpuppy retains its reddish gills for life.*

The legs of the mudpuppy are short but strong. The tail is shaped like a lengthy rudder, useful to a life spent in the water. The tail fin is occasionally tinted with orange or reddish pigments. Its small eyes have no eyelids. There are four toes on the front and hind feet; most salamanders have five toes on the rear pair of feet.

The mudpuppy, or waterdog, is gray to rusty brown on the upper surfaces, which also are showered with dark blue-black spots. The spots have irregular edges and are well-separated from one another. The pale belly is usually gray and is accented with dark spots. A dark stripe runs through each eye. Fifteen or 16 costal grooves mark each side.

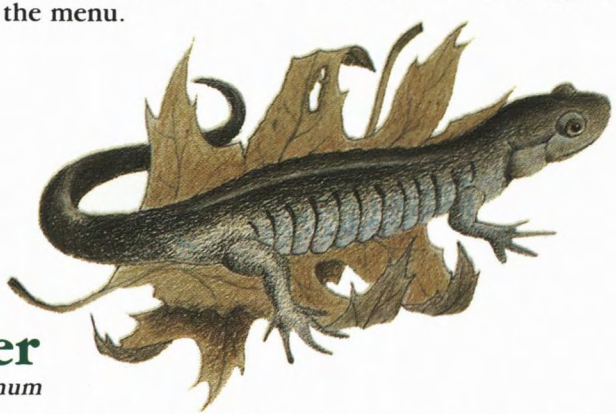
***Range.*** In Pennsylvania, the mudpuppy appears primarily in the Ohio River and adjacent Lake Erie watersheds, both part of its original range. This amphibian may also occur in eastern Pennsylvania, principally the Delaware River basin, possibly having migrated through the systems of manmade canals connecting these widely separated watersheds. Its range extends north to New York and southern Canada and south to Tennessee. It is found as far west as Manitoba and eastern Kansas.

***Habitat.*** Mudpuppy populations are found in lakes, rivers and streams. Although it seems to prefer clear, swift water, it can be found in habitats ranging from water that is shallow, muddy, warm and congested with thick stands of aquatic plants, to cool, clear, deep pools and lakes. It likes to spend its day hidden beneath underwater structures, venturing out at night in search of prey.

***Reproduction.*** Although courtship and mating occurs in the fall, the female mudpuppy does not deposit her eggs until the following spring, usually in May. As the nest is prepared, it is excavated with the open end on the downstream side, facing away from the flow of the current. The site selected for the nest is usually under a stone or a fallen log sprawled across the stream bed. Mudpuppies residing in a lake or pond normally leave the still water, traveling up a feeder stream to construct a nest in moving water.

As few as 30 to as many as 125 eggs are released by the female and become attached as single units to the underside of the nest's sheltering stone or log. They remain there under the watchful eye of the female until the incubation period is completed some six or eight weeks later. When the yellow eggs open, larvae less than an inch long wriggle free. At hatching, the larvae are striped with dark browns and yellow. Both front and hind legs are evident at this early stage. Toes have yet to develop. Mudpuppies need about five years to reach maturity.

***Food.*** The mudpuppy feeds on just about any aquatic animal it can capture. Crayfish are a favorite, but worms, insects, small fish and fish eggs add continuous variety to the menu.



# Jefferson Salamander

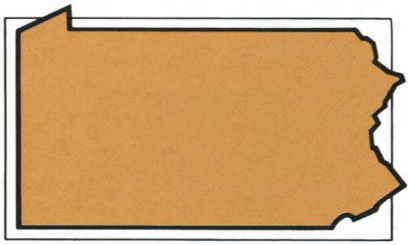
*Ambystoma jeffersonianum*

***General characteristics.*** The Jefferson salamander has close ties to Pennsylvania, aside from the belief that this area always has been a part of its natural range. This plain-looking amphibian was named for Jefferson College, located in Canonsburg, Washington County. The college, in turn, honors Thomas Jefferson, a noted naturalist who also happened to become president of the United States.

The Jefferson is one of our largest salamanders, attaining adult sizes that range from just over four to seven inches. Aside from its relative, the tiger salamander, only the mudpuppy and hellbender grow to lengths appreciably longer than that.

***Identification.*** This salamander is long and slender with a wide snout. Its toes are proportionately longer than those of most other salamanders. The back and sides are brownish gray; the belly is a shade lighter. The area surrounding the vent is usually gray. Small, bluish marks speckle the head, limbs and sides, but these tend to disappear with age. This salamander has 12 costal grooves.

***Range.*** The Jefferson salamander is believed to occur in limited numbers in all 67 counties. Elsewhere, its range extends northward to New York and western New England and southward to parts of Virginia, Kentucky and southern Indiana.



***Habitat.*** The Jefferson prefers damp forestland, especially a deciduous woods located near swamps or ponds. It finds shelter under fallen trees, rotting vegetation and other debris, often digging into the soil in the process. Like most Pennsylvania amphibians that breed in the water, the Jefferson salamander needs a close and stable source of water during its breeding period. Although these waters may dry up after breeding has been completed, they usually fill up again by the time breeding occurs the following year.

***Reproduction.*** Courtship occurs as early as March in Pennsylvania. Male and female emerge from their winter retreat and migrate to a nearby pond where a short time later the female could deposit up to 20 egg masses. Each mass could contain up to 15 eggs that are attached to underwater shoots or small twigs. The eggs hatch into young larvae in 30 to 45 days. Transformation from an aquatic to a land animal takes place sometime during July to September. The newly transformed salamander measures two to three inches in length.

***Food.*** Like other salamanders, the Jefferson salamander is carnivorous and preys on a variety of small insects, grubs and worms. Its habitat usually is conducive to providing an abundant variety of food.

# Spotted Salamander

*Ambystoma maculatum*

***General characteristics.*** The spotted salamander is one of our more common salamanders, although it is not often seen because it prefers to live underground. It generally is considered nocturnal. It reaches adult sizes that range from six to nearly eight inches, equaling or slightly exceeding the Jefferson salamander in average size.

***Identification.*** As might be imagined, large spots are a predominant means by which to identify this salamander. Two rows of yellow or orange spots run somewhat erratically the length of the body. Beginning on the head and near the eyes, the spots end at the tip of the tail. The spots on the head usually are orange even though the spots on the rest of the body could be yellow. The ground color ranges from black, to blue-black, to dark gray or dark brown. The belly is slate gray. A stout body begins with a round snout that is blunt and punctuated with large, dark eyes. There are 12 costal grooves.

***Range.*** In Pennsylvania the range of the spotted salamander extends from border to border in all directions. Except for Florida, southern New Jersey and the Delmarva Peninsula, it extends over the eastern one-third of the country.

***Habitat.*** The state's numerous hardwood forests offer a potential home to this amphibian, providing a pond (which could be temporary) or other wetland is nearby. Hillsides and other areas around woodland ponds seem almost irresistible. The spotted salamander spends most of its time beneath ground level, but also conceals itself in moist areas beneath moss-covered rocks or stones and among piles of leaves or other debris.

***Reproduction.*** Breeding occurs in early spring with the advent of warm rains and rising air temperatures. Rainfall and the yearly warming trend encourages migration to nearby breeding ponds. Here, in shallow water and at night, pairs of spotted salamanders perform a dance of courtship that ultimately results in fertilized eggs being deposited by the female. The eggs are encased in masses that swell to measure from two to four inches in diameter. The masses, up to four of them per female, are compact and can be clear or milky in appearance. Each mass clings to submerged branches and other vegetation and contains an average of about 100 eggs.

Depending on water temperatures, the eggs hatch in one to two months. The larvae are light sandy or greenish yellow and dark spots sprinkle the back. A dorsal fin extends over the back ending just above the front legs. The gills are lost and transformation takes place in two to four months. The spotted salamander returns to water during its second spring as a mature adult, ready to begin the cycle again.

***Food.*** Like all salamanders, the spotted salamander is carnivorous. The majority of its hunting is done at night when it seeks to feed on worms, slugs, spiders and insects.

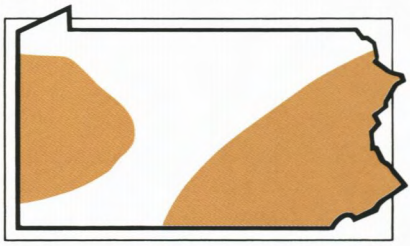
# Marbled Salamander

*Ambystoma opacum*

***General characteristics.*** Another of the so-called mole salamanders, the marbled salamander is a secretive creature, not often seen even by people who regularly spend time in the outdoors. Most of the reported sightings occur during the breeding season when the male and female leave their well-hidden shelter to mate. This amphibian reaches adult lengths that range from 3½ to just over four inches.

***Identification.*** The marbling effect that sets off this chunky salamander is a study in strong contrast. The body is dark gray to black, with bold white or silvery crossbands. On the female, these bands tend to be a bit more gray. Occasionally the crossbands run together on the sides, encasing a black area within a striking outline of white. The belly is black and unmarked. The marbled salamander has 11 or 12 costal grooves.

***Range.*** The marbled salamander inhabits the entire East Coast of the United States from New England to Florida. In Pennsylvania, two populations have been identified, with the smaller one in the western part of the state from Westmoreland and Indiana counties to Crawford County. For the most part, the Allegheny Mountains appear to form a western barrier to the species. Residing also in southeastern Pennsylvania, the range extends up to Centre County, then takes a swing to the northeast entering Wyoming and Pike counties. It is more numerous in this southeastern range than in the northwest.



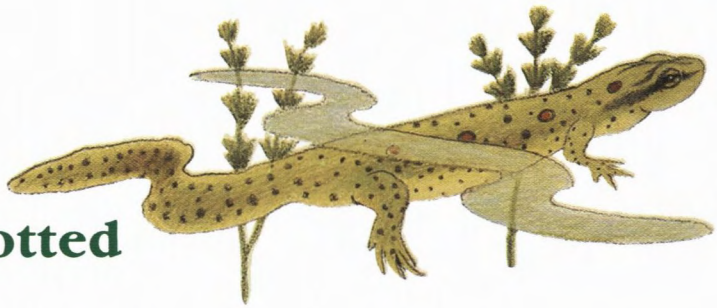
***Habitat.*** The marbled salamander adapts to a variety of habitats encompassing woodlands and low, swampy areas to relatively dry hillsides. Sandy, even gravel-laden terrain supports the marbled salamander, which prefers a drier habitat than other members of its genus.

***Reproduction.*** The marbled salamander breeds in the autumn, a departure from most other members of its family, and amphibians in general. In September through October in Pennsylvania the male marbled salamander courts the female. Mating and nesting occurs on land, but usually near water. Fifty to 200 eggs are laid in a small, sheltered depression that is flooded later by rainfall. Deposited one at a time, the eggs are guarded by the female, who curls her body around the clutch, remaining there until they are inundated. The eggs hatch a few days later. If the rains of autumn are sparse, the eggs lay dormant over the winter and hatch the following spring. The larvae are dark brown to black, liberally marked with lighter specks. About three-quarters of an inch long when hatched, the larvae transform into land-form salamanders in four to six months. The juvenile salamanders measure just two to three inches in length.

***Food.*** The marbled salamander searches dry, sandy soil, wetlands or woodlands for slugs, worms and insects. Its diet is varied, reflecting the insects and other small prey that could be expected in such diverse habitats.

Figure II-10

*Worms and grubs are a favorite prey of marbled salamanders.*



# Red-spotted Newt

*Notophthalmus viridescens viridescens*

***General characteristics.*** The red-spotted newt is actually the adult stage of an amphibian that progresses through three different stages of life: the aquatic larval stage, which immediately follows hatching from the egg; the terrestrial sub-adult stage known as the red eft; and finally, the mature adult, the aquatic red-spotted newt. Each stage has its own coloration and patterns and consumes somewhat different prey, although each retains the usual salamander preference for a carnivorous diet.

The adults remain moderately active all year long. Even during the winter months, red-spotted newts can be seen prowling the stream bottom even though ice may cover the surface.

The newts have a built-in protective device, effective in keeping predators at a distance. Even fish avoid the newt, which secretes a toxic substance from glands in its skin. This poisonous matter can at least irritate mucous membranes and is sufficient to discourage would-be predators from making a meal of the newt.

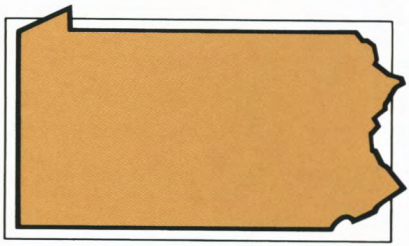
On the average, the red eft is slightly smaller than the newt. The red eft can be 1⅜ inches to 3⅜ inches long, compared to the adult newt's length of 2⅞ up to four inches.

***Identification.*** This amphibian is greenish yellow in its larval stage. It has two grayish lines, located just off center on either side of the back; the lines run the length of the body. At hatching, the larva has gills and just a hint of forelegs.

Two to three months into the larval stage, the forelegs and hindlegs have been developed, the gills are lost and the skin becomes granular and textured to the touch. At this point metamorphosis takes place, the land-dwelling red eft stage is entered and the body becomes a brilliant red to orange-red. A row of black-bordered, round red spots appears on either side of the back; the belly is yellow during this sub-adult stage. Not yet an adult but no longer a larva, the red eft remains terrestrial for one to three years before transforming to become a red-spotted newt.

At the end of the eft stage and within a week of entering the water to live out its life as an adult, the skin of the newly transformed red-spotted newt becomes smooth, and the tail fin develops, becoming compressed vertically to look rudder-like. Its color now is drab olive to yellowish brown or dark brown. The belly remains yellow and is sprinkled with numerous small black spots. A row of red spots, bordered with black, also covers the newt's

back on each side. In neither the eft nor newt stages are the costal grooves distinguishable.



***Range.*** Its range extends from central Georgia and Alabama, northward to southern Canada, and as far west as the Great Lakes. Each one of the state's 67 counties probably has some population of red-spotted newts.

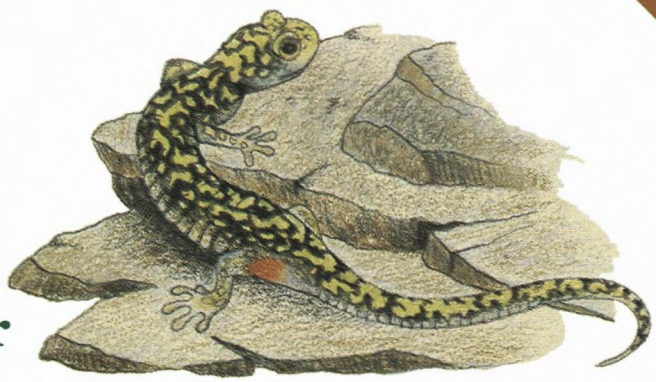
***Habitat.*** Considering its broad distribution, the newt is able to select from a variety of water in or near which to make its home. It prefers water that is more or less still—ponds, shallow lakes, marshland and quiet stretches of streams. Clean water is required and if it is covered with a dense stand of submerged vegetation, that's a plus. The newt alternately can be seen scrambling among the stems of aquatic plants in search of food and crawling methodically across the bottom where sometimes it pauses to rest before swimming away to some other rendezvous.

The newt lives in water, but the land-based eft takes up residence in neighboring damp woods. Preferring forested areas, the red eft likes to avoid exposure to direct sunlight. Even so, it may casually, and with an almost fearless air, stroll across the open floor of its forest home, seemingly oblivious to anything else around it. The red eft is especially active on a rainy day.

Like the adult newt, the sub-adult terrestrial eft may remain mobile all year and only occasionally seek relief from the rigors of winter. When it does decide to hibernate, it does so underground where a more moderate and stable temperature is available.

***Reproduction.*** The red-spotted newt is a spring breeder when the hind legs of the male become enlarged, and black, horny structures appear on the inner portion of the thighs and on the tips of the toes. At the right time, an elaborate courtship ritual ensues as the male seizes the female and both become involved in a frenzy of swimming, clasping and tail fanning. The female deposits from 200 to 400 eggs, which adhere individually to the stems of submerged plants. The eggs, spherical in shape, are brown and yellowish in color. The incubation period lasts for one to two months after which the three-eighths-inch larvae break free of their eggs to hide among the vegetation. The larval period lasts two to three months before the juvenile leaves the water to live in a nearby woods as the terrestrial eft. One to three years pass before the red eft migrates back to the water in which it was born, where as an adult red-spotted newt, the cycle begins again.

***Food.*** The aquatic larva feeds on small invertebrates it is able to find among the stalks of underwater growth or along the streambed or bottom of the pond. Moving ashore as the terrestrial red eft, small insects and snails become its main prey as it searches among the leaves and earth beneath the tall trees. After returning to the water as the adult newt, foraging in the shallows produces numerous opportunities for a meal. It consumes worms, small crustaceans and mollusks, young amphibians and the eggs and larvae of amphibians. The newt is a voracious feeder and relishes fish eggs when it can find them.



# Green Salamander

*Aneides aeneus*

***Threatened Species***

***General characteristics.*** The green salamander belongs to the lungless salamander family. This salamander family has more known species than any other. As an individual species, however, the green salamander has been placed on Pennsylvania's List of Threatened Species. Found in only a small area of the state, its restricted habitat is such that concern has been expressed for its continued existence. Drastic changes to its restricted, preferred habitat will affect the ability of this attractive salamander to continue to maintain stable populations in Pennsylvania.

Reaching a length of just over three to about five inches, the green salamander spends most of its day in hiding, preferring to move about in the relative safety of the night.

***Identification.*** The green salamander is aptly named and is considered our only truly green salamander. Its green or greenish-yellow irregular patches stand out boldly against an otherwise black body. It is a slender salamander with a somewhat flattened body. The head, however, appears to be swollen in the area just behind the eyes. The toes are square-tipped and expanded. As a lungless salamander, the green salamander breathes through thin, moist skin. Its costal grooves number 14 or 15.

***Range.*** In Pennsylvania the green salamander is found in only a small portion of Fayette County in southwestern Pennsylvania. Its natural range, however, extends south into Alabama, making the lower part of Pennsylvania just about the northernmost extent of its range.

***Habitat.*** The green salamander appears to prefer only sandstone outcroppings of a particular geological formation in Pennsylvania, in areas that are damp, but not necessarily wet. It takes refuge in the sheltered, narrow crevices typically found in these large faces of stone. It would not be unusual either to find the green salamander curled up under a stone or beneath the loose bark of a rotting tree or stump. Although it likes humid areas, it also seeks protection from the sun and rain. It occasionally climbs trees, but most often is seen at or near ground level.

***Reproduction.*** The green salamander seeks its mate sometime from May to August. Some 10 to 20 sticky eggs are produced. The female attends the eggs during the 12 or so weeks they take to hatch. There is no aquatic larval

stage and the hatchlings are about seven-eighths-inch long. The incubation process may at times be difficult because the eggs are attached in strands to the upper surfaces of narrow cracks in the salamander's rocky home. Sometimes they may even be deposited in the confined space where bark has separated from the solid inner wood of a tree.

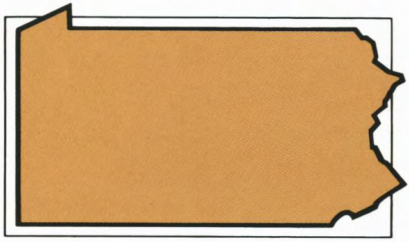
***Food.*** Small insects make up most of the green salamander's diet. Surefooted and hunting at night, the green salamander scales sheer rock walls in search of beetles, ants and even mosquitoes.

# Northern Dusky Salamander

*Desmognathus fuscus fuscus*

***General characteristics.*** The northern dusky salamander is a member of a large group of salamanders, the lungless salamanders, and as an individual species is found in abundance in Pennsylvania. The northern dusky salamander also is the more common of our three dusky salamanders. Its average adult size ranges from 2½ inches to 4½ inches.

***Identification.*** The northern dusky salamander is gray to tan or dark brown on the back becoming a bit lighter on each side. Although usually plain, a close inspection may sometimes show mottling not much darker than the background color. Larvae and juvenile specimens have pairs of oval blotches on each side that often fuse together to form streaks running the length of the body. Even then, this pattern may be obscured or disappear as the salamander gets older. The underside is pinkish with blue-gray speckles. The tail is triangular and less than one-half the total length of the salamander. It has 14 costal grooves.



***Range.*** The northern dusky salamander lives statewide and is an abundant amphibian in most counties. It stretches from New England to the Carolinas and westward to Indiana.

***Habitat.*** It seldom is found far from running water and seems to have a special fondness for spring seeps and small rivulets. It likes woodland streams where rock-strewn banks provide ample shelter. More often than not, the summer months find the northern dusky salamander submerged, taking advantage of the cooling waters. It also hibernates under water, escaping the worst of winter's rigorous cold.

***Reproduction.*** The northern dusky salamander conducts a courting ritual that results in successful breeding during June to September. A cluster of one to three dozen eggs is left by the female who guards them until they hatch in six to 13 weeks. The eggs are deposited near water, sheltered beneath rocks or rotting logs commonly strewn along the stream bank. The nest consists of a cavity carved out of the damp soil or decaying matter. After the eggs hatch, the larvae quickly move into the water. It remains aquatic for the balance of the larval period, transforming in six to 13 months to spend its adult life along the stream.

***Food.*** Spending much of its time in the water allows the northern dusky salamander to feed on sow bugs and other aquatic organisms. Insect larvae and earthworms make up the balance of the diet.

# Appalachian Seal Salamander

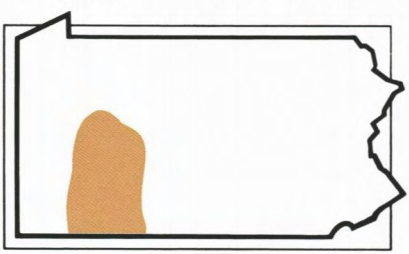
*Desmognathus monticola monticola*

***General characteristics.*** The Appalachian seal salamander is a member of the lungless salamander family, which, it is thought, evolved in what is now the eastern portion of North America. This family of salamanders is not equipped with lungs and thus needs to take in oxygen through its thin, moist skin. The Appalachian seal salamander averages 3¼ to five inches as an adult.

***Identification.*** The Appalachian seal salamander has a robust body similar to its cousin, the northern dusky salamander. The tail makes up approximately one-half the total length of this salamander. The tail is compressed, and the tip is knife-edged on the upper side. The very tip of the tail is pointed.

Although the body can be variably patterned, it is mainly light brown or grayish above with dark-brown or black wavy streaks or reticulations that stand out markedly. Sometimes these markings take on the appearance of worm-like blotches and may be surrounded by paler areas. The belly is light and usually plain, although specimens may be found with blotches on the underside. The sides of the Appalachian seal salamander are dark above but lighter and speckled as they approach the belly line. There are 14 costal grooves in the skin on each side.

***Range.*** In Pennsylvania the Appalachian seal salamander resides in an area in the southwestern part of the state, west of the Allegheny Mountains. Its range does not reach the Ohio border, however, and Clarion County just about marks its northern limits. It is an animal of mountainous and hilly regions, and its natural



range extends from Pennsylvania south into northern Georgia and Alabama.

***Habitat.*** The Appalachian seal salamander likes to stay close to water where it quickly dives if disturbed. Otherwise, it hides under rocks, downed trees or in burrows from where it feeds. Its hiding place almost always is on the bank of a mountain stream or small, rocky brook. A boggy ravine, rock-strewn and well-shaded from the rays of the sun by a mature hardwood forest, would present to the Appalachian seal salamander an ideal abode.

***Reproduction.*** In Pennsylvania the Appalachian seal salamander deposits its eggs as early as June. The nest is guarded by the female until the eggs break open, usually in September. From one to three dozen eggs are released by the female and are attached to the underside of a rock or other convenient protective device. The area selected for laying the eggs is usually wet. The larvae measure about three-quarter-inch when hatched and transform after they've grown about one inch more.

***Food.*** The Appalachian seal salamander often feeds as it rests in its daytime hiding place. Unmoving as it sits peering from the front of its burrow, the salamander can quickly grab an unsuspecting insect as it wanders by the opening. Ants, beetles and even other salamanders are included on this amphibian's menu.

# Mountain Dusky Salamander

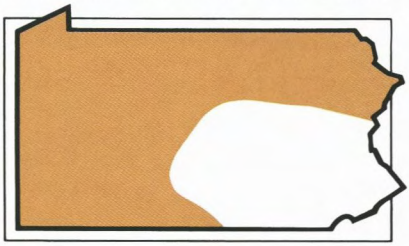
*Desmognathus ochrophaeus*

***General characteristics.*** The mountain dusky salamander is a lungless salamander, closely related to the Appalachian seal and northern dusky salamanders. It is more terrestrial than other dusky salamanders and during wet weather often wanders far into the surrounding forest and away from its usual habitat near water.

It is not a particularly large salamander, reaching adult lengths of nearly three to about four inches or slightly less than the other dusky salamanders.

***Identification.*** It is difficult to define the colors and patterns of the mountain dusky salamander because there is such a wide variation of both. The ground color, covering the sides and part of the back, usually is a dark color and can be almost anything ranging from grays to browns, olive to dark yellow, even darkish orange. A lighter stripe, bordered with a very dark, sometimes black pigment, runs the length of the body and onto the tail. This stripe also can be a variety of colors including orange, yellow, gray, tan or reddish. The stripe is wide, straight-edged and accented with dark vee-shaped marks. The sides of the mountain dusky salamander tend to be

mottled along their lower margins. Its face is marked with a light line extending from the eye to the jaw. The tail is slender and rounded. Costal grooves number 14.



***Range.*** The mountain dusky salamander ranges from New York to northern Georgia and Alabama. It is found over about two-thirds of the state, missing the southeastern corner. It is absent from that area south, and along the coast.

***Habitat.*** The mountain dusky salamander is an animal of the uplands where it favors small streams and springs. It stays close to water except to range occasionally over the floor of the forest, which most of the time is a stand of conifers. The mountain dusky salamander takes refuge under stones and old logs and hides among piles of damp leaf litter covering its forest home. During the winter, large populations of mountain dusky salamanders may gather around springs, seeps or other small wet areas. These same sites could later serve as breeding grounds and much needed aquatic habitat for mountain dusky salamander larvae.

***Reproduction.*** The mountain dusky salamander appears to be in no particular hurry to breed because mating can occur anytime between spring and fall. The mountain dusky salamander is at least three and perhaps four years old before it is sexually mature. After mating, the female picks a site near water where 11 to 14 eggs are laid in clusters. They are attached to nest cover, which may be decaying logs or any of several species of sphagnum mosses that commonly grow in this salamander's habitat. The female guards the eggs until the larvae emerge. They remain in the larval stage for two to eight months.

***Food.*** As is the case with most amphibians, the habitat of the mountain dusky salamander serves to produce a variety of insect life. The mountain dusky eats most insects, including beetles and numerous small flies. Mites, although not insects, and other "bugs" also are captured and included in the diet.

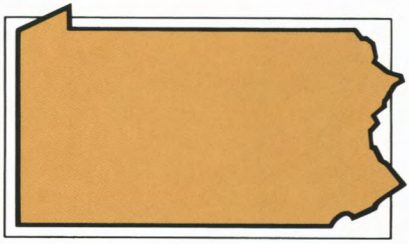
# Northern Two-lined Salamander

*Eurycea bislineata bislineata*

***General characteristics.*** The northern two-lined salamander is one of the brook salamanders, preferring wet, moist areas close to small streams or rivulets. It is not a large salamander, reaching adult lengths of 2 1/2 inches to just under four inches.

***Identification.*** The primary color of the northern two-lined salamander is yellow, although it may be tinged with brown, green or an orange-bronze. The back is nearly covered with a lighter stripe that runs the length of the

body. This broad stripe is bordered with narrower black or dark brown stripes that begin at the eyes and end on the tail where occasionally they break up into small spots. The sides are mottled, and although they may tend to be tan, they still show the characteristic yellow. The belly is bright yellow. There are 13 to 16 costal grooves.



***Range.*** The northern two-lined salamander is distributed statewide. Its range extends from Quebec to Virginia and the Tennessee River Valley, westward to Illinois.

***Habitat.*** The northern two-lined salamander is often found in abundant numbers, depending to a large extent on the habitat. It likes rock-bottomed brooks, preferring small streams to larger waters, although swampland and flood plains have their share of this colorful creature as well. When not in the water, this amphibian takes refuge among the rocks and tree roots lining the water's edge. During wet weather, the northern two-lined salamander may strike out, heading well into the damp forest surrounding its home, exploring, foraging, but always returning to its small, rock-strewn brook.

***Reproduction.*** Courting by the northern two-lined salamander commences in late winter to April and is carried on in the water. The female lays an average of 30 eggs which she may guard. The eggs are sticky and adhere to the underside of submerged rocks and logs or cling to the stems of aquatic plants. They hatch in May or June and the larvae are about a half-inch long. They remain in the larval stage for one to three years, transforming when they are nearly two inches in length.

***Food.*** Following the same pattern of most other salamanders, the northern two-lined salamander prefers a diet comprised mainly of invertebrates. Insects and their relatives are the main staple.

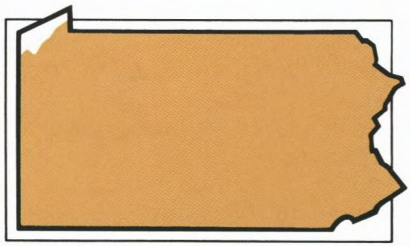
# Longtail Salamander

*Eurycea longicauda longicauda*

***General characteristics.*** The longtail salamander is one of the so-called "brook" salamanders, usually residing in or near small waters where fish are at a minimum at best. This lungless salamander attains adult sizes of four to just over six inches. Most of this length is "tail," because it accounts for much more than half the total length. The longtail salamander is nocturnal, although it may be seen moving about during the day following a heavy rainfall.

***Identification.*** The descriptive common name provides a clue to identifying this colorful amphibian. Much longer than the body, the tail is slender but continues the coloration and pattern that begin on the head. This salamander is yellow to bright red-orange and is marked with contrasting black

spots. The spots are heavier on the sides than they are across the back, and on the tail the spots may combine to form vertical bars. The salamander has 13 or 14 costal grooves.



***Range.*** The longtail salamander is a statewide resident except for the small area of the Commonwealth that drains into Lake Erie. There have been no reported sightings of the longtail salamander from Pennsylvania's 42 miles of Lake Erie shoreline or the inland Lake Erie Plain. Its range includes southern New York to northern Alabama and west to the southern tip of Illinois.

***Habitat.*** This amphibian is known to inhabit caves and abandoned mine tunnels, but more often is at home near small streams, seeps and springs. The longtail salamander waits for nightfall, hidden under rotting logs, stones and streamside boulders. It is also known to reside in banks of shale that overlook a watery environment, where it darts among the numerous cracks and crannies in search of food.

***Reproduction.*** The longtail salamander locates a mate to begin courtship from mid-autumn to early spring. Breeding occurs in or near the water sometime between October and March when the female lays up to nearly 100 eggs. The eggs may be deposited directly in shallow water, or sometimes near the water's edge under stones or in small openings in the ground. The eggs produce aquatic larvae in six to eight weeks and transformation follows after four to as much as seven months. The longtail salamander is sexually mature at one to two years of age.

***Food.*** Most of its hunting is done at night when this agile salamander preys on resident invertebrates. It especially likes to spend evenings during a warm rain looking for a meal that could include grubs and any number of insects.

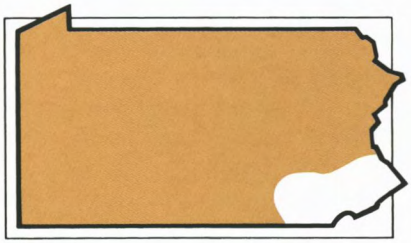
# Northern Spring Salamander

*Gyrinophilus porphyriticus porphyriticus*

***General characteristics.*** The northern spring salamander is the largest of several lungless salamanders that occur in Pennsylvania. Adult lengths range from nearly five inches to 7½ inches. It is sturdily built and nimble. This amphibian is at least partly nocturnal.

***Identification.*** The basic coloration of the northern spring salamander is salmon although variations occur through tints of reddish brown, yellowish brown or light orange. The back and sides sometimes have markings, and even then are often nearly obscured, appearing as a very subdued mottling.

These spots also are scattered about the throat. The belly is lighter. A light line edged with black begins at the eye and extends downward to the nostril and can help identify this colorful creature. There are 17 to 19 costal grooves.



***Range.*** The northern spring salamander extends from most of New England southwestward to Alabama. It is found statewide except for portions of the extreme southeast. It apparently has not made its presence known at least in Philadelphia County and parts of Delaware, Chester, Bucks and Montgomery counties.

***Habitat.*** As could be expected, the northern spring salamander is found in and along areas where water suddenly springs from the earth, but it also lives along fast-moving streams and even in wet caves. Mountain streams of the type that might hold wild brook trout could also contain populations of this amphibian. However, moving water appears not to be a strict requirement because it also is found in wet depressions beneath logs or stones. Forested areas seem to be a favorite.

***Reproduction.*** The northern spring salamander may begin its elaborate courtship ritual in which the male rubs and prods the female anytime between June and November. The eggs are deposited in the water one at a time and are attached to the underside of stones on the stream bottom. Cool water is preferred. The eggs hatch sometime from April to July and the larvae measure less than one inch. Two to three years pass before transformation takes place and by then the salamander may be four inches long.

***Food.*** This amphibian feeds on a broad spectrum of insect life and other invertebrates common to its habitat. Other salamanders even fall prey to a hungry northern spring salamander. Heavy rain on a warm summer evening might cause this critter to wander away from its usual aquatic haunts in search of a meal.

# Four-toed Salamander

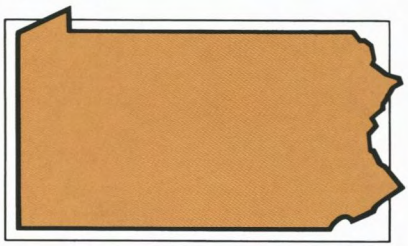
*Hemidactylium scutatum*

***General characteristics.*** The four-toed salamander is a secretive amphibian in its adult terrestrial life as well as during its aquatic larval stage. It has a novel defensive mechanism that enables it to flee from an attacker, with some sacrifice. If grabbed by a predator, the tail easily breaks from the body, the four-toed salamander slips away, and the hunter is left holding the small, twitching appendage. After escaping to a safe retreat, this delicate

creature bides its time, waiting for a new tail to be regenerated. The four-toed salamander is small, with adult lengths reaching only two to 3½ inches.

***Identification.*** There are two distinguishing characteristics that help identify the four-toed salamander. One is the basis for its common name; only four toes appear on each hind foot, where most other salamanders have five toes. The other important and distinctive feature is the belly. It is marked with large, bold, black spots that stand out predominately against an almost pure white. The back of the four-toed salamander is reddish brown to yellowish tan; its sides tend to be gray. The thick tail is marked near its base with a constrictive ring, indicating the point at which it would separate. The number of costal grooves varies from 12 to 14.

***Range.*** Although scattered populations occur in many states, the basic range of this salamander extends from Nova Scotia to Wisconsin and south to Alabama. The four-toed salamander may range statewide in Pennsylvania although its numbers are spotty.



***Habitat.*** The sparse population of this interesting creature no doubt reflects its special habitat requirements. It prefers boggy areas with an abundance of sphagnum mosses, and in Pennsylvania that somewhat restricts its range. Leaf litter in damp, forested areas might also be acceptable habitat, but a woodland pond would have to be close by. This small amphibian, with its special needs, has quickly felt the negative impact of agriculture and expanding urbanization.

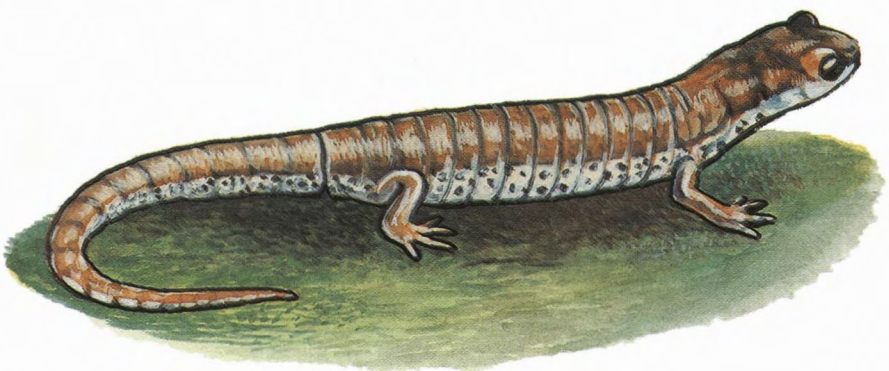
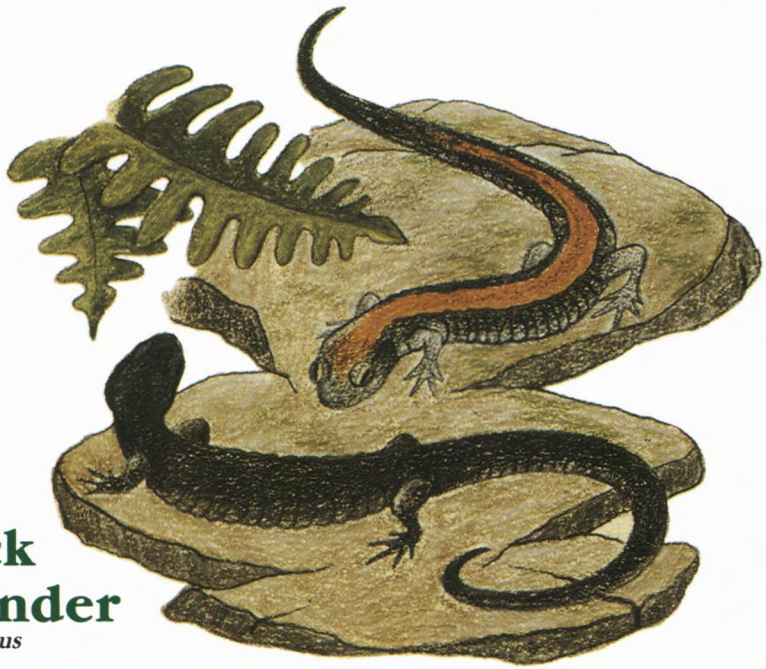


Figure II-11

*Four toes on the hind feet help tell the four-toed salamander from most others.*

***Reproduction.*** Courtship and mating occur in late summer to fall. An average of 50 eggs are laid the following April or May. Fertilization is internal after the female has picked up the male's spermatophore. The eggs of the four-toed salamander are deposited individually, not in clusters as they are by many other salamanders. Once laid, however, they may stick together in clusters. The eggs are allowed to settle among the thick, greenish mats of moss or are attached to other plants. Usually, the eggs are laid in a small cavity but always above and near the water's edge. The female protects the nest and eggs until they hatch in 52 to 60 days. The inch-long larvae, sporting large, bushy gills, quickly enter the water. Transformation takes place six to eight weeks later when they leave the water to begin their adult life on land. The four-toed salamander is sexually mature at about 2 1/2 years.

***Food.*** The four-toed salamander feeds on a variety of small insects and other invertebrates. An easy source of food is usually available within its range.



# Redback Salamander

*Plethodon cinereus*

***General characteristics.*** This completely terrestrial salamander occurs in three different color phases; they are described later. Other than in color, however, they are identical. The redback or "lead-backed" salamander is probably observed more frequently than any of the other salamanders within its range.

Regardless of color phase, this amphibian grows to adult sizes of just over two to 3 5/8 inches.

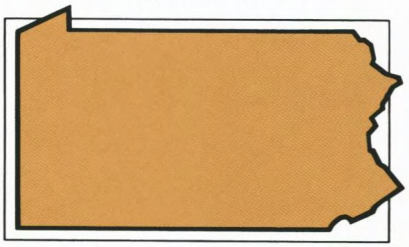
***Identification.*** This lungless salamander is long and slender. The redback is marked with a broad stripe that begins at the head and flows down the back and over the upper part of the tail, where the stripe shrinks in width. The stripe is usually red, although it sometimes may appear orangish, yellow, pink or light gray. The sides of the redback salamander are black, and this color extends upward to form a straight-edged border on each side of the stripe.

The lead-backed color phase ranges from a light gray to almost black. The solid color is shaded uniformly and it does not have the colorful stripe along the back.

A third color phase is found only occasionally. Marked with an unusual redness, it is referred to as an erythristic phase. The entire body, except for the belly, is red.

Regardless of the color phase the belly is always mottled in a distinctive pattern of black and white. Costal grooves vary a bit through this salamander's range and could number from 18 to 20 depending on the area.

***Range.*** The redback salamander inhabits a large chunk of the northeastern United States, extending west to Minnesota and into Quebec. This amphibian is found statewide in Pennsylvania and could show up in places far from water.



***Habitat.*** It favors cool, moist forests that could include timber stands of hardwoods or conifers or a combination of the two. The redback salamander is fond of hiding under stones, old logs and other objects where it remains sheltered during the daytime hours. In dry weather, this amphibian seeks even more protection by burrowing underground and only emerges after a rainfall. Beneath ground level is also where it seeks relief from the strongest winters. An unusually warm spell during the winter could bring the redback salamander temporarily from the protection of its den. The various color phases could establish residence in the same habitat, although one phase may predominate. In some areas, the entire population may be made up of all-red specimens.

***Reproduction.*** The redback salamander mates from October through April following the rituals of courtship common to the lungless salamanders. By June or July, the female, which lays eggs only every other year, selects a site in which six to 12 eggs are deposited. Formed in a cluster, the eggs hang from the "ceiling" of a cavity that is likely a depression dug out directly beneath a stone or other stable, relatively flat object (See Figure II-12). Sometimes, forsaking the protection of a sheltered cavity, a decaying log may be used as a nesting site. The eggs take about two months to hatch, during which time the female, her body often curled protectively around them, waits for the inch-long juveniles to emerge. There is no aquatic larval stage, and the juvenile redback salamander is a replica in miniature of the adult. Two years pass before maturity is reached.

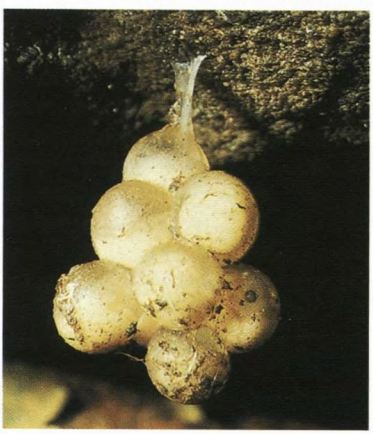
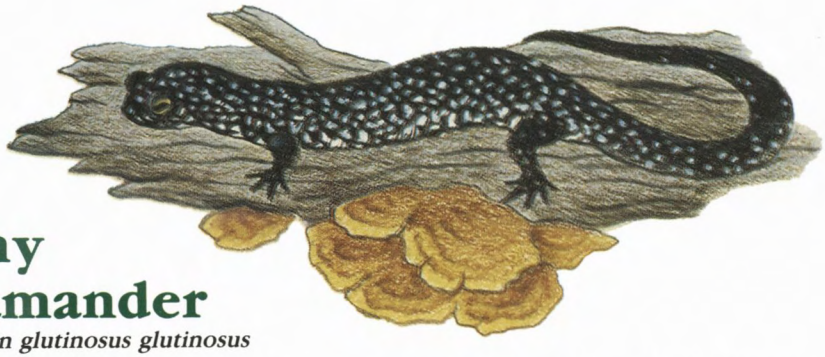


Figure II-12
*A cluster of eggs deposited by a redback salamander clings from the overhang of a cavity.*

***Food.*** The redback salamander is a nighttime forager. Leaving its favorite hideaway where it spent the daylight hours, the redback salamander prowls among the leafy debris of its forest home for very small invertebrates. Minute insects and their larvae are the mainstay of this amphibian's diet.



# Slimy Salamander

*Plethodon glutinosus glutinosus*

***General characteristics.*** The slimy salamander is a medium-sized creature of the forest and considered one of the woodland salamanders. Adult sizes range from barely five to nearly seven inches. This amphibian has skin glands that secrete a thick, gluey substance. Extremely sticky, it is very difficult to remove. In the event it gets on your skin, it probably will have to wear off. The slimy salamander wanders about mostly at night, spending its days in hiding.

***Identification.*** The slimy salamander is black, sporting a shiny coat that is marked with whitish or silver-colored spots. The spots are larger on the sides, smaller and scattered over the back and tail. The belly is slate-colored and unmarked. The chin and throat areas are dark gray. There are 16 costal grooves.

***Range.*** The slimy salamander resides along the entire eastern seaboard from New York to central Florida. It ranges as far west as Missouri and Oklahoma. In Pennsylvania, this member of the lungless salamander family is indigenous to the entire state.

***Habitat.*** Its favorite habitat consists of deep, moist and shaded ravines. Wooded slopes and banks of shale also offer refuge, and it is common to find the slimy salamander beneath large, flat rocks or rotting logs. During the hottest days of summer and in dry weather, it finds a cool retreat beneath a pile of damp leaves. The slimy salamander remains active until autumn's subfreezing temperatures force it to find shelter for the winter. It is among the first salamanders to appear at or near the surface in early spring.

***Reproduction.*** The slimy salamander can mate in spring or fall. The eggs, numbering from less than 10 to as many as 40, are laid in late spring. The egg masses are deposited deep beneath the ground or under a fallen tree that is well-rotted. The female protects the eggs during the incubation period, which extends until late summer. The slimy salamander does not have a free-living larval stage and the newly hatched juveniles are tiny duplicates of the adults.

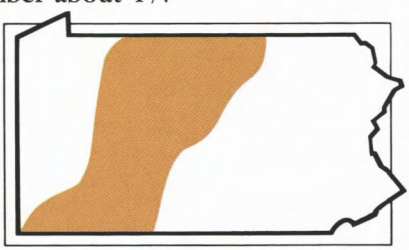
***Food.*** Foraging is done at night over the forest floor where the slimy salamander seeks worms and insects. It especially likes to wander about following a rain when its prey is perhaps more readily available.

# Wehrle's Salamander

*Plethodon wehrlei*

***General characteristics.*** This salamander is named for R. W. Wehrle, who, while residing in Indiana, Pennsylvania, collected specimens that eventually allowed this amphibian to be described as a distinct species. The Wehrle's salamander ranges in length from four to just over five inches as an adult.

***Identification.*** The body of the Wehrle's salamander is bluish gray to dark brown or almost black. Irregular spots, often looking more like dash marks, appear on the sides. They are white or bluish white in most cases, but sometimes can appear yellowish. The back occasionally is marked with very small flecks of a lighter color. The belly and the underside of the tail are evenly tinted in gray. The throat is white or at least blotched with white. Costal grooves along each side number about 17.



***Range.*** Wehrle's salamander inhabits an area extending from southwestern New York to Virginia and North Carolina. In Pennsylvania, Wehrle's salamander inhabits a little less than one-third of the state. This area generally includes the Allegheny Mountains as they range from the southwestern corner to the north central.

***Habitat.*** Wehrle's salamander prefers woodlands of beech, sugar maple and eastern hemlock, the official state tree. Stands of sugar maple are found in at least a portion of its range encompassing a section of Somerset County. Second-growth timber attracts this salamander, which tends to confine itself to unglaciated uplands. It takes refuge in deep crevices and hides under large, flat rocks and decaying timber scattered prone throughout the forest.

***Reproduction.*** Detailed information about the breeding habits of Wehrle's salamander are lacking, although it is thought to breed during the milder winter months. The female deposits about 12 eggs, usually selecting a site that is inaccessible to all but her. The eggs are protected by the female through the incubation period and until they hatch. This amphibian is mature at four to five years of age.

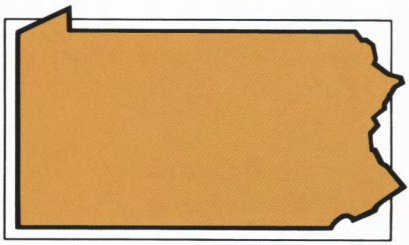
***Food.*** Like others of its genus, Wehrle's salamander feeds on invertebrates. It prefers spiders, centipedes and the larvae of insects.

# Northern Red Salamander

*Pseudotriton ruber ruber*

***General characteristics.*** The northern red salamander is medium-sized and another of the lungless salamanders. Adults reach sizes ranging from 4¾ inches to six inches. It is found only in the eastern portion of North America.

***Identification.*** For the most part, this amphibian remains true to its name—red is the primary body color. Even so, variations occur and it can be reddish brown to orange-brown. The adults tend to be darker than the young. The sides shade toward a lighter tone as they approach an even lighter belly. The back and the upper portion of the sides are dotted with numerous and irregularly shaped jet-black spots. Small dark spots may appear on the belly. The body is stocky and the legs and tail are proportionately shorter in comparison with other salamanders. Sixteen to 17 costal grooves mark the sides.



***Range.*** The northern red salamander can be found in all of the state's 67 counties. It extends from southern New York and Ohio to northern Alabama.

***Habitat.*** Preferring small streams and spring runs with bottoms of sand or gravel and rock, the northern red salamander likes water that is clear and cool. It avoids stagnant ponds or pools while seeking out bubbly springs and seepages. In part a terrestrial animal, the adult northern red salamander may roam some distance from the water. Woodlands, swamps and meadows offer refuge to this amphibian. It likes to dwell beneath logs, stones and clumps of moss.

***Reproduction.*** Mating occurs in early fall when the female seeks a suitable nesting site. Laid in the water, the eggs are attached to the underside of stones. From 50 to 70 eggs are laid. They hatch in late autumn or early winter and the aquatic larvae measure less than an inch in length. The larvae are dark gray, turning red at the time of metamorphosis. Transformation takes place in two to three years. They are five years old before attaining sexual maturity.

***Food.*** The northern red salamander preys on a wide selection of invertebrates. Its somewhat larger size allows it to take food that some other salamanders would be unable to handle. It shows a special preference for earthworms.

Figure II-13

*Wood-edged wetlands offer refuge to the red salamander where it can hide beneath fallen logs, stones and mosses.*

*Figure III-3, This bullfrog tadpole has progressed to where legs have developed, and only the tail remains to be absorbed before transformation into the adult is complete.*

*Figure III-4, The "hop toad" commonly found in gardens throughout the state is often identified as the eastern American toad.*

*Figure III-5, The yellow throat helps identify the male green frog.*

*Figure III-1, Small woodland ponds are critically needed by several species of frogs and toads.*

Chapter III

*Figure III-2, The pickerel frog's squarish spots contrast dramatically with its lighter body color.*

# FROGS & TOADS

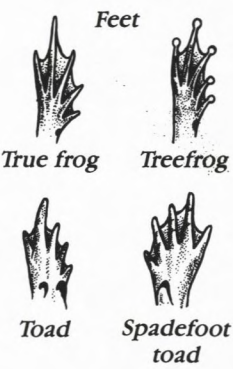
*Order Salientia*

# Chapter III—The Frogs and Toads

Frogs and toads are usually easy to identify as a group, although there may be some difficulty in distinguishing between the species or even in separating frogs from toads. In Pennsylvania, neither has tails when fully grown and they are the only amphibians without tails. Considering they are "jumpers" rather than "walkers," tails probably would do no more than hamper their progress. These amphibians have short, rigid backbones with at most, nine vertebrae, far fewer than other amphibians. The backbone ends in a pelvis that has been greatly modified. Widely separated, it has in its center a small set of unused tail bones fused into a single bone. The shock of landing after a long leap is absorbed by one of the vertebra, the flexible sacral joint.

The forelimbs are well-developed on both frogs and toads and the hind legs even more so. The hind leg is larger, benefiting from an additional "joint" that is actually an extension of functional foot bones. Frogs that live most of their lives in water tend to have longer hind legs than the more terrestrial species. The legs of the toad are a bit shorter than the frog's and account to some degree for a toad's hopping about more so than leaping as frogs do. There are no claws on the toes of Pennsylvania frogs or toads. The treefrogs, however, have sticky pads or discs on the underside of the toes, and this feature can be helpful in distinguishing treefrogs from other frogs and toads (See Figure III-6).

Figure III-6




An external eardrum (See Figure III-7 and III-11) marks a well-developed hearing system. Frogs and toads have internal lungs but also breathe through the skin as do many salamanders.

The frogs and toads possess true vocal chords and produce a call or song. The call of each species is distinctive and with some practice can be employed by naturalists to distinguish between the various species. In almost all cases, only the male calls. The call is used by the frog or toad to summon his mate, issue a distress call to other frogs and to protect its territory by driving off any would-be intruder.

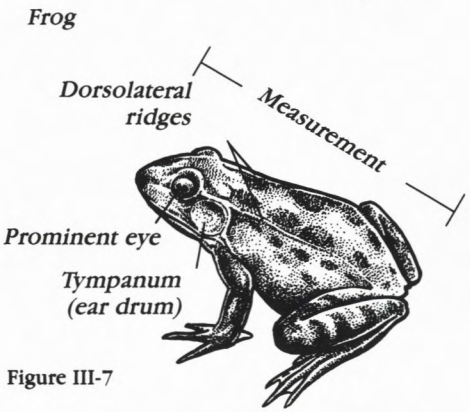



Figure III-7

Most frogs and toads return to the water to breed, although some deposit their eggs in a moist area on land. In mating, the male clasps the female around the body with his forelegs in a position referred to as amplexus. The eggs are fertilized externally as they are released by the female. The eggs develop and hatch to produce tadpoles, a gill-breathing larval stage, which later transforms through metamorphosis into young frogs or toads. Unlike

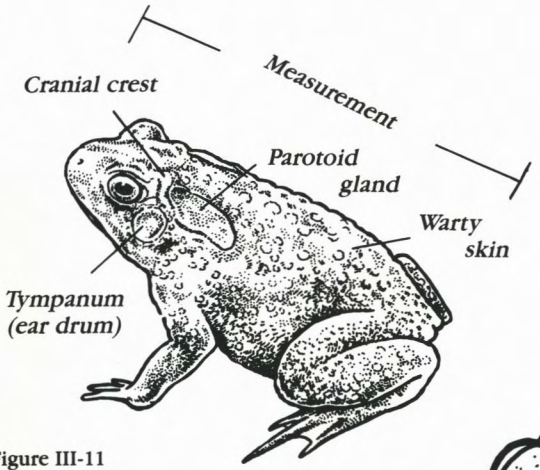



Figure III-11

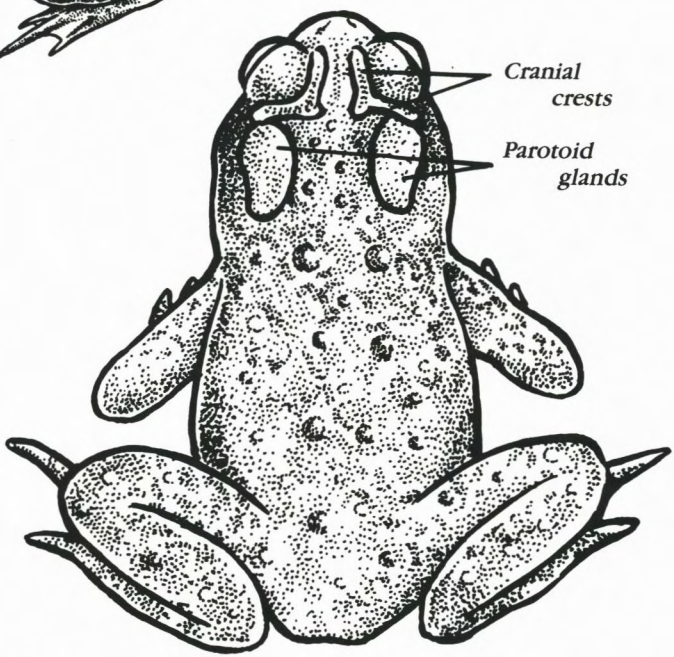



Figure III-12

adult frogs and toads, the tadpoles have a tail; it is an important appendage in moving through the water.

Toads can be distinguished from frogs in several ways. Toads have dry, warty skin compared to the relatively smooth, moist skin of the frog. The toad's legs are shorter, and a pair of parotoid glands are found on the head (See Figure III-11). The position of these parotoid glands in relation to the cranial crests (body ridges over the eye) can be used as an aid in distinguishing between the species of toads (See Figure III-12).

In spadefoot toads the parotoid gland is nearly indistinguishable. Also, each hind foot has a single, sharp, black spade.

In all cases, adult frogs and toads are carnivorous. In turn, most are preyed on by snakes, small mammals and even some fish. In Pennsylvania, there are four families, six genera and 16 species and subspecies of frogs and toads. Worldwide there are some 3,500 species; they are the most numerous of all the amphibians.

# A Sac Full o' Sound

Among the amphibians, the frogs and toads are capable of producing the most distinctive and greatest variety of calls. Even though the female frogs and toads are able to call, they do so infrequently. The males do most of the calling, and the majority of the singing is done at the breeding sites, because the main purpose of the call is to attract a mate. However, a different call may be used to stake out a territory, the frog or toad announcing his presence and in effect warning others away.

Figure III-8

*When calling, the throat sac on the eastern American toad expands to a size nearly equal to the head.*

The time of the year when frogs or toads begin their calling varies with species and depends on weather and temperature. Some species may begin as early as late February, while others wait until some months after that. Calling can continue until August or even later, depending on the species.

The call is produced in much the same manner as other animals produce sound—vocal chords vibrate as air passes over them. Unique to the frogs and toads, however, is the inflatable vocal sac possessed by most of them (See Figure III-8). There can be one or two vocal sacs, depending on species (See Figure III-9).

With the mouth closed, these amphibians draw air through the nostrils and into the lungs. The air then is forced from the lungs, and through openings usually located on the floor of the mouth, enters to inflate the sac(s). To emit its call, the frog or toad then pushes the air from the sac(s), forcing it over the larynx where the vocal chords are located. The sac is an effective resonator, like a sounding board on a


Figure III-9a

***American Toad***

Figure III-9b

*Single*

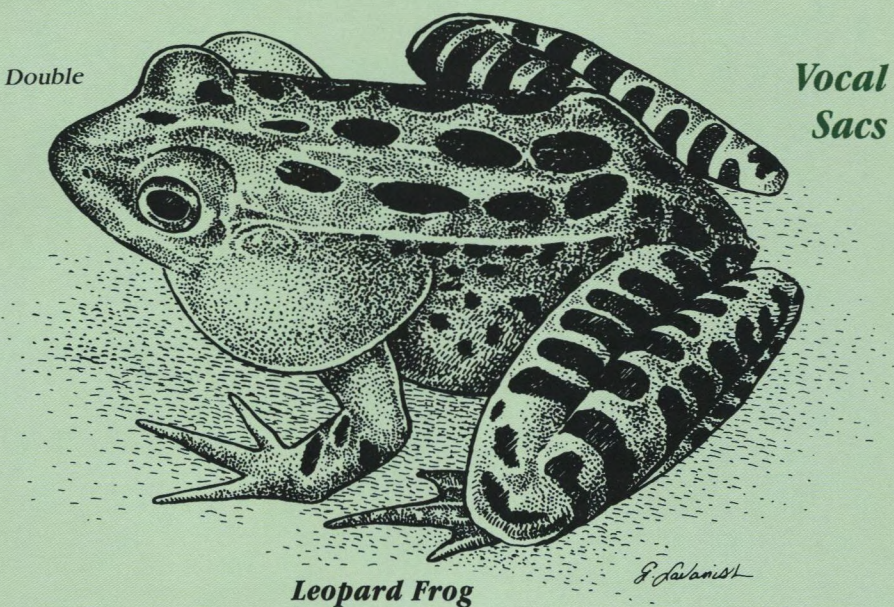
stringed instrument. The sac itself, however, is not able to amplify the level of the call. As the air is expelled over the vocal chords and the call is completed, the sac deflates. It often is seen as an area of wrinkles or folded skin on the throat or shoulders of some species.

The calls produced by the various toads and frogs range from simple clicks to whistle- or bell-like sounds to a full, resonating deep croak. Each species has its own distinctive call. It is recognized by the female of the species as the courtship ritual continues.

For the call to meet its intended purposes, frogs and toads have developed an effective hearing system similar to that found in humans. In most species, the external eardrum, called the tympanum, is easily seen. The tympanum is protected by a thin layer of moist skin and is located behind the eye on each side of the head (See Figure III-10).

Figure III-10

*The large, disk-like tympanum is easily detected on the bullfrog.*




***Leopard Frog***

Figure III-9c

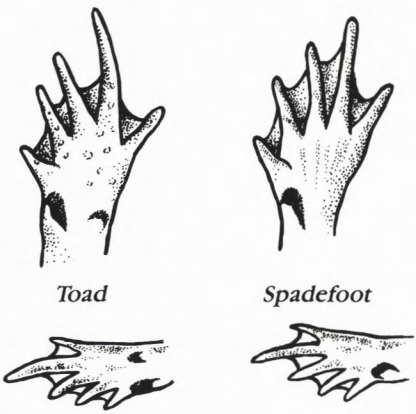
# Spadefoot (Family Pelobatidae)

**Eastern spadefoot—*Scaphiopus holbrookii***

Although there are seven members of this family residing in North America, only one occurs in Pennsylvania. Spadefoot toads can be separated from the true toads by the single, horny, dark and spade-shaped tubercle on the under surface of each hind foot (See Figure III-13). This sharp-edged tubercle usually is referred to as a spade, and it gives this family its common name. The spade is used effectively in digging rapidly into the soil. The pupils of their eyes are vertical (See Figure III-14), and they have teeth on their upper jaws. The skin of the spadefoots is not as rough or warty as that of the true toads.

Figure III-13

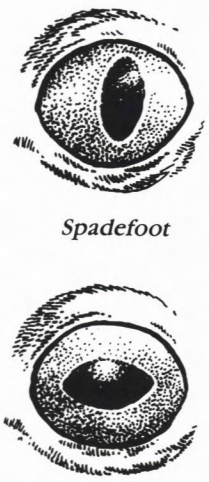
*Feet*



*Toad* *Spadefoot*

Figure III-14

*Eyes*



*Spadefoot*

*Toad*

# Toads (Family Bufonidae)

**Eastern American toad—*Anaxyrus americanus americanus***

**Fowler's toad—*Anaxyrus fowleri***

This family of toads is commonly called garden toads because of their habit of invading neighborhood gardens in search of insects, a favorite food. The toads are squat and plump and covered with dry, rough skin, which usually is dotted with warts. The true toads have no teeth on the upper jaw. The pupils of their eyes are horizontal (See Figure III-14). Two tubercles are located on the underside of each hind foot. Cranial crests are prominant (See Figure III-11). Enlarged parotoid glands located on each side of the head just above the neck secrete a poison that can cause inflammation of the mouth and throat and even death to a would-be attacker. Only the hognose snake appears immune to these toxic secretions. Even humans can suffer severe irritation of the mucous membranes if they come in contact with these secretions.

# Treefrogs (Family Hylidae)

**Northern cricket frog**—*Acris crepitans*
**Spring peeper**—*Pseudacris crucifer*
**Eastern gray treefrog**—*Hyla versicolor*
**Mountain chorus frog**—*Pseudacris brachyphona*
**Upland chorus frog**—*Pseudacris feriarum*
**New Jersey chorus frog**—*Pseudacris kalmi*
**Western chorus frog**—*Pseudacris triseriata*

The two small frogs of the genus Hyla spend most of their time in trees or small shrubs. The toes of these frogs expand on their undersides into sticky pads (See Figure III-6). These discs and their adhesive nature help these amphibians climb and perch in their arboreal homes. The male usually sings his pleasant song while clinging to a small shrub or bush standing in or overhanging the water. The other members of this family are more terrestrial and seldom climb trees or shrubs. Their toepads are less developed. Eggs are laid in the water.

In addition to the species illustrated and discussed in detail, two other closely-related members of this family occur in Pennsylvania. Upland chorus frog *(Pseudacris feriarum feriarum)* and the New Jersey chorus frog *(Pseudacris feriarum kalmi)*—The upland chorus frog has been found in southcentral Pennsylvania to as far north as Lycoming County. The New Jersey chorus frog has been reported only from southeastern Pennsylvania and is on Pennsylvania's List of Endangered Species. The area in which sighted helps identify these two subspecies and to separate them from the western chorus frog which they resemble. The New Jersey and upland chorus frogs are greenish gray to light brown or tan. Darker stripes divide the back. These stripes are more obvious on the New Jersey chorus frog than they are on the upland species, where they might be broken into rows of spots. The upper lip is outlined with a narrow, white band.

These small frogs can be found in a variety of habitats in grassy areas, either dry or wet, including swamps. Breeding occurs in shallow water from late winter to early summer. The average adult reaches three-fourths to 1½ inches in length. The call is similar to the western chorus frog.

# True Frogs (Family Ranidae)

**Bullfrog**—*Lithobates catesbeianus*
**Northern green frog**—*Lithobates clamitans melanota*
**Pickerel frog**—*Lithobates palustris*
**Northern leopard frog**—*Lithobates pipiens*
**Wood frog**—*Lithobates sylvaticus*
**Southern leopard frog**—*Lithobates sphenocephalus utricularius*

These are the larger frogs, usually with a slim waist and long legs. The feet have pointed toes; extensive webbing connects the toes on the hind feet. Heavy folds of glandular skin, called dorsolateral folds, are located along the upper sides and can be an aid in separating certain species (See Figure III-7). The true frogs are voracious carnivores, consuming large

amounts of spiders, insects and other invertebrates as well as small vertebrates. If not in the water, they almost always are close to it where they quickly plunge in the event of danger.

In addition to the species that are illustrated and discussed in detail, one other frog, which is included in the state's original herpetofauna, but now is endangered, should be included. Coastal Plain leopard frog *(Rana utricularia)*—This member of the true frog family is only rarely encountered. Much of its habitat has been destroyed, and its populations have suffered as a result. It is included on the state's List of Endangered Species. The Coastal Plain leopard frog resides in fresh or brackish water and in summer ventures into fields and meadows to wander among moist vegetation. It has been sparsely recorded in its original range in extreme southeastern Pennsylvania. It is primarily nocturnal.

Reaching two inches to perhaps four inches in length, this frog looks similar to the northern leopard frog. The Coastal Plain leopard frog, however, has a whitish spot on the center of the eardrum, or tympanum, which the northern leopard frog does not have. Narrow dorsolateral ridges extend to the groin. The ridges are light-colored and are separated by dark spots. This leopard frog is greenish to brown over the back and sides. The legs are marked with dark spots or bars. The upper jaw is margined with a light line and the head is long and pointed.

Breeding occurs from March to June when the female seeks shallow water in which she lays up to 5,000 eggs. The eggs hatch about two weeks later and transform by summer.

# Species Descriptions

## Eastern Spadefoot Toad

*Scaphiopus holbrookii holbrookii*

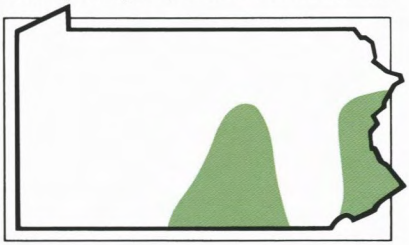
***General characteristics.*** The eastern spadefoot toad is similar in appearance to the true toads. However, its skin is smooth and covered with minute tubercles, unlike true toads, which have rough, warty skin. It is the only spadefoot east of the Mississippi River. The adult size of the spadefoot is 1¾ to 2¼ inches, averaging a little less than the American and Fowler's toads.

The eastern spadefoot has a built-in repellent, as do all other amphibians, including toads. Skin secretions emitted from glands can cause irritation, especially to mucous membranes, even on humans. The secretions can be fatal to certain predators.

***Identification.*** The primary key to identifying the eastern spadefoot toad is the hard sickle-shaped spade on each hind foot. This horny, sharp-edged tubercle can be found at the base of the shortest toe; there is only one spade. On the true toads, each foot has two enlarged tubercles, only one of which is sometimes hardened and spade-like (See Figure III-13). Also, unlike true toads, the spadefoot toad has teeth on the upper jaw.

The skin of the spadefoot toad is relatively smooth and covered on the back and sides with tiny, scattered tubercles. The body color can range through various shades of brown to yellowish or grayish to nearly black. The lighter shades frequently are mottled with darker pigments. There may be two light lines starting at the eye and continuing down the back. These lines, if present, are irregularly shaped and yellowish. Sometimes a light line also runs along each side of the body. The underside of the eastern spadefoot is white to grayish and unmarked.

The tympanum, or external eardrum, is distinct and obvious. The parotoid glands, on the other hand, are inconspicuous and appear to be absent. The eyes are prominent, elevated well above the upper surface of the head; the iris is golden. The pupil is black and vertically shaped, not horizontal as in the case of the toads.



***Range.*** In Pennsylvania, the eastern spadefoot toad resides in a split range. Populations are found in southcentral Pennsylvania in the Susquehanna River Valley from the Maryland border to the northcentral part of the state. The range becomes more narrow as it moves northward. The spadefoot also occurs along the extreme eastern edge of the state, beginning in the southeast corner where it follows the Delaware River Valley north to Monroe County. Its range extends into parts of New England and as far south as central Florida. Its western boundary is Missouri.

***Habitat.*** The eastern spadefoot toad especially likes sand, gravel or loose loam into which it can quickly burrow for protection. In the eastern United States, this species may be at home in forested or brushy areas, even cultivated land. However, other species of the spadefoot in more arid areas of this country usually are restricted to the preferred sandy soils more common to those areas.

The spadefoot seeks protection from adverse weather and predators by digging furiously into the loose soil. Using a backward digging movement and the spade on its hind legs as a digging tool, the spadefoot can be inches underground in a very short time. The burrow is dug nearly vertically five to 10 inches deep. The spadefoot can spend weeks, even months, underground, coming out only on warm, damp evenings to survey its surroundings or seek a meal. If it has time only to dig a very shallow hole, or if it wants to sit near the mouth of a deeper burrow, the spadefoot is able to assume a position that fills the opening. Facing outward, the spadefoot rests its chin on the front feet with the head bent downward. Tucking its feet in close and with eyes shut, the spadefoot expands its lungs to cause its sides to puff out, filling the passageway. Under these circumstances, the spadefoot is difficult to detect or grab, and closing off the entrance, it prevents any intruder from getting in behind.

***Reproduction.*** The eastern spadefoot toad normally is a spring breeder, but mating can occur as late as September. Calling starts from the time the spadefoot leaves hibernation in March, and the female responds to the male's song after a torrential rain; actual breeding has to wait until sufficient rainfall creates a temporary pool. Most of the breeding takes place in such pools, rather than in permanent ponds or streams. Temporary pools can be rain-filled depressions in the ground, ditches or impermanent marshes.

The spadefoot toad is an explosive and opportunistic breeder. Females are attracted to the male who has been calling from a rain-created pool. The male grasps the female around the waist and fertilizes the eggs as they are laid. The eggs are deposited in short strings of gelatinous bands and are attached to vegetation standing in the water. She lays about 2,000 eggs, a number considered unusually low for an amphibian using temporary pools for breeding. Thus, survival of the eggs and tadpoles is critical and could affect the population of the species in a particular area.

The process of egg development and transformation into a young spadefoot toad must be completed before the pool of water dries up. This accelerated cycle sometimes can be completed in as little as two weeks. Normally, the eggs hatch in two short days with transformation occurring several weeks later. The tadpoles are dark in color with a narrow spotted tail. The tadpole leaves the water as transformation begins and while the tail is still quite long. If it did not, the larva could drown because it would not be able to move about properly with the added weight and length of the tail.

***Call.*** The eastern spadefoot toad may begin calling from the burrow even before it has completely vacated its winter home. Later, as rainfall fills nearby ditches and other low areas, the male spadefoot begins to call from the surface of the water. The song is a coarse, nasal, low-pitched grunt that seems to burst from the vocal sac. The call is short, but repeated at about two-second intervals. It has been described as sounding like the cry of a young crow. It carries well, up to a half-mile. The throat sac where the call originates is a white bubble three times the size of the head when inflated.

***Food.*** Normally, the spadefoot toad does not venture far from its burrow in search of food. Flies, other insects and spiders are the mainstay of its diet.

# Eastern American Toad

*Bufo americanus americanus*

***General characteristics.*** The eastern American toad, closely related to Fowler's toad, is more widely distributed in Pennsylvania. It can be confused with Fowler's toad, although there are several characteristics separat-

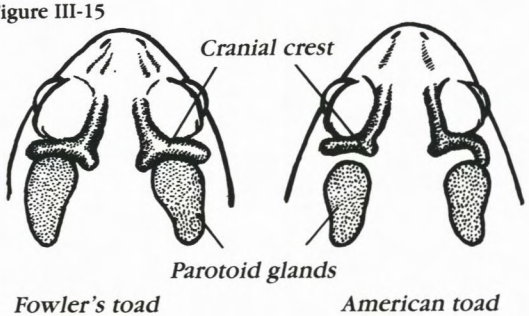
ing the two. They are noted here and in the description of Fowler's toad. Average adult size of the eastern American toad is two to 3½ inches, about the same as Fowler's.

The eastern American toad, however, can tolerate colder temperatures and thus goes into hibernation a bit later than Fowler's and emerges a few weeks earlier in the spring. The eastern American toad is primarily nocturnal and spends most of its day sheltered among piles of leaves or burrowed under loose rocks. So even though it is an abundant toad throughout most of its range, its nighttime habits prevent it from being seen very often.

This is the common "hoptoad," so-called because of its "hopping" in moving from one area to another, rather than "leaping," as frogs do. Characteristic of other toads, toxic secretions from skin glands can irritate mucuous membranes. People do not, however, get skin warts from this or any other toad.

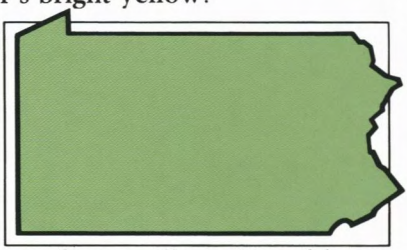
***Identification.*** Various patterns or patches in light colors, usually buff or yellowish, mark the eastern American toad. These patterns occur over a background color that usually is brown, but that also can be olive to brick red. In some specimens, a light stripe runs down the center of the back. The forward part of the belly, or abdomen, and the chest are spotted, compared to the plain underparts on Fowler's toad. Dark spots in brown or black range over the back. Each of these larger spots contains only one or two warts; Fowler's has three warts in each. These warts are red, yellow, orange or sometimes dark brown. The warts on each thigh are enlarged, bigger than on Fowler's toad. The parotoid gland (located behind the eye) is more kidney-shaped than the elongated gland of the Fowler's toad (See Figure III-15). On the eastern American toad, this gland does not touch the cranial crest (a bony ridge) behind the eye, or if it does, it is connected only with a slight spur. On the other hand, the gland on Fowler's toad comes in direct and full contact with this crest (See Figure III-12).

Figure III-15




The eyes of the eastern American toad are elevated well above the head. The pupils are horizontally shaped and black; the iris is golden on this toad, compared to Fowler's bright yellow.

***Range.*** Distributed statewide in Pennsylvania, the eastern American toad is a wide-ranging amphibian residing east of the Rocky Mountains. It is found from the warm climes of Louisiana to the cold of the Labrador Peninsula in Canada.



***Habitat.*** This amphibian has adapted to a variety of habitats and can be found in populated areas to remote wilderness regions, from well-manicured lawns to grassy fields and heavily forested, often rocky mountains. It has two requisites for suitable habitat over most anything else: The area must be moist and include an area of shallow water for breeding, and the area must have an abundance of insects. It is often seen foraging over plowed fields

where a variety of invertebrates has been disturbed as the land is prepared for agriculture. It is a friend of farmers and gardeners alike. The eastern American toad, though more tolerant of colder temperatures than Fowler's, seeks protection from the winter before the first frost hits. It hibernates in the ground where it burrows into loose soil.

***Reproduction.*** The eastern American emerges from hibernation and breeds before Fowler's toad, but after the common frogs such as the leopard, pickerel frog and wood frog. Mating occurs from March until July. Shallow water is required for breeding, even if it is only a temporarily filled ditch or rain pool. If a stream is selected, a slower-moving section or pool provides suitable breeding habitat.

The male arrives first at the breeding pond or pool. Emerging from hibernation in the spring, he travels at night to reach the water. Here, from the shallows, the male American toad begins to call his mate. Eggs are released and fertilized as the male and female toads float together on the surface of the water. The eggs are small and may number from 4,000 to 20,000. They are released in long, curling strings, usually a double strand encased in a protective jelly-like tube. They may stick to vegetation, or sometimes simply float downward until they rest on the bottom.

Depending on the temperature of the water, the eggs hatch in as little as three days or up to nearly two weeks. Breaking free of the small eggs, the black tadpoles begin to breathe using gills which at first are located externally. As the tadpoles develop, however, these gills become encased in a flap of skin. They remain in this larval stage a little less than two months, metamorphosing in mid-summer. During transformation, the back legs appear first, then 10 to 14 days later the front legs suddenly appear. After transformation is completed the young toadlets disperse immediately. The eastern American toad is mature in two or three years.

***Call.*** The males begin calling their mates in early spring, usually about March. The singing is performed night and day. Calling from shallow water, many male American toads join in chorus, sending their song in unison through the early season air. It is a pleasant voice, the call a musical trill lasting up to 30 seconds. When calling, air is pulled through the mouth and into the throat sac, expanding it to a size nearly equal to the head. The inflated sac is a light shade of blue-gray.

***Food.*** The eastern American toad consumes a huge number of insects, mosquitos included. Said to eat all sorts of "bugs," this amphibian is a real friend to the backyard gardener. Other invertebrates, worms and caterpillars are also taken as prey. This toad is adept at catching insects, aided by its sticky tongue. Fastened at the front, rather than the rear, the tongue can be flipped out and extended two inches from the mouth.

# Fowler's Toad

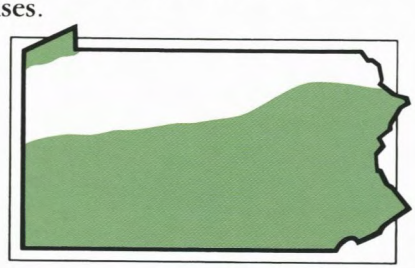
*Bufo woodhousii fowleri*

***General characteristics.*** One of only two true toads in Pennsylvania, Fowler's toad is abundant throughout most of its range. It does most of its foraging at night, preferring to rest during the day when it burrows into the ground or hides among clumps of grasses. It is more slender and more agile than our other toad, the eastern American, but it cannot tolerate temperatures as low as the American toad can withstand. As an adult, Fowler's toad averages two to three inches in length, nearly identical to the eastern American toad.

***Identification.*** The skin of Fowler's toad is dry, a common trait among toads. Its general coloration is brown or gray with an occasional greenish specimen showing up in the population. A light, nearly white stripe runs down the middle of the back. Large dark spots or blotches, more or less arranged in pairs, cover the back. Each of the largest spots contains at least three warts. On the underside of this toad, the belly is white and unmarked, although a dark spot sometimes is found on the chest. Warts cover the thighs, but they are small compared to those found on the eastern American toad.

The parotoid, or shoulder, glands are elongated (compared to kidney-shaped ones on the American toad). They come in contact with the cranial crests just behind each eye (See Figure III-12). The throat of the male is black; the female's throat is a very light shade. The underside of each hind foot of the Fowler's toad bears two tubercles. These tubercles should not be confused with the single, stiff spade protruding from each hind foot of the spadefoot toad (See Figure III-13). The eyes of the Fowler's toad have horizontally oval pupils with bright yellow irises.

***Range.*** Except for populations in the Lake Erie Watershed in the northwest, Fowler's toad in Pennsylvania is restricted to the southern two-thirds of the state. From there it extends along the Atlantic Coastal Plain to North Carolina and westward to Missouri.



***Habitat.*** Fowler's toad likes low-lying areas, especially where it can find sandy soils along the water. But marshes and even slight depressions temporarily filled with rainwater are accepted by Fowler's toad as suitable—though perhaps not permanent—habitat. It frequently forages among landscaped flower or vegetable gardens usually at night. It spends most of the day burrowed beneath the ground.

***Reproduction.*** Male and female Fowler's toads meet sometime from late March to mid-August. Fowler's toad waits for temperatures to warm up a bit, coming out of hibernation later than the American toad. The peak breeding activity probably occurs in May and takes place in shallow standing or slightly moving water. The eggs, which number many thousands, are laid in long, tangled strings. They become attached to vegetation growing in the shallows. This vegetation eventually provides shelter for the tadpoles. Incubation takes only about a week, perhaps a few days longer depending on the water temperature. The tadpoles are black and transform into young toads by mid-summer.

***Call.*** The male Fowler's toad begins calling in late March as he prepares to find a mate. Calling usually is done from shallow water, though sometimes he'll leave the water to sing from the shoreline. The call has been described as sounding like a weakened bleat of sheep. Lasting from one to four seconds, it has good carrying power and can be heard over a wide area. The throat sac is round when inflated; it is light-colored and transparent.

***Food.*** A nocturnal critter, Fowler's toad usually has no problem finding an ample supply of insects, a favorite food source. It takes advantage of lighted areas, knowing, it seems, that lights attract insects, thus making foraging for a meal a simpler task.

# Northern Cricket Frog

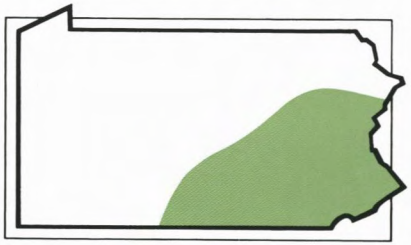
*Acris crepitans crepitans*

***General characteristics.*** You may have to look twice to see the northern cricket frog. Its coloration and small size allows this tiny amphibian to conceal itself easily, so it often is difficult to find even if nearby. As an adult, it averages only five-eighths to 1 3/8 inches long.

It is diurnal and when not basking in the sun, spends the rest of its day foraging for food. Although a member of the treefrog family, the northern cricket frog is destined to spend most of its time on the ground because this species has lost the large, adhesive toe pads typical of the treefrogs.

***Identification.*** The skin of the northern cricket frog is rough and warty. The ground color is usually gray accented with darker stripes that run down each side of the back. The dark triangular patch located between the eyes is a major identifying mark.

A dark stripe, usually with an irregular edge, runs along the rear portion of the thigh and also helps identify this species. The legs of the northern cricket frog are short with extensive webbing on the hind feet. The webbing reaches the tip of the first toe and this, along with the absence of toe discs, also can help sort this frog from other treefrogs and chorus frogs. The head is slightly rounded, almost blunt; the pupils of the eyes are horizontal.



***Range.*** The northern cricket frog occupies a little less than a quarter of the state. Found in the southeast corner, its range falls within an arc beginning in Franklin County, then curving north and east to the southern edge of the Pocono Mountains. It is distributed from Long Island south to the Florida panhandle, then west to just inside Texas.

***Habitat.*** Considered more terrestrial than most aquatic frogs, the cricket frog is content to hop among the sedges and grasses at the water's edge. When it feels the need to return to the water, the northern cricket frog prefers shallow, sun-drenched ponds punctuated with a substantial growth of vegetation in and along the water. It also can be found near slow-moving streams, often squatting on sandbars or banks of gravel where it warms itself in the glow of midday. It seeks shelter from extreme cold under stones and piles of fallen leaves.

When frightened, the northern cricket frog quickly dives beneath the surface of the water where it promptly buries itself in the bottom mud.

***Reproduction.*** Although mating might occur anytime between April and August, the northern cricket frog generally is considered to be a late breeder. Mating is accomplished when the male clasps the female just behind the forelegs as they float in the water. Two to 10 eggs are deposited singly or in small masses that become attached to submerged grasses, stems and leaves. Tadpoles may be seen as late as August and transformation follows in September.

***Call.*** In its northern range, the northern cricket frog is one of the last frogs to begin calling in full chorus. As the male sings, a single yellow throat pouch inflates and becomes the source of a shrill clicking sound, similar to a cricket. The call starts slowly, picks up speed and does not stop until 20 or 30 individual beats or clicks have been pushed out of the pouch. The sound has been described as two small stones rapidly clicked together. Singing often is done in full view with the male perched contentedly on the leaf of a water lily or other broad-leaved aquatic plant.

***Food.*** The northern cricket frog capitalizes on its ability to leap in long bounds when foraging for a meal. Insects are the mainstay of the diet, and much of the prey taken by this amphibian is caught "on the fly"—its knack for catching insects in mid-air helps ensure an adequate supply of food.

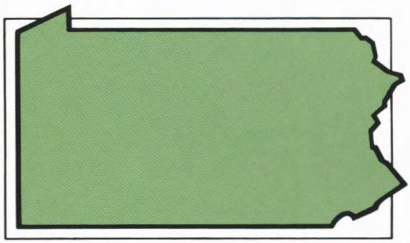
# Northern Spring Peeper

*Hyla crucifer crucifer*

***General characteristics.*** One of the state's tree-climbing frogs, the northern spring peeper belongs to the family Hylidae, as do all the tree dwellers. The northern spring peeper is seldom seen except during the breeding season, even though it is perhaps our most abundant treefrog. Nonetheless, its habitual and easily recognized call makes this small woodland amphibian one of our most familiar frogs. It averages in length from three-fourths to 1 1/4 inches as an adult.

***Identification.*** The most recognizable feature identifying the northern spring peeper is the large, dark, irregularly X-shaped mark in the middle of the back. A dark, modified Vee appears between the eyes, and the legs are barred with a dark color. The slender body is tan to light brown or grayish on the upper surface; the belly is light, becoming yellowish toward the rear but otherwise is unmarked.

The feet are moderately webbed and end in toes with the large, sticky pads characteristic of treefrogs.



***Range.*** Most of the eastern one-third of the United States has resident populations of this amphibian. It also extends into Canada and as far west as Manitoba. Each of the state's counties has populations of the northern spring peeper, available to signal the start of the spring season.

***Habitat.*** The peeper seems to have no problem finding suitable habitat, which usually is a wooded area near a permanent body of water. Even temporarily flooded swamp areas, floodplains or ponds are acceptable habitat, although the water must be clean; the northern spring peeper avoids polluted water. It especially likes wooded areas with a full, jumbled understory. As winter approaches, the northern spring peeper prepares to hibernate beneath logs or loose bark in the woodlands where it has spent the spring and summer months. The males call only sporadically at this time.

***Reproduction.*** The northern spring peeper is among the first frogs to leave the protection of its winter home and prepare for breeding. The high-pitched calls, which signal the start of the breeding season, can be heard in March as the air temperatures approach the mid-50s, and reach a peak when temperatures warm up another 10 degrees or so.

Courtship occurs March to June, usually initiated with the first warm rains. When the temperature is right, the peepers begin their migration to

nearby ponds or semi-permanent bodies of water where the female approaches to be grasped by the male. The female releases the eggs, which are fertilized by the male as they float away. The singular eggs become attached to plants, sticks and other underwater debris. Occasionally they may drift downward and settle on the bottom of the pond. As many as 1,000 eggs may be laid. They are tiny, black on top and white on the lower side.

The eggs expand and tadpoles break free in six to 12 days, depending on the temperature of the water. Metamorphosis follows in 90 to 100 days and the young froglets may climb onto nearby grasses even before the transformation process is completed. Inasmuch as breeding takes place early in the season, the juvenile frogs may have transformed completely as early as midsummer.

***Call.*** A chorus of northern spring peepers is a familiar and most pleasing sound. It is welcomed as one of the first signs of spring, stirring life to a fresh start and brightening the listener's mood after the drab and dreary days of winter. Calling begins with the early warm rains and initially is heard day and night. The daytime serenading often comes from under cover, or perhaps with the peeper perched atop the mottled new tops of a skunk cabbage. Later, as the season wears on, vocalizing is limited to late afternoons and at night. Singing normally is done in groups, with choirs of peepers singing from their lofts in small trees or shrubs. The host trees and other bushes usually are in or near the water of a deep forest pond, small pool or even marshland.

The call of the northern spring peeper has been described as a high piping whistle, a single note ending with an upward slur. The single tones come at about one-second intervals. A large chorus of peepers heard from a distance is reminiscent of a series of leather-strapped sleigh bells jogging down a quiet country lane. The peeper's vocal sac is a single glistening throat bubble.

***Food.*** Not a very large amphibian, the northern spring peeper feeds on small invertebrates. Flies, gnats, ants and small worms and grubs provide proper nourishment for this interesting amphibian.

# Eastern Gray Treefrog

*Hyla versicolor versicolor*

***General characteristics.*** As treefrogs go, the eastern gray treefrog is a moderately large animal, measuring 1¼ to two inches along its body. It is nocturnal and spends the day reposing beneath the loose bark or in the hollow of a tree. At other times it simply clings to the trunk or branch of a tree, where its color and pattern create a natural camouflage, blending in with the bark and concealing it from all but the keenest observer (See Figure III-16).

***Identification.*** The eastern gray treefrog is greenish to brownish or, perhaps more often, grayish. The back is marked down the center with an irregularly outlined blotch; it stands out dark and large. The thighs of the hind legs are a bright yellow-orange on their insides and undersides, areas usually concealed from view. A light spot, edged in a darker color, appears below each eye. The eyes have shiny black pupils with gray-green irises criss-crossed by a network of fine black lines.

The eastern gray treefrog has a blunt snout resembling a toad, but it has the narrow waist and long legs of a frog. Its toes end in large pads or discs. These discs are adhesive on their lower surfaces to aid in climbing. The skin of the eastern gray treefrog is rough and the back is covered with numerous warts, although they are not as prominent as those on toads.

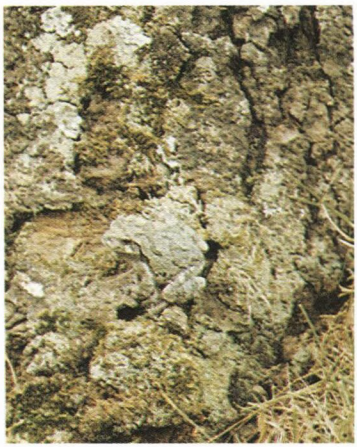
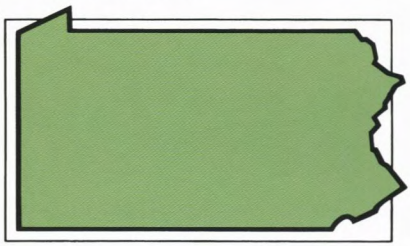


Figure III-16

*Can you spot the eastern gray treefrog effectively concealed against a tree?*



***Range.*** The eastern gray treefrog is believed to be distributed statewide in Pennsylvania, missing perhaps from the Allegheny Mountains where documented sightings are sketchy at best. Except for northern Maine and southern Florida, this treefrog extends over the eastern one-third or better of the United States. Its western limit is generally marked with a line running from Manitoba in Canada to central Texas.

***Habitat.*** The eastern gray treefrog spends most of its time in the upper reaches of trees, coming down to ground level only at night to call and to breed. It seems to prefer smaller varieties of trees or shrubs and especially likes those standing near or even in shallow, permanent bodies of water. It is an adaptable creature, because it is sometimes found in populated areas and around homes.

***Reproduction.*** In the spring, as nighttime temperatures begin to warm, the eastern gray treefrog carefully climbs from his perch to join others in chorus, signaling the start of the annual mating season. This is about the only time the eastern gray treefrog is seen on the ground. Mating occurs between April and August, with the later months probably the time when most treefrogs enter the water. The eggs are fertilized by the male as the female releases them. The female may lay 700 to 3,800 eggs, usually in small, floating groups or light-jellied masses of up to 40 eggs each. The brown and cream-colored eggs hatch in a few days. The tadpoles that emerge from the eggs are a golden color with a red to orange-red tail. The tail is marked with black spots. The tadpoles transform in summer, usually in six to eight weeks. The young frogs, greenish at this stage, are about a half-inch long. They stay close to the water, but by the end of the summer they have advanced to nearby small trees and bushes.

***Call.*** The eastern gray treefrog usually begins calling high in the trees and away from the breeding site. Later, as it moves down it calls at ground level, resting on wet leaves or on fallen logs or low tree limbs that overhang the water. The call of the eastern gray treefrog has been described as almost

flute-like, but at a lower pitch than the American toad. It is a hearty, resonating short trill of one to three seconds, performed several times in succession. The call comes from a single throat sac, a large inflated bubble. This frog calls mostly during spring and early summer at dusk or on rainy days.

***Food.*** A variety of insects such as beetles, flies, ants and so forth fulfills most of this amphibian's need for food. The eastern gray treefrog does not stalk its prey in the manner of most toads. Its prey is taken in trees located near or in the water where it swats down an unsuspecting victim as it passes by.

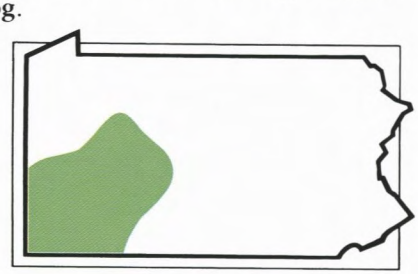
# Mountain Chorus Frog

*Pseudacris brachyphona*

***General characteristics.*** This member of the treefrog family is nocturnal. Though it is often heard, it is seldom seen, especially after the breeding season. In moving about, it leaps better than it walks. Adult sizes range from one to 1 1/4 inches in length.

***Identification.*** The small mountain chorus frog is light brown to green with some overtones of gray. The belly and undersides of the legs are yellowish. A key mark in identifying the mountain chorus frog is the pair of dark stripes on the back. These two stripes run lengthwise and curve inward and toward each other. The effect is two crescent-shaped marks that sometimes touch each other near their centers to form a crude "X."

A dark, broad, lateral stripe traverses each eye, beginning near the tip of the snout and ending a short distance behind the eye. The area on top of the head between the eyes is accented with a dark, modified triangle. The upper lip is margined with a white line. The toes are slightly webbed and have small, round tips that are miniaturized discs compared to other treefrogs. The smaller discs, or pads, prohibit this amphibian from reaching heights equal to the peeper or eastern gray treefrog.



***Range.*** Pennsylvania marks the northernmost extremity of the mountain chorus frog's range. It resides from here through southeast Ohio and into central Alabama. It ranges west of the Allegheny Mountains in counties in the southwestern corner of the state.

***Habitat.*** It prefers forested areas, often mountainous country where creeks and small brooks bubble down wooded slopes. However, it is not unusual to find mountain chorus frogs far from water.

***Reproduction.*** The mountain chorus frog is an early breeder, beginning as soon as February but extending until April. A single female responding to a chorus of numerous males finds her mate near or in the water. Breeding takes place in the shallows of a remote woodland pond or in water near the edge of a forest. Even ditches temporarily filled with water, or water collected as it springs from the side of a hill, could serve as breeding grounds. Released by the female, the eggs are fertilized by the male before they become attached to grasses and other vegetation. The eggs hatch in a few days, the tadpoles squirming free to swim among the stalks and stems that harbored the eggs.

***Call.*** The mountain chorus frog begins its song in response to the first warm rains of early spring. It is among the first frogs to beckon a mate as it sings day and night from a perch near or in shallow water. The mountain chorus frog vocalizes while concealed among leaf litter and grasses along the water's edge. The call is a high-pitched, raspy squeak, performed in a rapid series. The male has a single rounded vocal sac.

***Food.*** The mountain chorus frog, although a member of the treefrog family, forages mostly on or near the ground. Insects are taken from weeds or low shrubs.

# Western Chorus Frog

*Pseudacris triseriata*

***General characteristics.*** The western chorus frog is one of two chorus frogs of the genus *Pseudacris* that resides in Pennsylvania. The western chorus frog averages three-fourths to 1 1/2 inches in length.

This treefrog becomes most active late in the day as the sun sets. As a nocturnal creature, it usually is difficult to observe and becomes even more so past the breeding season when it spends most of its time in hiding.

***Identification.*** The smooth skin of the western chorus frog can be greenish gray to light brown or tan. The belly is off-white and usually plain, showing a lack of any markings. Three stripes, a gray or brown darker than the body color, divide the back. Another dark stripe begins on each side near the nostril, runs backward through the eye, along the side, and ends near the groin. A narrow, white band outlines the upper lip.

***Range.*** In Pennsylvania the western chorus frog is restricted to the area west of the Allegheny Mountains. It appears in the counties situated between the mountain ridges and the Ohio state line.

***Habitat.*** The chorus frog adapts to a variety of habitats that include grassy areas in terrain that can be either dry or wet, including swampland. It can even find agricultural land quite hospitable and conducive to meeting the needs of a thriving population. After the breeding season, and during the winter months, the chorus frog finds shelter under large stones, deep in tufts of grass and within the deserted tunnels of burrowing animals.

***Reproduction.*** The chorus frog breeds from late winter to early summer, usually February until June. The male fertilizes the eggs as the female releases them in shallow water. Usually laid in groups or masses of up to several hundred eggs each, the egg masses become attached to submerged plants. As many as 1,500 eggs may be laid and they take up to seven days to hatch. The larvae remain in the tadpole stage for six to eight weeks before transforming into young frogs.

***Call.*** It is not unusual to hear the male western chorus frog call even before all the ice has melted from what eventually will become his breeding pond. The call is a raspy trill, rising in pitch toward the end. Described as a vibrant *prrrrreep,* it lasts from one to two seconds and is repeated several times in succession. The chorus frog calls from near the water or while sitting upright in vegetation at the surface of the water. At the slightest threat, however, this amphibian retreats quickly, disappearing to safety beneath the water.

***Food.*** Moving about carefully at night, the western chorus frog searches for small insects and their larvae. Small invertebrates are the primary staple of this amphibian.

# Bullfrog

*Rana catesbeiana*

***General characteristics.*** The bullfrog is a large aquatic frog. It, or at least its call, is familiar to anyone who has ever been near a large body of water during the evening or early morning hours in the summer. It is a solitary

creature, more so than any of our other frogs, and does not engage in chorus singing even during the breeding season. In fact, the mating season may be the only time the bullfrog is prone to socialize at all, and then only with its mate. A bullfrog jealously guards its territory. Other males are aggressively kept from its calling site.

Adult sizes range from 3½ to six inches. It is not the longest jumper. That record goes to the leopard frog, which may outjump a bullfrog by as much as 10 inches, hitting the three-foot mark. However, the bullfrog is a powerful swimmer with long, strong hind legs. The bullfrog uses these powerful appendages to push rapidly through the water. When swimming underwater, the bullfrog is able to lower its eyes to a level even with the head by pulling the eye sockets into the roof of the mouth. Thus protected, the eyes also are closed so that the frog can swim only short distances before having to stop, or at least slow down, to view the surroundings before moving on again at a rapid speed.

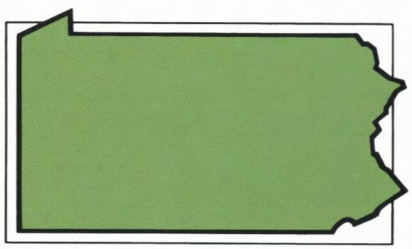
When under water, the entire surface of the skin acts as a large gill, allowing the frog to breathe. The nostrils and lungs are not required when submerged, and the frog can remain under water for months at a time during hibernation.

The legs of the bullfrog are considered a culinary delight by many people. In Pennsylvania, this amphibian is regulated by seasons and bag limits. Check your *Summary of Fishing Regulations and Laws* for details.

***Identification.*** The body of the bullfrog is broad and full. In a crouched position, the body is nearly parallel to the ground, rather than in the more-or-less upright position assumed by most other frogs. The head is broad and flat with large, protruding—almost bulbous—eyes. There is no outer ear as we know it in most mammals, which is typical of the frogs and toads. However, the external eardrum is present and is flush with the surface of the head; on the male adult bullfrog, the diameter of the eardrum is larger than the eye. In the bullfrog the folds of skin, referred to as dorsolateral ridges, begin at the eye, run around the eardrum and down to the forelegs. Its legs are long and well-muscled, suited to providing powerful swimming strokes. Except for the last joint of the longest (fourth) toe, the hind feet are fully webbed, which also aid its underwater mobility.

The bullfrog is green to yellowish above with a random mottling of dark gray. The belly is cream to white and also may be mottled with gray. The throat of the male, especially, may have a mottling of gray or yellow. The legs are often spotted or marked with dark bars.

***Range.*** The bullfrog is a statewide resident with populations in many of Pennsylvania's rivers and streams and hundreds of lakes and ponds. At one time, the Pennsylvania Fish and Boat Commission raised and planted bullfrogs throughout the state, and this may account, in part at least, for the bullfrog's widespread distribution. Outside of Pennsylvania it ranges from Nova Scotia to the Rocky Mountains.



***Habitat.*** The bullfrog prefers lakes and ponds (nearly every farm pond has some bullfrogs) and slow-moving water as long as there is sufficient vegetation to afford it proper cover. It likes large waters in which many of our other frogs might not "feel" comfortable.

The bullfrog is aquatic, though it often sits, sometimes warily, other times contentedly, among the grasses lining the water's edge. If frightened, it could flee with a giant leap into the safety of the water. Still, it is not apt to strike out on land on an extended excursion.

As autumn turns to winter and temperatures continue to fall, the bullfrog enters the water one last time, swims to the bottom and burrows into the soft mud. Here it hibernates until spring when the water again warms.

***Reproduction.*** Emerging late from hibernation, the bullfrog breeds after many other amphibians have already performed this annual ritual. May to at least July arrives before the male actively begins to call a mate. By now air temperatures are in the 80s and water temperatures have climbed into the 70s. These higher readings apparently trigger the breeding instinct. The male, aggressive and territorial, vigorously defends his calling site, and later, his breeding site.

The tiny eggs released by the female may number as many as 40,000; the eggs are fertilized by the male as they exit the female and float upward spreading into a large mass on the surface of the water. Unlike the egg masses deposited by some of our aquatic amphibians, the egg masses of the bullfrog are not encased in a cohesive layer of protective jelly. Thus free, the mass may cover an area on the surface of the water of one to two square feet or more. This mass usually spreads among surface vegetation to which it may adhere.

Hatching takes four to five days and the new tadpoles look like the tadpoles of the green frog. The tadpoles are olive-green and large, perhaps four to six inches by the time they transform into young bullfrogs. Metamorphosis from tadpole to frog could take up to two years in the case of the bullfrog. By then it may already be a three-inch frog, but won't reach full adult size for another two or three years.

***Call.*** The bullfrog has an internal vocal sac that inflated looks like a flattened pouch beneath the chin. It does not have the bubble-like appearance formed by the external sac common to the peeper or chorus frogs. The sac is an effective resonator. Air is taken in through the nostrils and enters the sac through an opening in the bottom surface, or floor, of the mouth. When the call is made, the air is pushed out of the sac and passes over the vocal chords located in the throat.

The deep, resounding series of low notes that result often can be heard up to a quarter-mile away or even farther on a quiet morning. Sung at irregular intervals, the reverberant song usually is described as sounding like a gravel-voiced basso repeating the theme *jug-o'-rum . . . jug-o'-rum.* It is a familiar sound, riding the night air away from the water's edge in May or June to as late as August. The bullfrog normally does not sing in chorus with other bullfrogs. Given its solitary habit, it is a lone singer, although with several individuals residing on the same water it may seem as if they were conversing with one another.

***Food.*** The diet of the bullfrog is more varied than most other frogs, and almost any moving object is a potential meal, including other smaller bullfrogs. Crayfish seem to be favorites, but insects, other frogs, small fish, bats,

birds, snakes and even turtles contribute to making a bullfrog's dinner menu quite different from that of many other amphibians.

# Northern Green Frog

*Rana clamitans melanota*

***General characteristics.*** This abundant frog is primarily nocturnal. That is, it is most active at night, but moves about and forages a bit during the day as well. Along with the bullfrog, it is more aquatic than many frogs. It is a medium-sized frog, slightly smaller, but otherwise similar in appearance to the bullfrog. Adult average sizes range from 2 1/4 to 3 1/2 inches. The northern green frog is more gregarious than the bullfrog, but it still maintains a more aloof attitude than some other frogs, living mostly a solitary lifestyle. It is not as wary as many other frogs, although when basking in the sun it sits alert, facing the water. This posture provides a quick escape into the water if danger threatens. A quick dive and it soon is lost among the bottom detritus, or gravel.

The green frog may molt four or more times a year, in or out of the water. If the outer covering is shed while the green frog is in the water, the skin simply floats away, carried by the wind or current. If the molting process takes place on land, the old skin may be eaten by the green frog, a practice also common to the leopard frog and American toad.

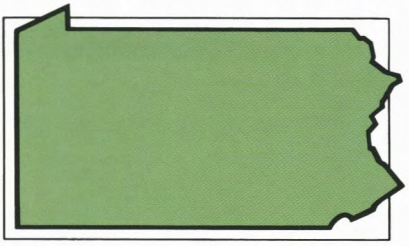
In Pennsylvania, the green frog is protected by seasons and bag limits identical to those protecting the bullfrog.

***Identification.*** The green frog appears in an assortment of colors and patterns. It may be a brilliant metallic green, or vary from greenish brown, or brownish to tan. Dark-brown or gray spots, some large enough to be called blotches, appear on the back, frequently in large numbers. The head and upper lip are green, which is especially noticeable in the adult male. A yellowish band runs along the jaw to the shoulders. The belly is white with dark lines or spots under the legs. The throat of the male is yellow, often brilliantly colored; the throat of the female is white with dark spots. Close examination of the eyes reveals a black, oval pupil with a gold iris.

The forward part of the head ends in a blunted point. The external eardrum is large, and on the male, bigger in diameter than the eye. The tympanum is flat, brown and covered with a thin, moist layer of skin.

Folds of skin, called dorsolateral ridges, help separate the green frog from the bullfrog. In the green frog, these folds extend from above the eardrum along the back; in the bullfrog they do not. Unlike many frogs, however,

the folds on the green frog do not extend all the way back to the groin, but stop about midway along each side.



***Range.*** The green frog is distributed statewide and is found in all Pennsylvania counties, many with abundant populations. Outside of the state, its range extends from the Maritime Provinces of Canada south to North Carolina. It goes west to Minnesota and Oklahoma.

***Habitat.*** The green frog stays close to shallow water. Although this frog is thought of typically as a frog of brooks and small streams, it also resides in most types of ponds, or in swamps and springs. Fallen logs, with their moist, decaying matter, provide shelter to the green frog. The green frog may remain active through 12 months of the year if the winters are not too severely cold. In the event winter does force it to seek refuge, the mud or moss of a pond or other shallow water offers sufficient protection.

***Reproduction.*** As winter's cold temperatures give way to the warming rays of the spring sun, female green frogs respond to the calling males and "select" a mate. Mating takes place in the water, and the males especially like an area thick with aquatic plants.

The actual breeding ritual, in which the male grasps the female in amplexus, can occur from as early as May to as late as August. The eggs appear in three or four clutches and are fertilized by the male as the female releases each mass. The small masses produce a combined total of 1,500 to 4,000 eggs. Each spherical egg is black on the upper side and white beneath. Once they have passed close to the male, each clutch becomes attached to vegetation at or just below the surface of the water.

The eggs hatch within a few days depending on the temperature of the water in which they were laid. The tadpoles that emerge are olive-green across the back with a cream-colored belly. Dark spots cover the back and brown markings splash the pointed, green tail. The tadpoles of the northern green frog remain in that stage at least through one winter. They may transform in less than one year.

***Call.*** The green frog almost always calls from the water, selecting a shallow area where it floats on the surface or squats on the broad leaf of a bullhead-lily or other aquatic plant. The vocal sac is internal and when inflated during calling causes the throat and sides to expand. The green frog emits a low-pitched twangy sound, similar to that produced by plucking one of the lower strings on a banjo or other stringed instrument. A single note is most frequently produced, although it may be repeated three or four times, decreasing in volume with each successive note. It has been described by some people as resembling the slow tapping of a woodpecker.

***Food.*** The diet of the northern green frog is varied and consists of vertebrates and invertebrates. Water striders, dragonfly larvae (also known as mud bugs) and a variety of other insects are consumed by a hungry green frog. Additional prey includes worms, small fish and small crayfish, all easily found sharing this amphibian's habitat.

# Pickerel Frog

*Rana palustris*

***General characteristics.*** Going back to the earliest years of the 20th Century and before, this frog had been a popular bait used by anglers fishing for "pickerel"—hence its name. Today, although frogs still are used as bait, anglers should be aware that regulations affect the number of frogs they may have in possession at any one time. The pickerel frog is a medium-sized amphibian that averages from 1¾ to three inches as an adult.

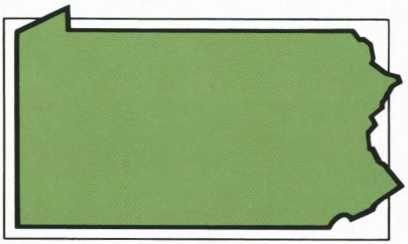
It benefits from a built-in defense mechanism particularly effective against snakes and other animals that normally prey on amphibians. And once experienced, snakes seem to avoid pickerel frogs—and even their lookalikes—thereafter. The pickerel frog secretes a substance from its skin that is at least irritating, but often toxic to would-be predators. It is distasteful and emits an extremely unpleasant odor that even humans find obnoxious. The secretion is toxic to frogs other than its own species and has been known to be fatal to other frogs when placed in the same water-filled container.

The pickerel frog does not rely totally on its toxic skin secretions for protection. When frightened, it quickly leaps to find cover under shoreline mosses, or by suddenly diving beneath the water, it buries itself in mud lining the pond or stream bottom.

***Identification.*** The pickerel frog is a spotted frog similar in appearance to the leopard frog, but with distinctly different markings. The pickerel frog has two rows of squarish spots down the back, but the leopard frog's spots are rounded and usually not in rows as well-defined as are those on the pickerel frog. Also, the leopard frog's wide head is more blunt than the pickerel's somewhat pointed snout.

The skin of the pickerel frog is smooth with an almost metallic-like lustre. The background color is tan or a light grayish to light brown. The two rows of parallel spots or blotches down the back are contained between the dorsolateral folds. The spots are squarish and although irregularly shaped with uneven lines, clearly are not round. They are black to dark brownish or reddish brown. Small, square-like spots also appear on the sides of the pickerel frog. The belly is whitish up front, becoming bright yellow to orange toward the rear. Dark bars mark the upper surface of the hind legs, which are bright yellow to orange underneath. The leg markings also help distin-

guish this frog from the leopard frog. The folds of skin, the dorsolateral ridges, are prominent and extend to the groin. They are yellowish or creamy to a golden color. A light streak outlines the upper lip or jaw.



***Range.*** The pickerel frog is distributed from Canada's Maritime Provinces in the north to the Carolinas in the south. Its western boundary runs from Wisconsin to eastern Texas. In Pennsylvania, each of the 67 counties has its share of pickerel frogs.

***Habitat.*** This amphibian spends more time out of the water than in it. For the most part, water is used only as a breeding site and a haven from enemies. The pickerel frog prefers slow-moving water. This frog is at home in marshes, but it can also be found along streams and cool springs. During the summer it moves far into grassy fields or meadows that are moist, seeking out damp areas thick with low vegetation. Grassy areas along streams and woodland ponds also provide suitable habitat. The pickerel frog hibernates from October until March, but usually does not go into its winter retreat until pushed there by autumn's first frost.

***Reproduction.*** The pickerel frog breeds during the period April until May, usually a bit later than the leopard frog. Water temperatures in the upper 50s nudge the male to begin calling its mate. The male joins the female in amplexus and fertilizes the eggs as they are released. The eggs are encased in a transparent jelly-like mass about 3 1/2 to four inches in diameter. Breeding is accomplished in shallow water where the globular egg mass adheres to the stalks and stems of standing, sometimes emergent, vegetation. The female lays 2,000 to 3,000 brown and cream-colored eggs. They incubate for several days to perhaps a few weeks, depending on water temperature. The warmer the water, the sooner the eggs hatch.

The tadpoles are greenish and sprinkled with fine black dots. The tail fin is edged in black. They reach about three inches in length. Transformation to young pickerel frogs takes place usually in July or August or 2 1/2 to three months after the tadpoles break free of the eggs.

***Call.*** Only the male pickerel frog calls, at times singing beneath the surface of the water from where it sounds like a reverberant snore. At other times the calling is done at the breeding site with a full chorus of other pickerel frogs emitting a slow, low-pitched, steady croak, of one to two seconds duration.

This species uses two vocal sacs. When filled with air, they cause the area between the ear and foreleg to become swollen, producing a puffiness along each side of the head.

***Food.*** The pickerel frog preys on caterpillars, a variety of insects including flies and gnats, crayfish and spiders. Like other frogs, it is carnivorous and feeds on just about anything it can handle.

# Northern Leopard Frog

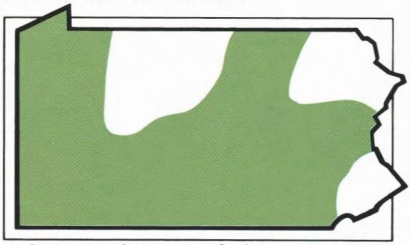
*Rana pipiens*

***General characteristics.*** The leopard frog is one of our most attractive frogs. It is primarily nocturnal and prefers to spend the better part of the day in hiding. It comes out at twilight to fill the night air with its song or forage for a meal. Although extremely agile, those who have studied them say that the leopard frog is not as agile as its cousin, the pickerel frog. However, it does take honors for the longest jumper. Even the larger bullfrog cannot cover a greater distance in a single leap. If fleeing from danger, the leopard frog is able to cover a lot of ground, taking three or four long, low erratic leaps, each time going off in a different direction. Average adult leopard frogs attain lengths of two to 3 1/2 inches.

***Identification.*** The leopard frog is slender with relatively smooth skin, although small tubercles cover much of the body. The head is wide, ending in a more or less blunt snout.

The leopard frog resembles the pickerel frog, although the body color is not tan as is usually the case with the pickerel frog. The leopard frog is brownish or green. Its dark spots are round, not the squarish shape of the pickerel frog's spots. The spots appear in two or three rows between prominent dorsolateral folds. The spots are black or reddish brown and edged with a lighter color that produces a halo effect around them. The wide dorsolateral ridges are creamy to yellowish or bronze. Dark spots also appear on the sides below the folds of skin.

The belly is white to yellowish and the throat is white. Each of the legs is clearly marked with dark bars. The under surface of the legs is whitish, not yellow or orange as on the pickerel frog. The upper jaw, which protrudes over the lower, is marked with a light spot or line. A yellowish band streams from the end of the muzzle backward to the shoulder.



***Range.*** The leopard frog ranges far into Canada in the north and south to Kentucky. It extends to enter the eastern edge of the Pacific states. Populations of the leopard frog occupy a large portion of Pennsylvania. It is apparently absent from the northeast, in a general sense the Pocono Mountains; from a small corner in the southeast; and from the extreme northcentral part of the state, encompassing parts of the Allegheny Mountains.

***Habitat.*** During the summer months the leopard frog wanders far from water when it can be seen in moist meadows and fields. It especially likes damp grasslands, but marshes and small ponds also hold colonies of the leopard frog. It cannot withstand a great amount of heat and therefore spends most of its time in areas that are moist and heavily covered with vegetation. Interestingly, the leopard frog resides in brackish marshes as well as fresh water. That cannot be the case in Pennsylvania, though, because it is absent from the southeast counties and the Delaware River estuary, our only potential locale for salt marshes.

After experiencing the heat of summer and land-based excursions, the leopard frog seeks protection from winter's coldest days by retreating to the water. Digging well into loose gravel or sand on the bottom, the leopard frog hibernates until the spring warming trend again brings it scurrying to the surface.

***Reproduction.*** It doesn't take too much of a warming trend to bring the leopard frog out of hibernation. It is among the first frogs to emerge in the spring—perhaps late winter would be a better description—when water temperatures have climbed barely into the low 40s. The mating period can begin in March and continue until May or even June. Breeding takes place in shallow water where eggs are laid encased in a round, flattened transparent gelatinous mass. Thus protected, the egg mass is attached to submerged vegetation, or sometimes rests on the bottom. From 5,000 to 6,000 eggs are released by the female; they are blackish on top with the lower part, the yolk, a creamy white. The yolk is available as a source of nourishment for the new tadpole for several days. Depending on water temperature, the incubation period for the eggs can be as short as four days or as long as a month. Average time to hatching is probably nine or 10 days.

As they escape from the egg, the tadpoles have a brownish body and translucent tail crests sprinkled with small black dots. They remain in this larval stage for two to three months. When they attain a length of about three inches, metamorphosis takes place, and by July or August, frisky young leopard frogs have been welcomed into the world.

***Call.*** Among the leopard frogs, both the male and female can be heard calling, although the female's song is not as loud as her mate's. A pair of vocal sacs expand and collapse as the frog produces its vibrant song. Expanded, the vocal sacs are round, and cause the area above the front legs to swell. Collapsed, the sacs become wrinkled and baggy.

The leopard frog sings early in the spring, usually heard from the shallows of a pond or from deep within a marsh that is just beginning to feel the effects of warmer, longer days. As air is pushed from the vocal sacs, the frog produces a low guttural, reverberant sound, lasting for about three seconds. It ends in a clucking-like grunt.

***Food.*** The leopard frog does most of its foraging as it travels over land, taking insects and other prey from the surrounding grasses. It feeds under water only on rare occasions. Spiders, worms, grasshoppers, and at times, snails add variety to the leopard frog's diet.

# Wood Frog

*Rana sylvatica*

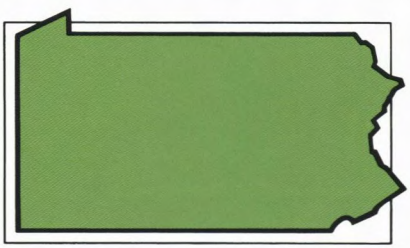
***General characteristics.*** The wood frog is primarily a diurnal amphibian; that is, the frog is most active during the day. Even so, due to its secretive and solitary nature and natural camouflage, it seldom is seen other than during the breeding season. This medium-sized frog's average adult length is 1⅜ to 2¾ inches.

More terrestrial than a lot of other frogs, the wood frog is also capable of jumping farther than most. In addition, when fleeing from danger it is able to turn itself around as it hits the ground to face a startled enemy eyeball to eyeball. Thus prepared, it can take other evasive measures, if necessary.

***Identification.*** The body of the wood frog appears more flat than most other frogs. The head is broad, but ends in a pointed snout. Its skin is relatively smooth and moist to the touch. Although usually a shade of tan, the body also can be pinkish to an occasional dark brown. An important identifying mark is a prominent, dark mask that covers each eye and extends along the side of the head to just behind the eardrum (tympanum). A light line or stripe marks the edge of the upper lip. The chest is marked with a dark spot located near the base of the forelimbs. The white belly sometimes is mottled with darker pigment.

In some specimens, dark bars break up the tan color of the legs, which on the undersides are yellow-white to greenish white. The toes are webbed, but only slightly. The dorsolateral ridges are distinctly evident and extend all the way to the groin. They are a lighter shade than the rest of the body. The wood frog has protruding large eyes, bigger than the tympanum. The gold iris of each eye is darker on its lower half than on the upper half.

***Range.*** The wood frog can find suitable habitat throughout the entire state. This frog is quite adaptable—it is found north of the Arctic Circle, the only North American frog residing in this frosty environment. It ranges across Canada to Alaska in the north and in its eastern range as far south as the southern Appalachians.



***Habitat.*** A terrestrial animal, it ranges far from water during the summer months. It likes shade and moisture, so damp woodlands are a favorite haunt of the wood frog. Well-camouflaged against the dead leaves littering the forest floor, the wood frog spends much of its time here, unnoticed and alone. Although a strong swimmer and able to produce a vigorous kick with its hind legs, the wood frog spends little time in the water except when it breeds. As winter settles over its wooded home, the wood frog burrows beneath the forest debris to hibernate among the leaves or in the soil beneath moss-covered logs.

***Reproduction.*** Along with the leopard frog, the wood frog is among the first to mate and breed. Warm rains are needed to entice the wood frog from hibernation and when the air temperatures reach 50 degrees, the male begins to call his mate. Often, the first singing is heard even before the winter's coating of ice has completely melted from the breeding pond. The male wood frog begins to call as early as February or March. The male greets the female in a day or two and the eggs are quickly deposited by the female and fertilized by the male. The eggs usually are laid in slow-moving pools of streams or small ponds. In the event of a late freeze, the eggs do not die but simply await warmer temperatures to develop. Before releasing the eggs, the mated wood frogs swim close to shore where the water is shallow and warmest. They choose an area with a profuse stand of submerged vegetation, and these stems, branches and shoots receive the globular egg masses as they are deposited. The black eggs are encased in a clear jelly mass that adheres to the plants just below the surface. The wood frog lays between 2,000 and 3,000 eggs and then quickly leaves the breeding site. After being in the water for a little more than a week, the egg masses begin to flatten, float upward to the surface and spread out, looking much like the familiar green scum often found on ponds.

The eggs at this point take less than a month to hatch. The tadpoles leaving the tiny eggs are greenish olive and have high tail crests (See Figure III-17). They remain in the tadpole, or larval, stage for about two months.

***Call.*** Only the male wood frog calls and he may do so while floating on the open surface of the mating pond. The song is heard early in the breeding season, about the only time the wood frog vocalizes. The call consists of a series of short, raspy duck-like quacks, each about one second in duration. At times, the wood frog may produce a clacking noise, but it always sounds hoarse. The call of the wood frog is not heard over great distances.

***Food.*** The moist forest home preferred by the wood frog provides a varied menu. This amphibian of the woods preys on numerous insects and other small invertebrates.

Figure III-17

*The high tail crests, typical of wood frog tadpoles, are not yet apparent on these larvae just emerging from the egg mass.*

*Figure IV-2, The Blanding's turtle is a candidate species in Pennsylvania.*

*Figure IV-4, The carved pyramids on the carapace of the wood turtle are actually large scales.*

*Figure IV-3, Wetlands are crucial to the survival of many species of turtles.*

Chapter IV

# TURTLES

## Order Testudines

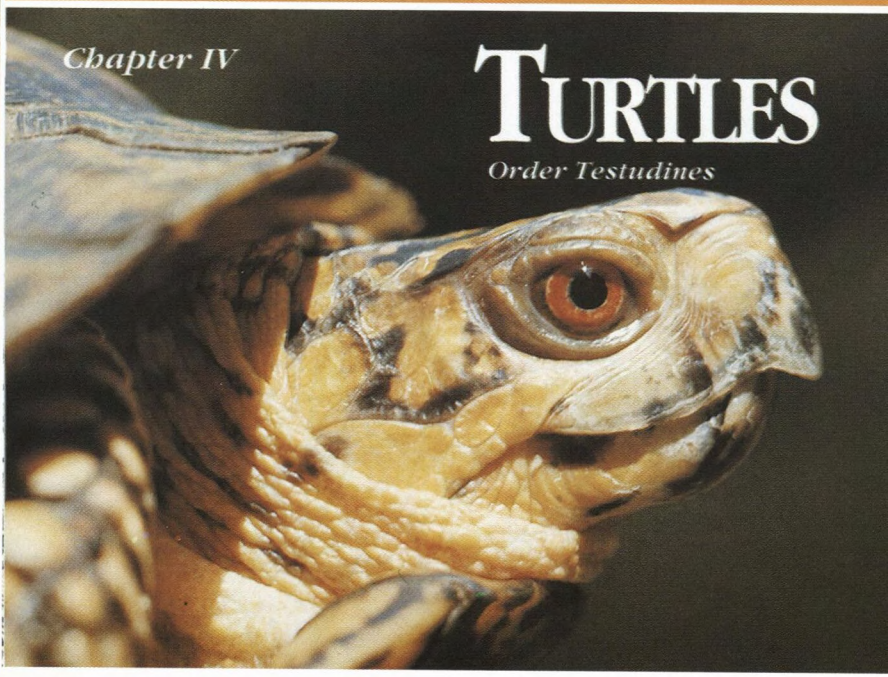
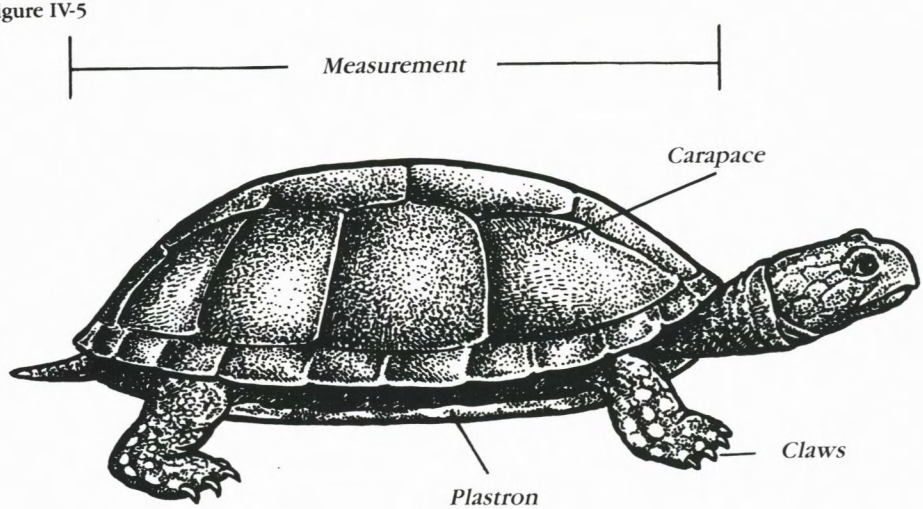


*Figure IV-1, The down-turned beak and red eye aid in identifying this male box turtle.*

# Chapter IV—The Turtles

The unusual physical structure of the turtles makes them one of the most familiar and easily recognized of all our amphibians and reptiles. The distinctive shell that protects the turtle's body is unique and known to nearly everyone. The shell's shape, size, color and pattern can help identify several of the species. The upper shell, called the carapace, comes in a variety of shapes and markings (See Figure IV-5). The plastron, or lower shell, varies in size and in some species is equipped with one or two hinges that allow it to move or swing open and shut. This feature provides these turtles effective protection when they withdraw their legs and head and close up the shell tightly. Large scales, which actually are horny plates called scutes, cover the shells.

Figure IV-5




Turtles are our oldest living reptiles and have gone practically unchanged in the 200 million years they have been in existence. They also are considered to be the more intelligent of the reptiles. Turtles have adapted to a variety of environments. Some are fully aquatic, never leaving the water except to lay eggs. Others, though they reside near water, seldom enter it. All turtles enjoy basking and often can be seen soaking up the rays of the warm sun.

All turtles lay eggs and they must leave the water to perform this annual ritual. The female digs a hole, usually in well-drained soil, in which to deposit her clutch. After carefully covering the eggs with soil, she departs, leaving the eggs to incubate and hatch on their own.

Turtles have dry, scaly skin, claws on the toes (See Figure IV-5) and an upper and lower shell. Turtles lost their teeth sometime during the course of evolution, and they have been replaced by a hard, sometimes very sharp, horny beak.

Occasionally when turtles are discussed, the term *tortoise* may be used. This term usually refers to the large turtles that dwell on land. A "terrapin" normally is one of the aquatic, hard-shelled, often edible species.

In Pennsylvania, turtles make up four families, representing 10 genera and 14 species and subspecies.

# Snapping turtles (Family Chelydridae)

**Snapping turtle—*Chelydra serpentina***

The snapping turtles, of which there is only one species in Pennsylvania, are among the largest turtles inhabiting fresh water. They have long tails (our other turtles do not) with saw-toothed projections running down the upper side. Their huge heads are equipped with a powerful set of jaws. The flexible plastron is shaped somewhat like a cross (not the usual oval or round) and it is smaller in proportion to the rest of the body, compared to those of other turtles.

# Musk and mud turtles (Family Kinosternidae)

**Eastern mud turtle—*Kinosternon subrubrum subrubrum***
**Eastern musk turtle—*Sternotherus odoratus***

Members of this family have smooth, oval-shaped upper shells, with 11 scutes (large scales) on the margin along each side. The tail of the female is very short. The tail of the male extends just beyond the outer margin of the carapace. These turtles are almost fully aquatic, content to crawl along the bottom of the stream or pond. They rarely leave the water except to deposit their eggs. Members of this family may sun themselves in shallow water when only the highest point of the upper shell is exposed. Two pairs of musk glands are located beneath the edge of the carapace. These glands emit an offensive odor and confirm that the stinkpot turtle is aptly named.

Only two species from this family occur in Pennsylvania, one of which, the eastern mud turtle, once thought to be extirpated in Pennsylvania, may still occur in limited numbers.

# Pond, marsh and box turtles (Family Emydidae)

**Midland painted turtle—*Chrysemys picta marginata***
**Spotted turtle—*Clemmys guttata***
**Wood turtle—*Glyptemys insculpta***
**Bog turtle—*Glyptemys muhlenbergii***
**Blanding's turtle—*Emydoidea blandingii***
**Map turtle—*Graptemys geographica***
**Red-eared slider—*Trachemys scripta elegans***
**Eastern redbelly turtle—*Pseudemys rubriventris***
**Eastern box turtle—*Terrapene carolina carolina***

Many members of this family live in the eastern part of the United States. It is the largest living family of turtles in the world with more than 80 species. Eight species reside in Pennsylvania.

This family of turtles includes species that are aquatic, semi-aquatic and terrestrial. Their hind feet are more flattened and elongated than members of some other families. There also is some webbing between the toes. In most members of this family in Pennsylvania, the upper shells are not highly domed but appear more flattened and from the side project a low profile. Basking is a popular pastime with these turtles.

# Softshell turtles (Family Trionychidae)

**Midland smooth softshell—*Apolone mutica mutica***

**Eastern spiny softshell—*Apolone spinifera spinifera***

Only a single genus and two species typify this family in Pennsylvania. There is one other species in the United States, a total of 22 worldwide. The shells of these turtles are covered with soft, leathery skin rather than the bony plates common to most turtles. The carapace, or upper shell, is circular and often described as resembling a pancake. The feet are fully webbed with three very sharp claws. The snout is tubular-shaped, ending in a blunt point. Extended slightly above the waterline, they use this snorkel-like snout to breathe as they cruise just below the surface of the water, or when lying buried in the mud under the shallow water.

This family of turtles is aquatic. They are strong swimmers, but at the same time quick and agile on land. At times they actually seem to run when moving over land. The softshells prefer moving water rather than lakes or ponds. In addition to the spiny softshell turtle, which is illustrated and described in detail, one other member has been known to occur in Pennsylvania. Midland smooth softshell turtle *(Trionyx muticus muticus)*—Now believed extirpated in Pennsylvania, the original range of this softshell turtle included parts of several western countries. It extends from there to a broad portion of the Midwest. It likes larger streams and rivers, especially those with a moderate flow of current and bottoms of mud or sand. Only infrequently does it inhabit lakes or ponds. It is seldom seen more than a few feet from water.

This turtle's carapace, or upper shell, is smooth and without the tubercles along the front edge and rough texture that mark the spiny softshell, a close cousin. The upper shell is olive to brownish and splattered with dots only slightly darker than the background. The long snout, which is typical of the family, ends in round nostrils.

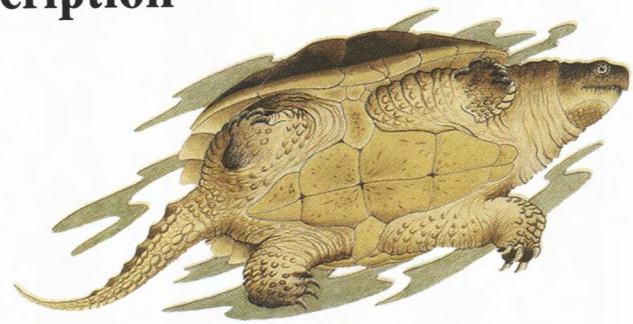
The smooth softshell turtle breeds in May to July. Its nest is actually a cavity six to nine inches deep, dug out by the turtle using its hind feet. From one to three clutches of spherical hard-shelled eggs are laid. Up to 30 eggs could be included in each clutch. Two to 2 1/2 months pass before the eggs hatch. It takes seven years for the hatching females to mature, and thus begin the cycle again.

The smooth softshell turtle is very much an aquatic animal and feeds on crayfish, frogs and fish.

Figure IV-6

*The crayfish resides in many Pennsylvania streams and provides food for the largely aquatic softshell turtle.*

# Species Description



## Common Snapping Turtle

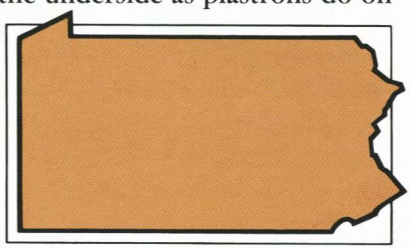
*Chelydra serpentina serpentina*

***General characteristics.*** The common snapping turtle is sometimes referred to as the freshwater "loggerhead," and is the only turtle in Pennsylvania with any economic value. This turtle is commonly sought for its meat, which is considered a delicacy and a base for snapper soup. In Pennsylvania a fishing license is required to take snapping turtles and traps or set lines may be used.

Many people think the snapping turtle is ugly, both in appearance and disposition. Although on land it may lash out viciously, it is generally inoffensive when submerged in water where it spends most of its time. It does not bask in the sun nearly as much as many other turtles do. The snapping turtle is a good swimmer but more often than not prefers to walk across the bottom of its watery habitat, which it does quite well. Confronted on land, the common snapping turtle is quick to assume its offensive stance, in which the hind quarters are elevated above the rest of the body, and the jaw is opened wide, at which time the turtle may lunge forward repeatedly. During such shows of strength, the snapper may emit a loud hissing sound to discourage further any would-be adversary. The common snapping turtle is one of our largest turtles. Its carapace may measure up to 12 inches in length.

***Identification.*** The snapping turtle is easily recognized by its large head, a plastron smaller in relation to the rest of the body compared to other turtles, and a tail proportionately longer than on other turtles. The tail is at least as long as the carapace and supports a series of large saw-toothed keels on its upper side. The neck is covered with loose, warty skin. The strong jaws end in a distinct hook. The carapace of the common snapping turtle is tan to dark brown, sometimes nearly black. The carapace is quite rough, serrated along its rear margin, and has three rows of keels running its length. These keels may be difficult to discern in older specimens. The unpatterned plastron is yellow to tan and it is cross-shaped and relatively small. It does not cover nearly as much of the underside as plastrons do on most other turtles.

***Range.*** This large turtle resides in a broad area of the country. Its natural range extends from southern Canada to the Gulf of Mexico, and from the east coast to the Rocky Mountains. Thus, the common snapping turtle is distributed throughout Pennsylvania.

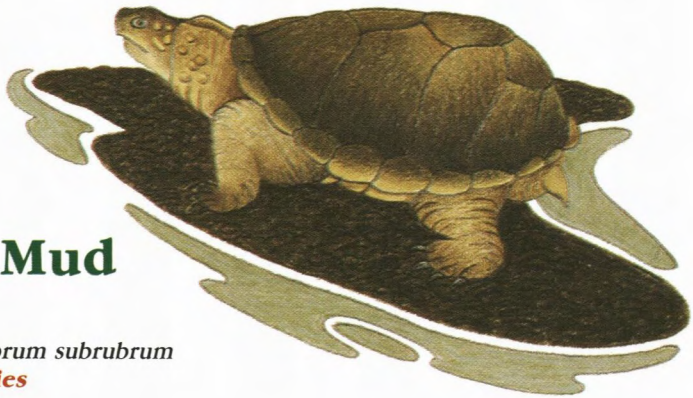


***Habitat.*** An aquatic reptile, the snapping turtle has little preference for the type of water in which it resides. Snappers have been found in small streams as well as large rivers, in the smallest ponds to the largest lakes. It likes soft mud bottoms, especially if abundant vegetation is convenient. Rarely seen basking, the snapper prefers to rest in shallow water with just the eyes and nostrils exposed. The snapping turtle hibernates beneath the water. It ends its hibernation in April, emerging from an overhanging mud bank, muskrat hole or from under a collection of vegetative debris.

***Reproduction.*** For the snapping turtle, the peak time for laying eggs is June. A usual clutch includes 25 to 50 eggs. The eggs are round and just over one inch in diameter. The nest, a cavity four to seven inches deep, might be dug some distance from the water (See Figure IV-7). Depending on the weather and locale, nine to 16 weeks could be needed to incubate the eggs. When the eggs finally break open, young snappers barely more than an inch long emerge.

Figure IV-7
*The round eggs of the common snapping turtle are laid in a cavity four to seven inches deep.*

***Food.*** To some extent, the snapping turtle is considered a scavenger because it feeds on a certain amount of carrion. But the snapper does not limit itself to that. It eats a variety of invertebrates as well as fish, small mammals and even birds. Ducklings, for instance, have been known to fall prey to a snapping turtle. Walking casually along the bottom of a lake, eyes alert, the snapping turtle could surface quickly to snatch a feathery meal. Omnivorous in its feeding habits, the snapping turtle also consumes a variety of aquatic plants.



# Eastern Mud Turtle

*Kinosternon subrubrum subrubrum*

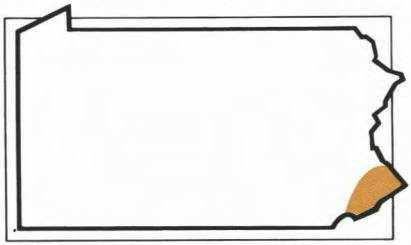
***Endangered Species***

***General characteristics.*** It is more an aquatic animal, so draining wetlands and filling in swamps and marshlands has had a predictable adverse effect on the population. A small turtle, the eastern mud turtle reaches an upper shell length of only three to four inches.

***Identification.*** The eastern mud turtle has few, if any, distinctive field marks. The carapace may range from and olive to a dark brown or almost

black. There is no definitive pattern or markings. The upper shell is smooth and the scales, or scutes, have no keels. The plastron is yellow to brown and may be marked at times with black or brown. The lower shell is double-hinged and contains 11 scutes. The head of the eastern mud turtle is brown and marked with numerous widespread yellow spots or streaks. On the male, the tail ends in a well-developed blunt spine.

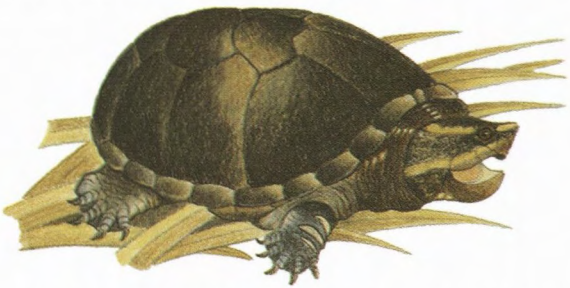
***Range.*** In Pennsylvania, the eastern mud turtle inhabited the extreme southeastern corner of the state, particularly in the lower Delaware River Valley. In this heavily populated area much of its habitat has been destroyed, accounting for its dwindling numbers. Its natural range extends south from here to the Gulf Coast, and north to Connecticut.



***Habitat.*** Even though it is essentially aquatic, the mud turtle travels some distance over land in search of a new home if that becomes necessary. It prefers shallow, slow-moving water, either fresh or brackish, and it likes streams with a soft bottom. Marshes, ditches and even wet meadows satisfy the mud turtle's need for a water-based environment.

***Reproduction.*** The eastern mud turtle is sexually mature at five to seven years old and breeds in mid-March to May. Its nest is a three- to five-inch cavity carved from either a pile of vegetative debris or sandy or loamy soil commonly found in its habitat. In June, the mud turtle lays one to six eggs that are elliptical and hard-shelled. About one inch long, the shell is pinkish or bluish white. When hatched, the young mud turtle has a rough carapace that becomes smooth as it matures.

***Food.*** The eastern mud turtle is carnivorous, preferring to search beneath the water for its meals. Insects are the main diet staples.



# Stinkpot Turtle

*Sternotherus odoratus*

***General characteristics.*** The stinkpot is the only musk turtle inhabiting Pennsylvania. Although abundant in many waters within its range, it often is not seen because it is primarily an aquatic animal. Nonetheless, it likes to leave the water to bask in the sun, and quite mobile, often climbs slanted trees or logs to find a resting place. An apparent ability over other turtles to climb steeper surfaces is provided by a smaller plastron, which allows greater movement of the legs. The carapace measures three inches to just over four inches in adults. In clear water the stinkpot might be observed walking across the bottom in search of food. It often is caught by a surprised angler. When disturbed, it is liable to secrete a foul-smelling yellowish fluid. This fluid, which acts in many cases as a deterrent to would-be attackers, is discharged from two pairs of musk glands located under the

border of the upper shell. Some have described the stinkpot as pugnacious, almost vicious. It is said to have a short temper and strong jaws.

***Identification.*** The stinkpot's carapace is smooth, highly domed and elongated. It is normally olive-brown to dark gray and may be marked with irregular streaks or spots of a darker color. The small plastron has 11 scutes with small patches of skin visible between them. There is a single hinge that is difficult to locate on most specimens. The female's tail is very short. The male's tail tends to be a bit longer and ends in a blunt, horny nail. Small fleshy barbels protrude from the chin and throat. On most individuals, two light stripes stand out on an otherwise black head.

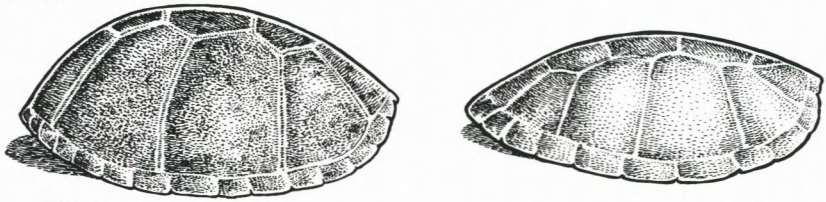
***Range.*** Although thought at one time to be distributed statewide, recent studies show that the stinkpot does not inhabit the Allegheny Mountains. These same studies indicate that the stinkpot dwells in two separate ranges in opposite corners of the state. In the northwest, it is found in the swampy areas of the Shenango River Watershed and Lake Erie. It also is found in a larger area of southeastern Pennsylvania and particularly in the more centrally located counties where prosperous populations of stinkpots have been discovered in the limestone streams. The stinkpot is distributed from New England, southern Ontario and Wisconsin, south to Texas and Florida.

***Habitat.*** The stinkpot prefers quiet, slow-moving, shallow streams and rivers, preferably with a mud bottom. In early spring the stinkpot seeks out waters shallow enough so that it can bask with the center of its carapace exposed to the warm sun.

***Reproduction.*** The stinkpot is one of the first turtles to nest, beginning in May but going as late as August. Mating occurs under water. Then, leaving the water, the female lays one to nine eggs in a shallow nest dug under a rotting stump or within the confines of an old muskrat hole. The eggs are off-white but circled with a stark-white band. They are thick-shelled, elongated and just a bit more than one inch long. The eggs take nine to 12 weeks to incubate. The carapace of the newly hatched turtle is black, three-quarters to one inch in length, and it has a rough texture.

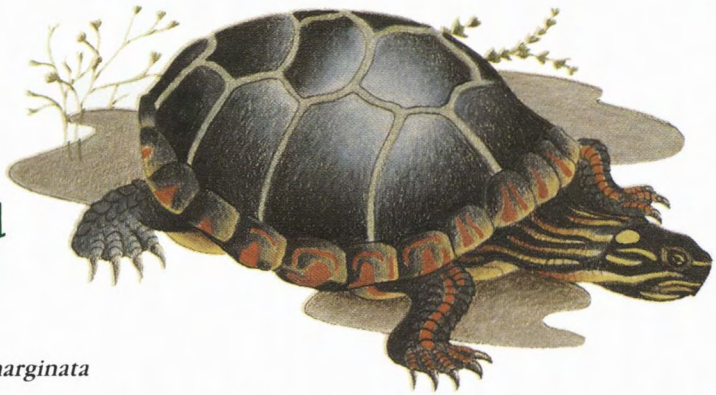
***Food.*** The stinkpot is carnivorous and seems to eat nearly anything it is able to catch. A sampling of the stinkpot's diet includes small fish, snails, aquatic insects, clams, worms and fish eggs. Apparently hungry a large portion of the time, the stinkpot has been known to forage for a meal day and night.

Figure IV-8



*Stinkpot Turtle* *Other Turtles*

*The upper shell of the stinkpot is raised in the shape of a high dome. Others tend to be only slightly raised or rounded.*



# Midland Painted Turtle

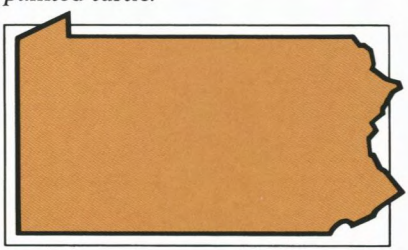
*Chrysemys picta marginata*

***General characteristics.*** The attractive painted turtle is the most widespread of any in North America. One subspecies with intergrades, which may show characteristics from other subspecies in adjoining areas, is found in Pennsylvania. Not a particularly large turtle, it attains adult sizes of four to six inches along the upper shell, or carapace.

***Identification.*** The carapace is olive or black, oval, smooth, and somewhat flattened. Red and black markings on the edges of the shell, in the form of bars or crescent-shaped patterns, are good identifying characteristics. The plastron is an unmistakable yellow or red with a dark blotch in its center. Each side of the head is marked with bright-yellow spots and stripes (See Figure IV-9), and yellow and red stripes define the neck, legs and tail. The upper jaw is notched.

Figure IV-9

*Bright yellow spots and stripes mark the side of the head of the painted turtle.*



***Range.*** Its range extends from southern Quebec and Ontario in Canada southward to Tennessee. It misses most of Virginia and North Carolina. In Pennsylvania, the painted turtle is found from border to border in all directions.

***Habitat.*** It is fond of basking and often is observed sunning itself on a large rock beside a slow-moving stream or river. Shallow areas of lakes or ponds also attract the painted turtle. It particularly likes streams with soft bottoms, generously sprinkled with vegetation and dotted with submerged logs.

***Reproduction.*** The male painted turtle is sexually mature at two to five years of age. The female matures from four to eight years of age. One to two clutches, consisting of two to 20 elliptically shaped eggs, are laid in May to July on land in a flask-like nest about four inches deep. The eggs incubate for 10 to 11 weeks before splitting open to reveal hatchlings an inch or less in shell length. The young may spend the first winter in the nest.

***Food.*** While young, the painted turtle is basically carnivorous but becomes more herbivorous with age. It eats insects, crayfish and mollusks in the beginning, then turns to a variety of aquatic plants.

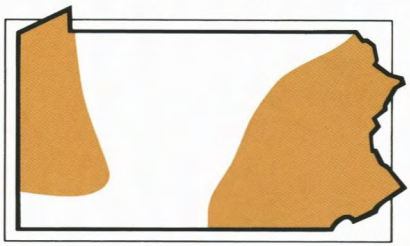
# Spotted Turtle

*Clemmys guttata*

***General characteristics.*** The spotted turtle is found in fairly good numbers throughout its range, unlike its close cousin, the endangered bog turtle. This turtle is small with an upper shell length of only three to slightly more than four inches. It likes to bask in clumps of grasses, especially during the cooler spring months, and is more often seen during the spring than any other time of the year.

***Identification.*** The carapace of this small turtle is black and without keels on the scales. Its upper shell is sprinkled with round yellow spots that vary greatly in number from one specimen to another. The head, neck and legs are marked with yellow or orange spots. Its black head has an orange spot over the eyes. The lower shell, or plastron, is creamy yellow and bordered with large black blotches. The female has orange eyes and a yellow chin. The male has brown eyes and a tan chin. The male also has a long, thick tail.

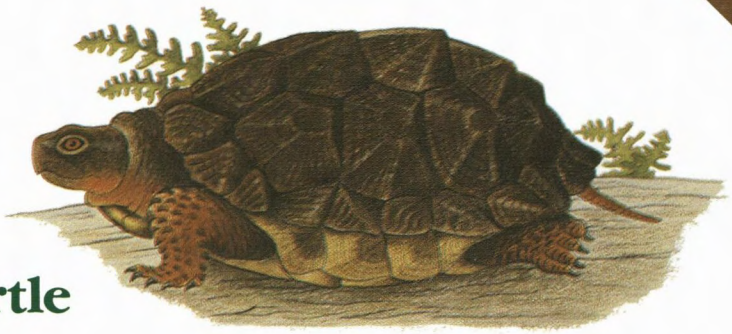
***Range.*** The spotted turtle resides in states along the Atlantic Coast from Georgia northward to southern Maine. Beginning at Maryland, its range swings to the west extending into eastern Illinois. In Pennsylvania, the spotted turtle is found east and west of the Allegheny Mountains, its range encompassing perhaps two-thirds of the state.



***Habitat.*** Marshy meadows, bogs, wet woodlands and similar moist areas attract the spotted turtle. It likes shallow, often spring-fed mud-bottomed streams. It spends winters hibernating in the mud or debris accumulated along the stream bottom, or if it can locate one, takes up residence in an abandoned muskrat hole cut into the stream bank.

***Reproduction.*** Mating occurs in March to May. The spotted turtle chooses a sunny area on land in which to dig a flask-shaped nest that receives three to five eggs in June or a bit later. The eggs are white and elliptical and hatch in late August to September.

***Food.*** The spotted turtle is primarily carnivorous. It occasionally eats plants, but it prefers a variety of animal life, including insects, worms, larvae, mollusks and tadpoles.



# Wood Turtle

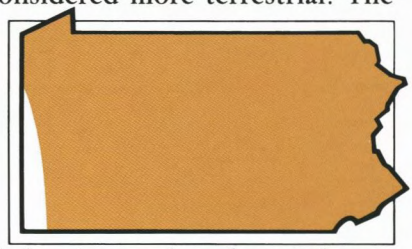
*Clemmys insculpta*

***General characteristics.*** The wood turtle is often called the "sculptured turtle." Looking at its upper shell, it is easy to understand how it obtained this descriptive nickname. Its carapace appears as if an artist had taken a fine-edged knife and carefully carved an intricate, nearly symmetrical pattern from a piece of dark wood. Adults grow until the upper shell measures five to almost eight inches in length. Other than the box turtle, the wood turtle is Pennsylvania's most terrestrial turtle. During the late 1800s to early 1900s, this turtle was available at market for its meat.

***Identification.*** The upper shell of the wood turtle is brown and keeled. Its scutes, or large scales, are pyramidal, a series of concentric growth ridges and grooves, larger on the bottom, becoming smaller as they approach the top. These exaggerated scales appear sculptured and are rough to the touch. The plastron, or lower shell, is yellow, and each of the scutes is margined on the outer edge with black blotches. The plastron is hingeless and can aid in distinguishing this turtle from the box and Blanding's turtles, which are considered "land" turtles like the wood turtle. The lower shell of the male is concave. The female's lower shell is flat or slightly convex. The skin on the neck and front legs is frequently reddish orange. The tail is moderately heavy and nearly as long as the carapace, or upper shell.

***Range.*** The wood turtle's range extends from Nova Scotia south to Virginia. The wood turtle is found in most of the state's 67 counties but is missing from the western border.

***Habitat.*** Although a terrestrial turtle, the wood turtle is very much at home in the water. In fact, it hibernates in water during the winter months. In Pennsylvania, only the box turtle is considered more terrestrial. The wood turtle wanders from home, ranging far afield if necessary to find its favorite habitat, which includes cool streams. It is especially fond of streams running through a hardwood forest. It can be found in marshy meadows and other farmland and is attracted to swampland with stands of red maple. It is an excellent climber, and even manmade barriers such as fences do not necessarily stop the wood turtle from going where it desires.



***Reproduction.*** The wood turtle lays one clutch of four to 12 eggs a year. The elliptical eggs have shells that are flexible. The eggs are normally deposited by the female some time in May or June. They hatch in September or October, and it is not unusual for the young wood turtles to remain in the nest through the winter.

***Food.*** Although omnivorous, the wood turtle is partial to vegetation, feeding voraciously on wild fruit. It favors strawberries and low-bush blueberries. Other plants, such as dandelion and sorrel with its heart-shaped leaflets, also are favored. The wood turtle eats slugs, insects and tadpoles and can be seen searching newly plowed ground for worms, especially after a cool spring rain.

# Bog Turtle

*Clemmys muhlenbergii*

***Endangered Species***

***General characteristics.*** The bog turtle was the first turtle to be placed on the Pennsylvania List of Endangered Species. It now appears only in isolated populations. Loss of habitat has been the biggest factor in its decline. Mankind's propensity for draining bogs, marshes and swampland has taken its toll on the bog turtle. Its habitat left high and dry, the bog turtle simply had no place to go. Some years ago, the pet trade also was a factor in the decline in populations of this species.

The bog turtle, sometimes referred to as Muhlenberg's turtle, is a secretive reptile. Scientists actively engaged in restoration efforts find that the bog turtle's retiring attitude makes it a difficult animal to study. In spite of its shy nature, it still likes to bask in full sunlight, often atop tufts of grass or perched on a log. The bog turtle is active from April through mid-October, perhaps a bit longer period than some turtles. It may bury itself and become inactive during the hot days of summer. The bog turtle is a small turtle, never reaching more than three or four inches long along its shell.

***Identification.*** The bog turtle's carapace, or upper shell, is light brown to mahogany. Its large scutes sometimes have a tinge of yellowish or reddish marks in their centers. The plastron, which is hingeless, is brownish black with some yellow along the mid-line. The head is black and marked with a yellow, orange or red blotch on each side, an important identification characteristic. The male has a medium-thick tail.

***Range.*** The bog turtle has been found in separated ranges across parts of New York and extending southward to the western border of North Carolina. Its range includes New Jersey. The bog turtle's distribution in Pennsylvania splits into two separate historic ranges—two areas where this turtle was once found in stable populations. The largest range includes southeastern Pennsylvania as far west as Franklin County and north to near the Pocono Mountains. The smaller of the two original ranges includes portions of three counties in the northwestern part of the state near the Ohio border. However, it's doubtful whether the species still occurs in this range.

***Habitat.*** Wetlands, such as bogs, marshes and swamps, are preferred, but wet pastures also have been known to hold populations of the bog turtle. It likes narrow, shallow, slow-moving rivulets of unpolluted spring water flowing over a soft mucky bottom. The bog turtle seeks relief during periods of extremely hot weather and buries itself in mud or vegetative debris. It hibernates during the coldest winter months buried deeply in mud flooded over by water.

***Reproduction.*** The bog turtle matures sexually at five to seven years of age. Mating occurs during the first warm days of spring. Nesting is completed in June when the female lays a clutch of one to six eggs in a two-inch deep cavity. The eggs, barely more than one inch in length, are elliptical and flexible. They hatch in August or September after a six to nine-week incubation period.

***Food.*** The bog turtle is omnivorous, allowing it to enjoy a varied menu. It eats wild berries and also feeds on slugs, tadpoles, snails, worms and insects. The diet also includes the shoots of tender plants.

# Blanding's Turtle

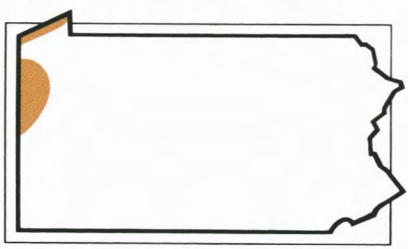
*Emydoidea blandingii*

***Candidate Species***

***General characteristics.*** This turtle, which has been placed on Pennsylvania's List of Candidate Species, was named for Dr. William Blanding, a nineteenth-century Philadelphia naturalist who first observed the species. It grows to an average adult shell length of five to just over seven inches. The Blanding's turtle is more tolerant of cold temperatures than most other turtles.

***Identification.*** The Blanding's turtle has a carapace that is smooth and shaped like a helmet. It is sprinkled with a heavy profusion of pale-yellowish spots, which in some areas become connected to form vermiculations. The plastron, or lower shell, is yellow and accented with large black blotches. The chin and throat are both bright yellow. In Pennsylvania, only the softshell turtle has a longer neck. Large protruding eyes serve only to emphasize a flat head. The plastron is hinged so that it can be closed toward the carapace, but not to the extent the box turtle is able to close up.

***Range.*** The Blanding's turtle extends from Nebraska eastward to Ohio and Ontario. Its range is spotty east of Ohio. Although perhaps not found at all today, the Blanding's turtle in Pennsylvania never occupied a large area. Its original range included the vicinity of Lake Erie and a portion of southwestern Crawford County. Conneaut Lake and the swampy



areas that now encompass Pymatuning Lake were included in the original habitat of the Blanding's.

***Habitat.*** It is primarily an aquatic reptile. Still, the Blanding's likes to bask in the sun on land, although it will not wander far from the water's edge. Wetlands are a favorite of the Blanding's turtle, and marshes, ponds and similar watery environments are potential habitats for this animal. It especially favors areas covered with a dense growth of aquatic vegetation.

***Reproduction.*** The Blanding's turtle lays its eggs in June or July. The clutch consists of about eight oval, dull-white eggs, approximately 1 1/2 inches in length. They are hard-shelled and hatch in August or September. When hatched, the young Blanding's turtle is barely more than one inch long.

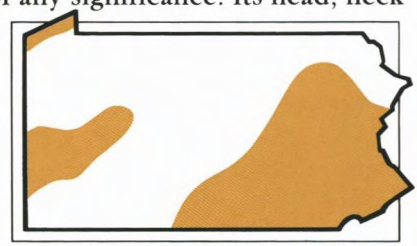
***Food.*** The diet of the Blanding's turtle is varied. It is a carnivore and feeds primarily in the water. Crayfish make up most of its diet. It may come ashore in search of food, prowling through the undergrowth to seek out insects and snails. It also eats wild berries and the tender shoots of plants. When it is able to catch them, frogs are also added to the Blanding's menu.

# Map Turtle

*Graptemys geographica*

***General characteristics.*** A moderately large turtle, though certainly not the largest found in Pennsylvania, the map turtle reaches an average seven to 11 inches in shell length. It is fairly common throughout its Pennsylvania range. Perhaps due to limited basking sites, individual turtles often pile on top of one another while basking on rocks or logs, which is a favorite pastime. But it also is a shy animal and if disturbed will slip quickly into the water to avoid a potential predator.

***Identification.*** The carapace of the map turtle is greenish to olive-brown. Its irregular pattern of thin, yellow-orange lines networking randomly across the upper shell like roads on a map give this turtle its name. The carapace is somewhat flattened and marked with a distinct keel. The plastron is yellowish and bears no markings of any significance. Its head, neck and tail are accented with narrow yellow lines. A yellow, somewhat triangular spot appears behind each eye.



***Range.*** The distribution of the map turtle in Pennsylvania is scattered into one larger and two smaller portions of the state. It is found along Lake Erie and in a small portion of the Ohio River Drainage. Its largest range encompasses a major portion of the Susquehanna River Basin and the lower Delaware River Basin. An interesting, recently developed theory suggests that the map turtle reached the lower Delaware by way of a series of canals. According to some experts, the map turtle was

able to leave its native Lake Erie home and travel through canals to the Hudson River, which in turn gave it access to the Delaware River through a similar system of canals. In any event, the distribution of the map turtle in Pennsylvania is scattered and broken into several sections. Elsewhere, this turtle is found across upper New York to Wisconsin and then south into Louisiana.

***Habitat.*** The map turtle prefers slow-moving, large rivers over smaller, faster waters. Lakes, rather than ponds, are considered choice habitat. Mud bottoms with profuse stands of vegetation top its list of preferred habitat. It is not in any hurry to hibernate and comes out of hibernation sooner than other species of turtles.

***Reproduction.*** The map turtle may have two or more clutches of eggs a year, depending on just how far north it is living. The female lays 12 to 14 eggs in May to mid-July in a nest about four inches deep. The eggs hatch mid-August to September. In some cases, the hatchlings do not leave the nest until May or June of the following year.

***Food.*** The map turtle includes some vegetative matter in its diet, but the mainstays probably are mollusks and crayfish. The female, equipped with powerful jaws, can crush freshwater clams and large snails to feast on an even wider array of food.

## Red-Eared Slider *(Trachemys scripta elegans)*

***General characteristics.*** Red-eared sliders are non-native to Pennsylvania. They are included in this book because they have gained a foothold in Pennsylvania waters and wetlands and are seen with increasing frequency. Red-eared sliders from Pennsylvania have been recorded with shell lengths of up to 10 inches. This species is native to the southcentral and southeastern United States. However, for decades these turtles have been sold in pet stores in Pennsylvania and other states outside of its natural range. People have illegally released their pet turtles into the wild in Pennsylvania, thereby creating self-sustaining populations. This is ecologically undesirable because these turtles compete with native species for food, basking areas and nesting areas.

***Identification.*** Red-eared sliders could be confused with map turtles, red-bellied turtles and even painted turtles because they exhibit some characteristics common to each of these species. However, only the red-eared slider contains, as its name suggests, a bright-red patch or stripe immediately posterior to the eye on the side of its head.

***Range.*** New information comes in each year regarding the distribution of red-eared sliders in Pennsylvania. They are well-established in many waters of the Delaware River drainage, around some of the larger cities in the state and in several isolated locations. Their clustered distribution in areas around cities is directly related to the release of former pets into neighboring parks, lakes and rivers.

***Habitat.*** This turtle prefers areas that offer slow-moving water, soft, muddy bottoms and an abundance of aquatic vegetation. These habitats can be found in large rivers, canals, ponds and lakes. Basking sites are important for proper thermoregulation and may cause sliders to congregate.

***Reproduction.*** Depending on the growth rates of an individual, the age of first reproduction can range from two to eight years, with age three to four a typical average. Little is known about the specifics of reproduction in Pennsylvania populations, but elsewhere, egg laying occurs during May, June

or July with clutch sizes averaging from six to 10 eggs. Incubation time is from two to three months and depends on environmental temperatures. The young may leave the nest or overwinter until the following spring.

***Food.*** Red-eared sliders primarily consume aquatic plants, but like many turtle species, they feed opportunistically on animal matter, live or dead. Aquatic invertebrates, fish, tadpoles or plants such as pondweed or coontail may be on the menu on any given day.

# Redbellied Turtle

*Pseudemys rubriventris*

***Threatened Species***

***General characteristics.*** This sun-loving turtle is one of our largest. It is alert and active, but at the same time, a shy reptile. Another of Pennsylvania's threatened species, the redbellied turtle, like so many other animals, is a victim of people's desire for the better life. Destruction of the habitat frequented by this colorful creature is blamed for its declining populations. A fairly large turtle, the redbellied turtle grows to an average upper shell length of 10 inches to better than 12 inches.

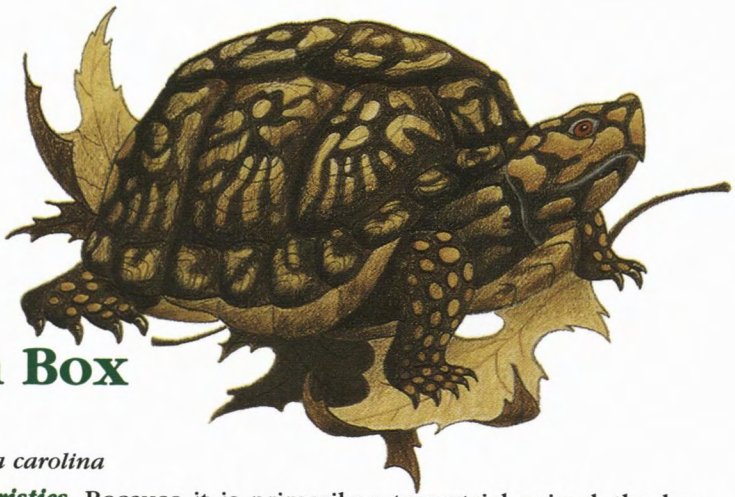
***Identification.*** The carapace varies from brown to black and it usually has a mottled pattern of reddish brown. Several vertical red bars run from the center of the shell to its outer edge. The lower shell, or plastron, while sometimes coral-colored, more often is yellow to reddish. There is a prominent notch at the tip of the upper jaw, and an arrow-shaped stripe runs atop the head between the eyes to the snout.

***Range.*** Although recent sightings have been sparse at best, the redbellied turtle was known, at one time at least, to have inhabited the lower Delaware River, the lower Susquehanna River and a portion of the Potomac River Basin, which reaches into a small section of southcentral Pennsylvania. Today it is found primarily in the lower Delaware River Drainage and at one known location in the Potomac River Basin. Its range extends from southern New Jersey and eastern West Virginia to northeast North Carolina.

***Habitat.*** It likes large waters. Deep ponds, lakes, rivers and streams are potential homes for the redbellied turtle. Dense aquatic vegetation is a must where its habitat is concerned. Where populations still exist, it might be seen basking on a favorite sun-drenched rock in company with painted turtles, a close cousin. The redbellied turtle, however, is the much larger of the two.

***Reproduction.*** The redbellied turtle nests in June or July, preferring a sandy loam in which to dig its four-inch-deep nest. This frequently occurs in cultivated ground, especially if it is located next to water. Eight to 20 elliptically shaped eggs are laid in the cavity, and once safely deposited are usually covered. The eggs hatch in 10 to 15 weeks, producing colorfully marked hatchlings one to two inches long. The newly hatched reptiles may spend their first winter in the nest.

***Food.*** The redbellied turtle is largely a vegetarian, although it may vary its diet with prey from its watery environment. An assortment of aquatic vegetation provides a feast, but snails, crayfish and tadpoles also supplement the menu.



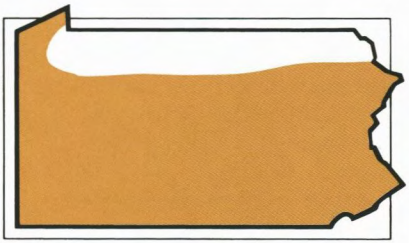
# Eastern Box Turtle

*Terrapene carolina carolina*

***General characteristics.*** Because it is primarily a terrestrial animal, the box turtle is perhaps the one turtle species most often seen in its range. Many people have had the opportunity to identify a box turtle because it occurs in urban as well as suburban areas. It usually moves about in the early part of the day or soon after a summer rain. The eastern box turtle reaches an average shell length of just over four inches to as much as six inches as an adult.

***Identification.*** The carapace of the eastern box turtle is high-domed and keeled. Color and patterns vary greatly, but black or brown are probably most often seen, with markings of yellow, orange or olive. The sharply rising dome-shaped upper shell is a good identifying characteristic. The colors on the plastron are quite varied. Markings may range from yellow-orange to olive, on a tan, brown or black background. The plastron has a single broad, movable hinge that allows the box turtle to close it tightly against the upper shell. It thus becomes effective protection from predators or other disturbances. The male usually has red eyes, and the eyes of the female are normally yellowish brown. The upper jaw ends in a down-turned beak (See Figure IV-1).

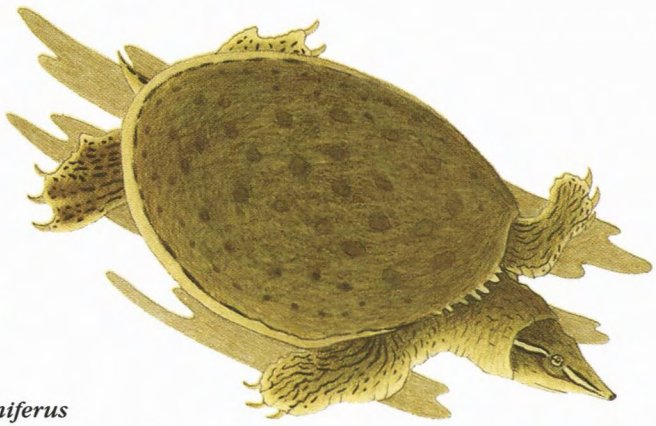
***Range.*** The eastern box turtle inhabits an area encompassing a large segment of the eastern states. It extends from the lower New England states to Georgia and west to Tennessee and Illinois. It inhabits a large portion of Pennsylvania. It resides over most of the southern two-thirds of the Commonwealth. Its range in the west also reaches northward into the Lake Erie Basin.



***Habitat.*** Although essentially a terrestrial animal, the box turtle enjoys soaking for hours at a time in wet mud or water. It likes moist, forested areas but does not insist on woodlands, and often can be seen in wet meadows or flood plains. During the hot, steamy months of summer, the box turtle actively seeks out a swampy area where it burrows in the cooling retreat of logs or rotting vegetation.

***Reproduction.*** The eastern box turtle matures in five to seven years. Nesting activity takes place in May to July when three to eight eggs are laid. They are elliptical and thin-shelled. The eggs, which average just over an inch in length, are placed in a deep cavity that may have been dug in the soft earth of a cultivated field.

***Food.*** The box turtle is omnivorous and enjoys a widely varied diet consisting of all kinds of vertebrates and invertebrates and carrion. It also feeds on an assortment of wild fruits and berries.



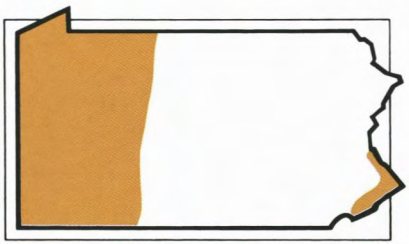
# Eastern Spiny Softshell Turtle

*Trionyx spiniferus spiniferus*

***General characteristics.*** The eastern spiny softshell turtle is a completely aquatic reptile, leaving the water only to deposit its eggs or on occasion to bask on a sun-baked log or the shoreline. Even then, it suns itself only in an area that provides quick access to the water. It might also be seen atop a mass of floating debris, soaking up the warming rays of the sun. In shallow water, the softshell turtle has a habit of lying buried in the sand or mud with only its eyes and snout exposed. By extending its long neck the nostrils can reach the surface to take in air. Thus, the softshell turtle is able to soak itself in this manner for extended periods. The softshell turtle is able to move fast

on land and in the water. It is a powerful swimmer and extremely agile on land where it nearly runs if it needs to. The eastern spiny softshell turtle can reach large sizes. The length of the carapace in adults may reach from five inches to as much as 17 inches.

***Identification.*** The carapace, or upper shell, of the eastern spiny softshell turtle gives this reptile its name. The shell easily bends at its sides and across its rear margin. The carapace is olive to tan or yellowish brown. Spots, which are slightly darker than the background color, are bordered with black. They are more predominant toward the center of the shell. On the female, these spots are larger and appear more as dark blotches. The large carpace is also marked with a dark line around its rim. The shell is covered with a soft, leathery skin. It does not have scales, or scutes. The plastron is white and for the most part unmarked. The feet are deeply marked with streaks and spots. On adult males, the carapace is covered with very small projections that feel like sandpaper to the touch. They help distinguish the spiny softshell turtle from the smooth softshell turtle. Overall the body of the softshell turtle is flat, almost pancake-like, and oval-shaped. The snout is tubular, like a snorkel and ends in a blunt point.



***Range.*** The eastern spiny softshell turtle extends from western New York and West Virginia to Wisconsin and south to Tennessee. Distribution of the eastern spiny softshell turtle in Pennsylvania is limited to the western third of the state. It is found generally in the Lake Erie and Ohio River watersheds. Eastern spiny softshells have recently been found in the Delaware River and several of its tributaries in southeastern Pennsylvania. This is apparently the result of an introduced population originating in southern New Jersey.

The eastern spiny softshell turtle primarily is a lake and large river dweller. Its favorite habitat includes sand and mud bars into which it can easily dig and bury itself. Although it prefers fast-flowing rivers, it may also inhabit lakes, farm ponds and marshy creeks.

***Reproduction.*** The eastern spiny softshell turtle may nest more than once a season. The nesting season is extended, running from May to August. The eggs, numbering from four to 32, are laid in a flask-shaped cavity dug in a bank of sand or gravel. This turtle prefers to dig a nest in an area exposed to full sunlight. The eggs are white, spherical and a little over one inch in diameter. They hatch in late August to October. In some instances, the hatchlings may remain in the cavity to emerge the following spring.

***Food.*** The eastern spiny softshell turtle has a voracious appetite. It is carnivorous, feeding entirely on animal life. Its prey includes tadpoles and frogs, but with its strong beak it also crushes and consumes mollusks. It also preys on other forms of aquatic life.

*Figure V-1, Appearing smooth and shiny, the body of the five-lined skink is covered with scales.*

*Figure V-4, The northern fence lizard could deposit two to four clutches of eggs after its first year.*

*Figure V-2, This stream-laced, tree-lined ravine could provide the humid woodlands favored by most of Pennsylvania's lizards.*

## *Chapter V*

# LIZARDS

*Order Squamata*
*Suborder Lacertilia*

*Figure V-3, The northern coal skink rummages among its surroundings for insects.*

# Chapter V—The Lizards

Lizards make up the largest living group of reptiles, numbering about 3,000 worldwide. They are more predominant in warmer, drier areas, and in this country most are found in the southwest. Pennsylvania has four species from two genera and two families. They become more rare as they move northward. The lizards common to Pennsylvania are harmless.

Snakes are closely related to lizards, from which they evolved. However, lizards have movable eyelids and external ear openings (See Figure V-5);

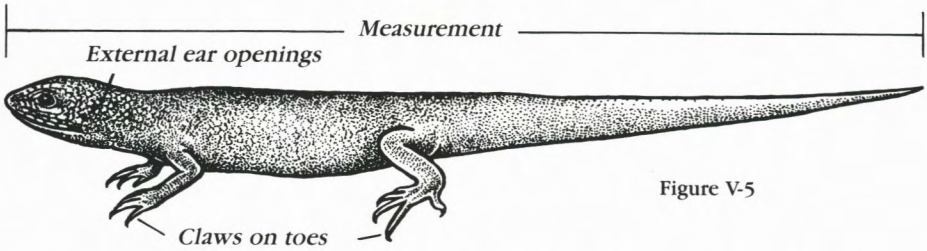



Figure V-5

snakes do not. Snakes also have no limbs, as do most lizards. (There also are some species of lizards in other parts of the country that do not have legs.) Lizards can swallow prey larger than might reasonably be expected. However, unlike the jaw of the snakes, the lower jaw bones of the lizards are firmly connected in front. This restricts the lizard's prey to smaller sizes than snakes can handle.

On the surface, salamanders (which are amphibians, not reptiles) may resemble lizards. However, there are several distinctly different features separating the two. The skin of lizards is scaly and dry, compared to the smooth, moist skin of salamanders. Lizards have clawed feet and external ear openings. The feet of salamanders are clawless (See Figure I-II) and these amphibians lack external ear openings.

Lizards for the most part are diurnal. They live in trees, on the ground and in burrows beneath the ground. They breed in the spring and most lay eggs following internal fertilization. Lizards possess the sensations of smell and taste much as we know them. Snakes do not. However, like snakes, many lizards are also able to use the tongue and Jacobson's organ to sample the air around them. (This organ is described in the opening section to the snakes.)

Many lizards, without apparent harm, can lose a tail to an attacker. An effective escape mechanism, special bone structures in a portion of the tail allow it to separate easily from the rest of the tail. This characteristic is called autotomy. In time, a new tail grows to replace the one lost, although its coloration is different.

## Iguanid lizards (Family Iguanidae)

### Eastern fence lizard—*Sceloporus undulatus*

Only one species of this family is found in Pennsylvania. The iguanids are most predominant in warm, dry regions and more than 40 different species inhabit North America. This family is very large both in the numbers of species and in their physical size. Some species reach 72 inches or more. Some of the iguanids are egg layers. They are territorial in nature. Males defend their home stakes with an elaborate display of head bobbing and

dramatic push-ups of the body, using the front legs. With mouth agape, they boldly inflate the chest and throat to present a menacing pose to any who would enter. Other displays, all designed to scare off intruders, are used as well.

Members of the family have five clawed toes on each leg. They also have a long tail.

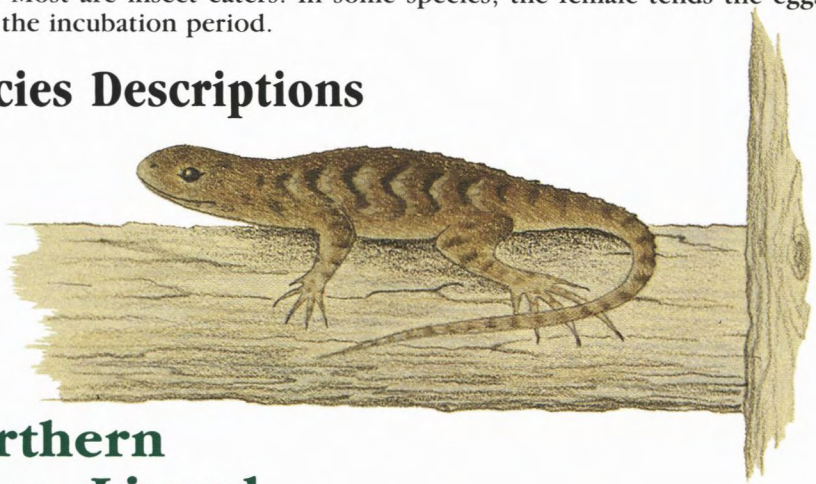
## Skinks (Family Scincidae)

**Northern coal skink**—*Eumeces anthracinus anthracinus*
**Five-lined skink**—*Eumeces fasciatus*
**Broadhead skink**—*Eumeces laticeps*

The skink family is a group of smooth, shiny, almost slippery lizards. The cylindrical body and tail are covered with smooth scales. This group is found on every continent with the exception of Antarctica. Over 1,200 species occur worldwide; three species are found in Pennsylvania.

This family of reptiles is diurnal and likes a moist or damp area in which to live. Most are insect eaters. In some species, the female tends the eggs during the incubation period.

# Species Descriptions

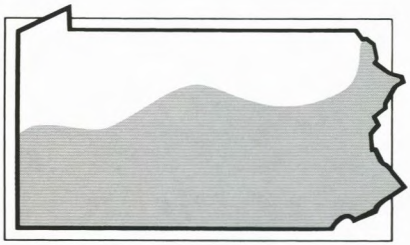


## Northern Fence Lizard

*Sceloporus undulatus hyacinthinus*

***General characteristics.*** The northern fence lizard belongs to a group of lizards commonly known as "spiny lizards." It is the only one of its genus in Pennsylvania. The northern fence lizard is not a large lizard. Adults range in size from four to seven inches, even though other members of its family in other parts of the world may reach 72 inches in length. It is diurnal and can be seen sunning itself, like many other reptiles. It spends a great amount of its time in trees where it hunts, rests and finds safety when frightened.

***Identification.*** The northern fence lizard varies from gray to brown. Colors on the belly range from whitish to greenish blue to pale blue. There may be dark, wavy crossbars on the back, which are most evident normally on the female. The male has a blue patch near the base of the throat. The scales on the back of this lizard are keeled and pointed. They are jagged and rough to the touch, which explains its nickname, "spiny" lizard.



***Range.*** This reptile, territorial by nature, is located in roughly the southern two-thirds of Pennsylvania. Its range might extend a bit farther north within the Delaware River Basin. It can be found from New York to Georgia and west to Kansas and central Texas.

***Habitat.*** The fence lizard defends its territory with an elaborate physical display that includes head-bobbing and open-mouthed gestures. Then, while appearing to do push-ups from its two front legs, the northern fence lizard inflates its chest and throat in an all-out effort to threaten an intruder.

Generally, the preferred habitat that it so vigorously defends is a sunny area of grassy or open woodland. It likes rotting logs and outcrops of rocks from where it can survey its domain. It often sits on a tree stump or fence, but usually is not far from a tree or wall where it can flee quickly to safety. When frightened, it scampers up a tree skirting to the opposite side where it remains motionless until it again feels safe. If caught from behind, the lizard quickly parts with its fragile tail. In time the broken appendage is replaced.

***Reproduction.*** The northern fence lizard usually responds to the warming trend in April by seeking its mate. In some cases, mating does not occur until August. In its first year, the northern fence lizard lays one clutch of three to 13 eggs. In subsequent years, the female could deposit as many as two to four clutches. The eggs hatch from June to September and the young lizards measure about two inches as they break away from the egg.

***Food.*** Beetles are a favorite food of the northern fence lizard and are eagerly sought. When beetles are unavailable, the lizard turns to other insects, spiders and even snails when it can locate them. Water is taken by the lizard from small deposits on rocks or droplets found on the leaves of nearby plants.

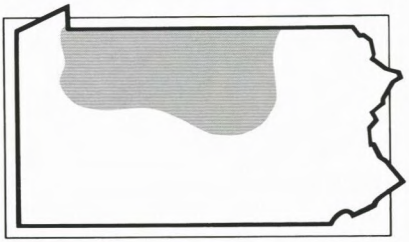
# Northern Coal Skink

*Eumeces anthracinus anthracinus*

***General characteristics.*** A member of a single, very large family of skinks, the northern coal skink is difficult to distinguish from others of its genus. The coal skink does most of its foraging during daylight hours, as do other skinks. Adult sizes range from five to seven inches.

***Identification.*** The body of the northern coal skink is brown. Two pairs of light stripes, each enclosing a dark band, extend from the neck onto the tail. There are no light lines on the head of the coal skink, which helps distinguish this skink from the two others found in the state. The breeding male might have a reddish head. The young have a blue tail, but otherwise are marked identically to the parents.

Figure V-6 *Its bluish tail marks this northern coal skink as a juvenile.*



***Range.*** In Pennsylvania, the northern coal skink is known from the northcentral, a portion of the northwest, and one southwestern county. Its population is scattered and does not occur in large numbers anywhere in its range. It is also found in portions of New York, the Virginias and Kentucky.

***Habitat.*** It prefers damp, moist woods, especially those with an abundance of leaf matter or loose stones. Springs, with their welcome supply of cool water, are favorite spots. Even so, this animal often occupies drier, more rocky open areas. When frightened, the coal skink quickly dives into water where it finds shelter beneath a convenient rock.

***Reproduction.*** The northern coal skink mates in the spring to early summer. The female, which guards the eggs, deposits eight or nine of them in a small, protected depression in the ground. This usually occurs in June. They hatch after an incubation period of four to five weeks.

***Food.*** Following the pattern of other skinks, the northern coal skink is insectivorous. It rummages among leaf litter and small stones in search of a variety of insects.

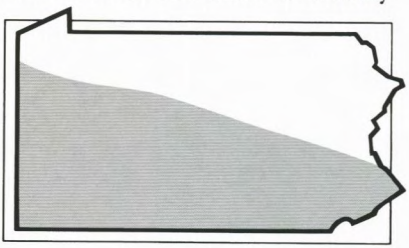
# Five-lined Skink

*Eumeces fasciatus*

***General characteristics.*** The five-lined skink is another of the state's smooth, shiny lizards. It is most comfortable in a temperature range of 78 to 85 degrees. These temperatures suit Pennsylvania's lizards and they are most active in this range. Like other skinks, the five-lined skink is diurnal and spends much of the day in search of food. It reaches an adult size that varies from five to just over seven inches.

***Identification.*** This skink is brown to black with five broad, light stripes running the length of the body. In some adults, the pattern nearly fades completely with age. As the ground color becomes lighter, the stripes be-

come darker. The tail of the juvenile is bright blue, turning gray as the skink grows older. During the breeding season, the head of the male is usually swollen and turns red-orange.



***Range.*** This skink is found from New England to Florida and west to Wisconsin and Texas. The five-lined skink inhabits about two-thirds of the state, generally south of a line drawn from Crawford County in the west to Bucks County in the east.

***Habitat.*** It occasionally is seen in gardens or around homes, especially in damp areas, but it prefers humid woodlands. Decaying matter, abundant in most forests and even small woodlots, attracts the five-lined skink.

***Reproduction.*** Warming temperatures in April and May signal the start of the breeding season. A clutch of four to 15 eggs is deposited in a nest, which is usually a small excavation in the damp earth. The female guards the eggs until they hatch in July to September. The young skinks measure two inches when they break out of their shells.

***Food.*** Although considered terrestrial, the five-lined skink will climb a decayed snag in its forest home where it knows insects can be found in abundance. It consumes insect larvae, spiders, crustaceans, worms and even small mice, a diet perhaps more varied than that of some other skinks.

Figure V-7

*Allowed to stand, woodland snags can be a food source and refuge to the five-lined skink as they are to many animals and birds.*

# Broadhead Skink

*Eumeces laticeps*
***Candidate Species***

***General characteristics.*** The broadhead skink is the largest of three skinks that inhabit Pennsylvania. Adult sizes range from just over six inches to a bit more than 12 inches, including the tail. The minimum length of an adult broadhead is barely less than the maximum size attained by Pennsylvania's other skinks. The broadhead skink is most active during the day, similar to others of the family. It has been placed on Pennsylvania's List of Candidate Species.

***Identification.*** The outstanding characteristic of this skink is its head. On the male, it is large and gives the impression of having swollen cheeks. The body of this reptile is brown to olive-brown and the breeding males are striking with their orange-red heads. There may be five light stripes down the body of both sexes during their early adult life, but these usually fade with age to become indistinguishable in the fully adult male. The juveniles are black with a bright blue tail. Five to seven brilliant yellow stripes are quite evident on the young, but patterns and colors fade with age and length.

***Range.*** Pennsylvania is on the extreme northern limit of this reptile's range. It is found only in the southeast corner of the state, and extends to central Florida. It ranges as far west as Kansas.

***Habitat.*** Largely a woodland creature, the broadhead skink is the most arboreal of the state's skinks. It likes moist woods but also resides in open areas that provide adequate protection in the form of vegetative debris or other matter.

***Reproduction.*** The broadhead skink seeks its mate during April or May. In May until July, the female deposits six to 16 eggs, usually in a small depression excavated beneath logs or leaves on the forest floor. The eggs hatch in June to August, after having been tended carefully by the female.

***Food.*** Insects make up the major portion of the diet. A good climber, this skink hunts high in the trees in search of a meal, where it might also take advantage of cavities or small holes for temporary protection from unexpected cool temperatures.

*Figure VI-5*

*Figure VI-1*

Figure VI-3

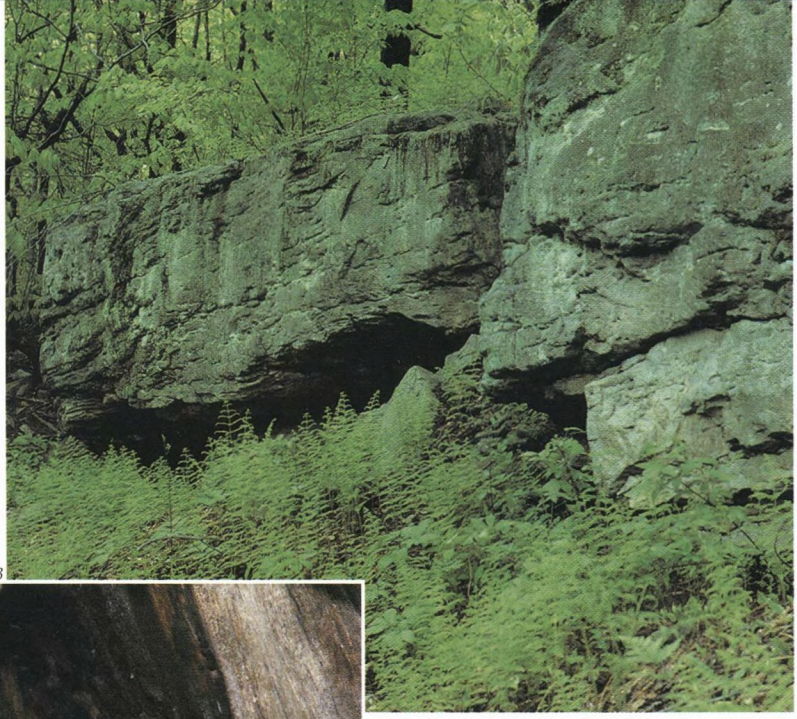


Figure VI-2

## *Chapter VI*

# SNAKES

*Order Squamata*
*Suborder Serpentes*

Figure VI-4

*Figure VI-1, A yellow stripe accents the lower sides of the queen snake.*
*Figure VI-2, By the time ferns cover the forest floor, the timber rattlesnake has left this winter den for more open areas.*
*Figure VI-3, A timber rattlesnake peers from the shelter of a burned out stump on a warm autumn day.*
*Figure VI-4, The eastern smooth green snake can easily become lost among tall grasses.*
*Figure VI-5,The northern ringneck snake wears a golden or yellowish necklace around its neck.*

# Chapter VI—The Snakes

Mention the word "snake," and many people cringe, shudder, scream, run or all of the above. Snakes could be the most maligned, misunderstood, feared and hated animals known to man. Almost from the beginning of mankind (engravings of snakes were found on crafted antlers dating back to 8,000 B.C. to 15,000 B.C.), snakes have been a source of mystery, myth, folklore, fascination and fear. From the ancient story of Adam and Eve in the Garden of Eden to the present day, snakes have been considered fascinating—but a doer of dirty deeds. To ancient Hebrews, these serpents were the personification of evil, and early biblical references portrayed snakes as the sin-offering Satan.

Still, snakes have been popular symbols for countless centuries. The ancient Greeks believed that snakes had supernatural healing power, and even today the medical profession is symbolized by two snakes coiled around a winged staff. Called a Caduceus, the snake-encrusted staff originally was carried as a symbol of authority by Mercury, the messenger god of Roman mythology.

The elaborate headdresses worn by the pharaohs of Egypt were embedded with the likeness of snakes. The ancient rulers were convinced that snakes were a source of power and protection from harm.

Even colonists in the early days of this nation emblazoned a rattlesnake on their first flag and on several others afterward. With the words "Don't Tread On Me," the rattlesnake (with 13 rattle segments, one for each colony) graphically and boldly portrayed the determination of a fledgling country to become independent. In a letter that appeared in *Bradford's Journal* of December 27, 1775, it was written that "ancients regarded the serpent as an emblem of wisdom, and . . . of endless duration." It went on to note that "the rattlesnake is found in no other quarter of the globe than America, and it may therefore have been chosen on that account to represent . . . the Revolutionary armies."

Regardless, many people continue to regard snakes only as a menace and a symbol of repulsiveness and evil. There are some who believe that the fear and hatred most people feel toward snakes is not inherent, but is taught, handed down from generation to generation. True, some date back to ancient biblical references. But what young Cub Scout, about to leave for his first-ever outing, hasn't been admonished by mother as he goes out the door, "watch out for snakes." And even as we get older, one angler might caution another about to embark on a fishing trip into a not-so-remote wilderness area to "be careful of the snakes in there." We're faced, it seems, with constant reinforcement that snakes—all snakes—are something to be feared.

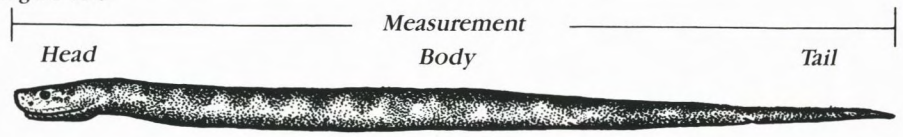
Through a better understanding of these reptiles, fears can be overcome, mysteries unraveled and hatred diminished. Armed with more knowledge, all of us can respect these animals for the important part they play in helping keep nature in check. There's no question that care should be exercised when in the presence of poisonous snakes—they can be harmful. But given their due respect and the understanding that their venom sometimes is used as a means of defending themselves and in obtaining prey, even these snakes in most cases can be left to go their own way. They, like all animals, should be allowed to fulfill the mission nature intended for them as an integral component within a complex ecosystem.

There are some 2,700 snakes known in the world today. Snakes inhabit

all the continents except Antarctica. There are 11 families of snakes in all, five of which have representative species in the United States. In Pennsylvania, two families appear, with 16 genera accounting for 21 species; only three of these are poisonous.

Ancestors of today's snakes apparently evolved from lizards. It's believed lizards went underground where they escaped the huge appetites of the dinosaurs. Though safe from monstrous predators, over eons of time these lizards lost their limbs, hearing and to some degree their eyesight. Perhaps confined to close quarters, snouts became narrower and that meant smaller, non-chewing teeth. As they became more slender, internal organs also underwent changes resulting in a less efficient heart and the loss of one lung. The result of these changes, which occurred over countless years, is the snake much as we know it today.

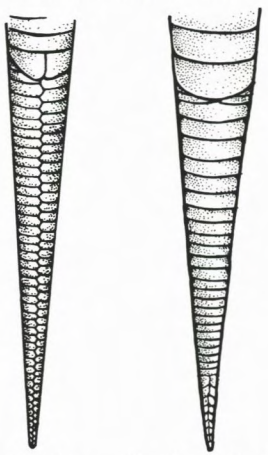
Figure VI-6




Snakes are generally described as long and slender (See Figure VI-6), perhaps elongated is a better term, and without limbs (although some species still have hidden vestiges of legs not completely lost during their evolution from lizards). Snakes do not have movable eyelids and there are no external ear openings. Their bodies are covered with scales that differ somewhat between species. Some scales are smooth (completely flat) while others have a ridge that extends down the center of the scale and are said to be keeled (See Figure I-10). The scales are dry and help prevent dehydration. They also aid in protecting the snake from physical injury. The type of scales, whether they are smooth or keeled, can help sort out one snake from another. The anal plate, a scale located near the vent, may be divided into two segments or appear as a single scale. This, too, can help identify certain snakes (See Figure VI-7). The scales on the underside of the tail help distinguish our pit vipers, which have a single row of scales, from our non-poisonous snakes which have two rows of scales (See Figure VI-7).

Figure VI-7

*Underside of Snake Tail*



*Divided anal plate*
*Scales in two rows*

*Single anal plate*
*Scales in one row*

Snakes have a highly developed sense of balance, a trait especially helpful to those snakes considered arboreal. While some may spend a majority of their time in trees, other terrestrial species seldom, if ever, leave the ground. Still others are considered at least semi-aquatic and spend a certain amount of time in the water. Some of these reptiles are nocturnal. Others are considered diurnal and crawl about during the day. All are carnivorous and swallow their prey whole.

Snakes do not feed on plants or plant parts, so grains, seeds, vegetables and so forth are never touched.

Snakes may mate anytime from spring to fall. The male locates the female by scent, and during breeding fertilization is accomplished internally.

Among our snakes, egg laying is probably the most common means of reproduction, although some species retain the eggs or young snakes inside the body during the embryo stage. In this case the snakes are born alive (See Figure VI-8).

Figure VI-8
*A young black racer gets its first look at the outside world.*

There are several advantages to keeping the young inside the mother during the development stage. Protection from predators is better ensured and atmospheric fluctuations that could cause eggs to dehydrate or rot are minimized. Development is also enhanced because the mother can better regulate the temperature of the embryo by avoiding extremes of heat or cold, moving from one area to another as necessary to ensure proper and speedy growth of the expected progeny. The eggs, which remain inside the female, lack a calcified shell and in fact are more a sac-like membrane.

In most cases after the young are born, or the eggs are laid, the parent snake departs immediately and the juveniles are left to fend for themselves. Fortunately, young snakes are self-sufficient from the very beginning and can manage quite well without their parents. In some cases, a quantity of unused egg yolk may remain in the body. Thus, the young snake has an internal source of nourishment to carry it over until it is able to forage for itself.

Some snakes, usually the smaller species, feed on worms, insects and other small prey. Larger snakes feed on rodents, fish, frogs, birds and a variety of mammals. Different species of snakes employ different methods in obtaining and swallowing food. The smaller snakes simply grab the prey with their teeth and swallow it live. Others snatch their prey with their teeth and constrict it until it dies from suffocation. Still others have adapted poisons to kill their prey before eating it.

All snakes have numerous teeth, but in most cases they are designed only for grasping and holding. The teeth have not been developed for chewing, so the snake is unable to carve its food into bite-sized pieces before eating it. Thus, it is forced to swallow its prey whole. This process has fascinated people for ages because the prey sometimes exceeds the diameter of the snake. But again, nature has constructed a jaw that permits this reptile to engulf prey many times larger than itself.

The lower jaw is not solidly fused in front but is held together instead by an elastic ligament that allows the jaw to part. This jaw is only loosely connected to the skull. The upper jaw is immovable, but the bones to which the upper teeth are attached can be moved slightly. With the prey held firmly in the mouth by many sharp, rear-pointed teeth, either side of the lower jaw can be loosened, which enables the head to move forward, up and around the prey, a small step at a time. The mouth now opens in a wide gape, each side works alternately and independently of the other and by so doing pulls or "walks" the food into the mouth (See Figure VI-9). As the food is forced into the back of the mouth, the throat expands because of a

loose assemblage of head bones, and the food enters the throat. At this point, powerful muscles work the food into the stomach where strong digestive juices take over, even to the extent of absorbing bones. The skin is extremely elastic, and when distended, allows prey to be taken into the stomach where a large bulge shows that the snake has just enjoyed a meal. A movable windpipe, which extends from the throat to the end of the lower jaw, permits the snake to swallow large prey and breathe at the same time.

Figure VI-9
*A specially adapted jaw allows snakes to swallow their prey without chewing.*

A snake's skin does not grow as the body matures and becomes larger. Therefore, the skin must be shed, a process called ecdysis. Snakes may shed for the first time only a few days after being born or hatched. As they age, shedding may occur from four to six times a year at first, slowing to only once or twice a year after they reach maturity.

As the shedding process begins, the snake's general coloration becomes dull and the eyes become cloudy as a molting fluid fills the space between the old and the new skin. This may occur 10 days to three weeks before the actual shedding takes place, and the snake may be partially blind during a portion of this process. As the skin becomes slack, it is first worked loose at the chin and snout as the snake rubs against a solid object. With the skin on the head loosened, muscular contractions take over and the snake slips out of the skin, turning it "inside out" in the process.

Snakes have no eardrums or external ear openings. They apparently were lost during the evolutionary process. Even though they are unable to hear as can most other animals by sensing air-borne vibrations, snakes are sensitive to contact vibrations and in that sense have a well-developed sense of "hearing." A bone called the columella, transmits vibrations from the lower jaw into the inner ear embedded in the side of the skull. It's an effective method. Approaching footsteps are easily detected and the snake often escapes long before it might be seen by the approaching intruder.

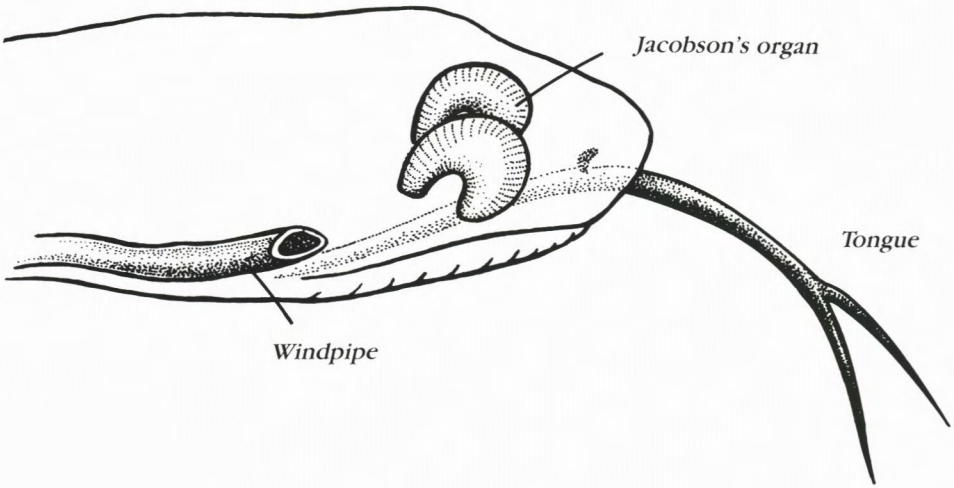
Several snake myths and folklore have been fabricated on the "unblinking stare" of these serpents, that their steady gaze has caused their prey—and perhaps even humans—to become hypnotized. Although snakes do not hypnotize, it is true that they do not blink. They can't blink. They are not equipped with movable eyelids. Instead, the cornea is covered and protected by a transparent eyecap that actually is a fixed, circular scale shed and renewed along with the rest of the skin and scale covering. This eyecap, called the brille, is an important protective device and prevents injury when the snake burrows, swims through the water or slithers quickly through dense vegetation.

Although its eyesight is keen and sensitive to movement over a wide range, distant vision is not so well-defined because it lacks a refined method of focusing.

The tongue seen darting quickly in and out of the mouths of snakes also has been a source of myth and tall tales. It is not a needle-like projection and cannot be used to penetrate the skin of prey, a nearby foe or humans. It is not capable of injecting venom or any other toxic substance. It is, in fact, harmless.

Figure VI-10

*Jacobson's Organ and Tongue*




The tongue is moist and quite delicate, and it's an important part of an extremely sensitive system used for tasting and smelling. (Some lizards and salamanders have similar systems.) Though the snake's sense of taste is not highly developed, the ability to smell (although perhaps not in the same sense as humans) is excellent.

The tongue is forked and can dart in and out of the mouth through a notch in the upper jaw even when the mouth is closed. When extended, the tongue picks up microscopic particles from the air and brings them into the mouth. Here, the double-tipped tongue quickly places the samples into two small cavities embedded in the palate at the rear of the mouth. The cavities lead to a chemical receptor called the Jacobson's organ (See Figure VI-10). The Jacobson's organ contains sensory cells able to identify chemical particles and transmits these sensations of taste-smell to the brain.

When not collecting chemical information, the tongue is withdrawn into a narrow sheath on the floor of the mouth located just in front of the breathing tube. When disturbed or in some other way its interest is aroused, the snake's tongue moves rapidly and frequently between the Jacobson's organ and the air outside. With this well-developed sense of "smell" the snake detects the presence of enemies, finds food and locates its mate.

# How Does a Snake Get from Here to There?

In spite of having lost its limbs as it developed over millions of years, the snake as we know it today in Pennsylvania is able to move about efficiently and when needed, quickly. Several methods or a combination of means can be used.

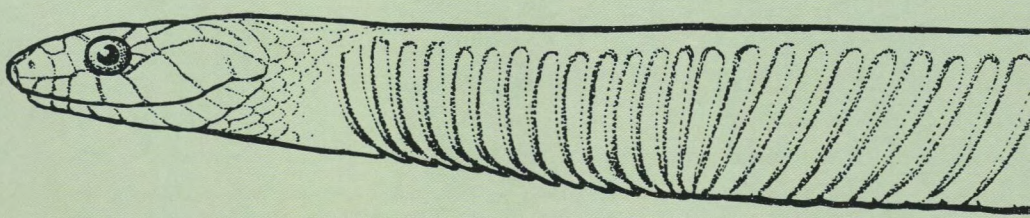
The most important body structure allowing snakes to be as mobile as they are, is the very large number of vertebrae in the spine, or backbone. Counted in the hundreds, each vertebra is attached to a pair of ribs curving downward and around the body. The ribs in turn are attached with muscle to large scales, or scutes, on the belly. These scales and the ribs are important if a snake is to be able to move quickly and effectively through its surroundings.

When not in any hurry, a snake uses a caterpillar-like movement called rectilinear locomotion (See Figure VI-11a). This method of locomotion allows the snake to move in a straight line. To do so, the scutes (those belly scales) move in groups, alternately gripping and advancing; not all the scales on the belly move at the same time or in unison. Instead, several scutes in a group grip the surface over which the snake is moving and push forward, while the next group of scales is picked up slightly and moved forward. The second group of scales then grips the surface as a third group advances to be laid down in preparation to provide the grip, and so on. The effect is similar to the familiar method used by a caterpillar.

When the snake needs to move more rapidly, it uses another, more effective method, called serpentine locomotion. In this case, a series of writhing undulations is used in which the sides of the body are pushed against some solid object such as a tree, stone or even the rough surface of the ground. The unmoving objects provide a hold or push-point for each rib as it passes (See Figure VI-11b). As the snake moves, it alternately contracts and relaxes the muscles attached to the vertebrae, first one side, then the other. The result is a bending of the body into a series of S-curves (See Figure VI-12), providing pressure points on the back side of each body curve. As the curved body pushes against the stable object, the snake is propelled forward in a wavelike motion. It is thought that the scutes are also used to help pull the body forward while gripping the surface.

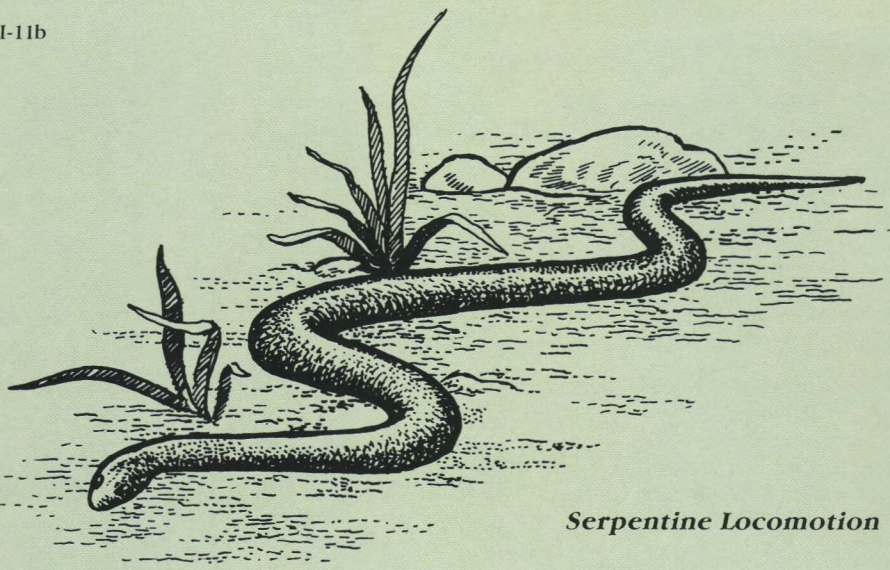
By using either the rectilinear or serpentine method of locomotion—or a combination of the two—snakes can negotiate nearly any surface and move about almost anywhere.

Figure VI-11a



***Rectilinear Locomotion***

Figure VI-11b



***Serpentine Locomotion***

Figure VI-12

*Snakes use pressure points at the rear of each body curve to propel themselves forward.*

The liquid movement of snakes has been a source of wonder and amazement for many people over countless years. To become mobile, snakes have developed a specialized and effective bone-muscle-scale construction.

One of the most important elements in the enhancement of this reptile's locomotion was the growth of a large number of very small vertebrae. Some species have as many as 400 of these miniature spinal bones, which allow the snake's fluid movement and flexibility. Except for the tail, these vertebrae have a pair of ribs attached to them. Muscles in turn connect the ribs to large belly scales, called scutes. The scutes are able to grip the surface over which the snake is moving, enabling it to travel over a variety of terrain and climb trees.

The ribs and scutes do not all move together as the snake propels itself forward. As scales on one part of the belly move forward, others are just beginning to move backward, to be picked up and placed in a forward position once more. The scales, as they move back and forth, grip the surface and produce a caterpillar-like movement, pulling the snake along at a leisurely pace with the body in a straight line. The pace is silent and slow, ideal for stalking prey.

However, when the snake is disturbed or wants to move quickly it uses a series of undulations in an accordian-like form of locomotion. By drawing the body into several S-curves, successive sides of the body are pushed against solid objects such as rocks, plants or the rough ground. This serpentine effect is produced with alternate contractions and relaxations of the muscles on each side of the body. Relaxing the muscles and ribs attached to one side of the vertebrae while contracting the opposite allows the body to flex or bend. This S-shaped wriggling continues in a wave-like pattern as the curves alternately form and straighten out. This "curve-push-straighten-out" series of movements can be performed rapidly and it quickly propels the reptile forward.

## Colubrid snakes (Family Colubridae)

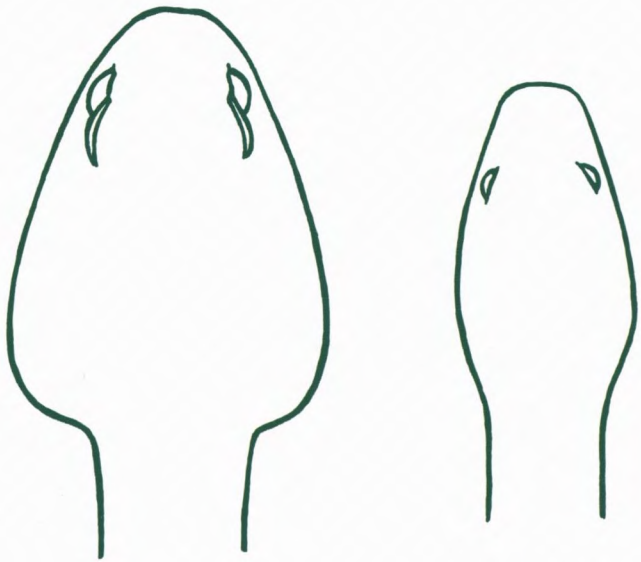
**Eastern worm snake**—*Carphophis amoenus amoenus*
**Kirtland's snake**—*Clonophis Kirtlandii*
**Northern black racer**—*Coluber constrictor constrictor*
**Northern ringneck snake**—*Diadophis punctatus edwardsii*
**Eastern ratsnake**—*Pantherophis alleghaniensis*
**Eastern hognose snake**—*Heterodon platyrhinos*
**Eastern kingsnake**—*Lampropeltis getulus getulus*
**Eastern milksnake**—*Lampropeltis triangulum triangulum*
**Northern water snake**—*Nerodia sipedon sipedon*
**Rough green snake**—*Opheodrys aestivus*
**Eastern smooth green snake**—*Opheodrys vernalis vernalis*
**Queen snake**—*Regina septimvittata*
**Northern brown snake**—*Storeria dekayi dekayi*
**Northern redbelly snake**—*Storeria occipitomaculata occipitomaculata*

**Shorthead garter snake**—*Thamnophis brachystoma*
**Eastern ribbon snake**—*Thamnophis sauritus*
**Eastern garter snake**—*Thamnophis sirtalis sirtalis*
**Earth snake**—*Virginia valeriae*

The colubrid family is the largest of all the snake families and contains all of Pennsylvania's non-poisonous species. Three-fourths of the world's 2,700 snakes belong to this family. There are 18 species from this family in Pennsylvania, representing 13 genera. The colubrid family includes arboreal snakes, and others that seldom, if ever, leave the ground. The state's water snakes are also included in this family.

Figure VI-13

*Shape of Heads of Pennsylvania's Snakes*



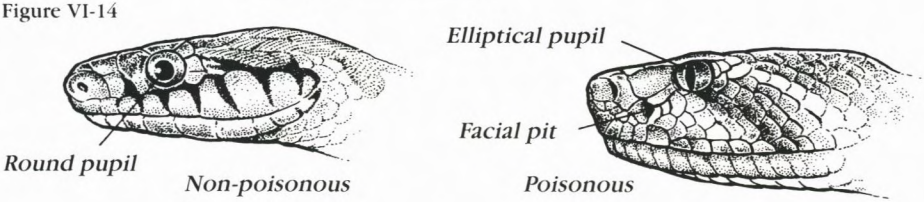
*Poisonous* *Non-poisonous*

Generally, these snakes all have a head that is tubular to somewhat flattened. The head is normally as wide as the neck (See Figure VI-13), perhaps a bit more so in some species. The pupils of the eyes are round in Pennsylvania species (See Figure VI-14). The head is covered with large scales arranged in a regular pattern. The scales across the back may be either smooth or keeled and can help in identifying several of the species (See Figure I-10). There are two rows of scales on the underside of the tail (See Figure VI-7). There are teeth on the upper and lower jaws, but these snakes do not have the enlarged hollow fangs common to the poisonous varieties.

The colubrid snakes feed on a variety of vertebrate and invertebrate animals. They devour their prey whole. No vegetation is used in the diet of these snakes.

*Facial Pit and Pupils of the Eyes of Pennsylvania's Snakes*

Figure VI-14




# Pit Vipers (Family Viperidae; subfamily Crotalinae)

**Copperhead—*Agkistrodon contortrix***
**Timber rattlesnake—*Crotalus horridus***
**Eastern massagauga—*Sistrurus catenatus catenatus***

Pennsylvania has three poisonous snakes. All are members of the pit viper subfamily Crotalinae of the family Viperidae and all its species are poisonous. Most are stout-bodied snakes with a head that is well-defined from the neck (See Figure VI-13). Their pupils are vertically elliptical, shaped like a cat's pupil (See Figure VI-14). Most members of this family are nocturnal and bear live young. They are considered the most advanced of the snakes.

These snakes are equipped with long, hollow fangs that actually are modified teeth located near the front of the upper jaw. Their normal position is folded back along the jaw where they connect to a movable bone but swing forward rapidly when the mouth is opened in preparation to strike. Except for its tip, each fang is encased in a fleshy sheath. While only one set of functional fangs is in place, several others may be in various stages of development with replacement occurring every few weeks.

Each of these large, hollow teeth is connected by a duct running from the base of the fang to a gland located on the side of the head, behind the inner ear (See Figure VI-15). The snake usually strikes from a defensive S-curve posture. It is lightning-quick as the body straightens. The snake can strike a distance of about one-third to one-half its body length. Young snakes can strike, inflict a wound and inject venom as soon as they are born. The venom of Pennsylvania's poisonous snakes is a complex mixture of proteins primarily affecting elements of the circulatory system. Tissues are destroyed by the venom and the blood's ability to clot properly is affected. Victims also find that the body's ability to fight off infection is lowered. The venom may also contain some neurotoxin, thus potentially inflicting damage to the nervous system.

*Pit Viper Head*

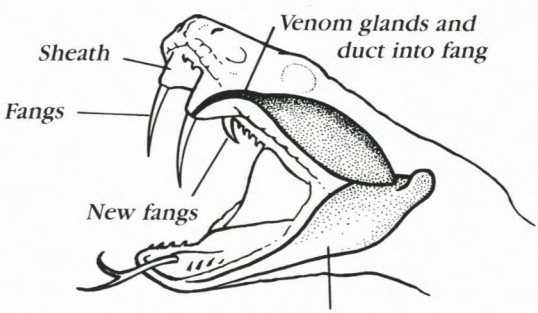



Figure VI-15

Prompt medical treatment should be sought in the event of a bite. However, these snakes are able to withhold the venom if they desire, even

though the fangs may have been used to inflict a bite. So-called "dry strikes" are known to occur.

Pennsylvania's three poisonous species are pit vipers, so named for the deep pit located on each side of the head between the eye and the nostril (See Figure VI-14). These depressions are heat-sensitive organs able to respond to very small changes in temperature. Always alert, the organs respond to the amount of heat reaching them and help the snake detect the existence and locate the direction of a warm body. It is especially helpful at night when lying in wait for prey, because it allows the snake to locate warmblooded prey in complete darkness. Using this heat receptor, the snake locates prey that comes its way and strikes with great accuracy.

Like other snakes, pit vipers must shed their skin as they grow. In the case of the rattlesnakes, this also means adding a new segment to the rattle. A new segment is added each time the skin is shed, which could occur several times a year depending on the age of the snake. Thus, counting the number of segments on the rattle does not reveal the true age of the snake. A newborn rattlesnake has a pre-button on the end of its blunted tail. The first button is not gained until the young rattlesnake sheds its skin for the first time. The scales on the underside of the tail are in a single row (See Figure VI-7).

These snakes, like the others, are carnivorous and must consume their prey in a single piece.

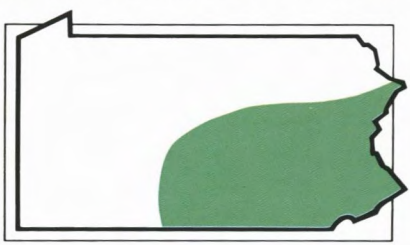
# Species Descriptions

## Eastern Worm Snake

*Carphophis amoenus amoenus*

***General characteristics.*** It's easy to understand how the eastern worm snake got its name. It resembles an earthworm and isn't much larger when you consider that adults reach only seven to 11 inches. It is one of the smallest snakes in Pennsylvania. The worm snake is a secretive animal, rarely seen in the open. If you wanted to locate a worm snake, you would have to do some serious searching.

***Identification.*** This snake is tiny and glossy in appearance. Except for the belly, which is a bright reddish pink, the eastern worm snake is brown and unpatterned over its entire body. The head is blunt and rounded and the tail is short with a sharp tip. The scales of the eastern worm snake are smooth and contained in 13 rows. The anal plate is divided.



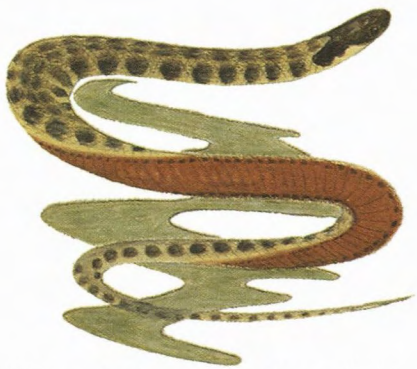
***Range.*** Range. This small reptile ranges from lower New England to South Carolina and Alabama. The known distribu-

tion of the eastern worm snake in Pennsylvania is limited to the southeast quadrant, covering about one-fourth of the state. It has not been confirmed as inhabiting areas north of the lower Poconos nor west of the Allegheny Mountains.

***Habitat.*** Damp, often hilly woodlands are home to the eastern worm snake. It is partial to wooded or grassy hills above streams or moist ground. The eastern worm snake takes temporary shelter under rocks and decaying logs or retreats into the loose soil of its environment. During dry spells and during periods of cold weather, the eastern worm snake burrows deep into the soil.

***Reproduction.*** The tiny eastern worm snake mates during April and May, depositing one to eight eggs in June or July. Elongated and thin-shelled, the eggs measure less than an inch. The eggs hatch in seven weeks and the emerging young eastern worm snakes are three or four inches long. Darker than the adults, they mature in three years.

***Food.*** The eastern worm snake feeds on worms and soft-bodied insects. Its habitat normally produces sufficient food of the type preferred, so it feeds well before going into winter hibernation. Not without problems, however, the eastern worm snake is in turn preyed on by the milk snake.



# Kirtland's Snake

*Clonophis kirtlandii*

***General characteristics.*** This snake is one of three water snakes in Pennsylvania, but it is found only in limited numbers and considered very rare. It was named for Jared P. Kirtland, an Ohio physician/naturalist. It is the smallest of the state's water snakes, attaining adult sizes of 14 to 18 inches. Kirtland's snake reacts in much the same manner as other water snakes when alarmed, except its reaction is more pronounced. When frightened, the defense mechanism is suddenly and swiftly to flatten their bodies to the ground. Kirtland's ability to perform this feat is more developed than other water snakes, becoming almost ribbon-like in the process.

***Identification.*** Kirtland's snake is a slender reptile with background colors ranging from brown to reddish brown or gray. The back is accented with two rows of alternating dark, squarish spots that run the length of the body. The belly is reddish and bordered along each side with a line of round, black spots. The latter is a good identifying characteristic, helping sort this snake from others that might have similar markings or reddish underparts. The scales are keeled and the anal plate is divided.

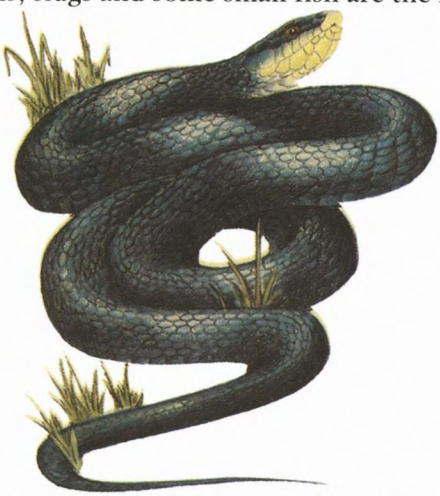
***Range.*** In Pennsylvania, Kirtland's snake is limited to the western portion of the state, roughly following the western slope of the Allegheny Mountains. From here it ranges west through Ohio into Michigan and Illinois and

south to Kentucky. It does not extend into Erie County. It is an Endangered Species of special concern.

***Habitat.*** Unlike many water snakes that thrive in or close to a near-total aquatic environment, this water snake prefers to remain near marshy meadows, swamps or woodland ponds. It would not be unusual to find it tucked under a piece of sandstone or other flat stone in a marshy meadow. Although it swims well, Kirtland's snake is the least aquatic of the water snakes.

***Reproduction.*** Young are born in early August to late September. It does not lay eggs, giving birth instead to live young measuring five to 6½ inches long. The size of the litter varies from four to 22. When born, the belly is a deep red, becoming somewhat subdued as the snake matures.

***Food.*** The diet of Kirtland's snake is limited to what it can find in watery or at least moist surroundings. Worms, slugs and some small fish are the main staples.



# Northern Black Racer

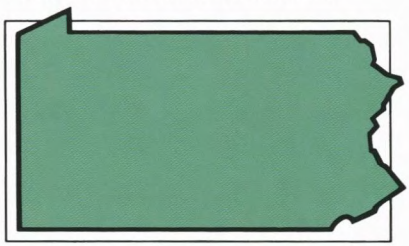
*Coluber constrictor constrictor*

***General characteristics.*** The northern black racer is often referred to as the "black snake" and is second only to the black rat snake in size. It can attain an adult size measuring three to five feet in length. The northern black racer is diurnal, which means that it is most active during the day.

In spite of its scientific name, the black racer is not a constrictor. In fact, it is among several species of snakes considered non-constricting. If picked up, however, it does have a tendency to bite, sometimes repeatedly, and is apt to thrash about violently. The unusual habit of rapidly vibrating its tail against dry leaves has probably startled a hiker or two. One's first reaction to the buzzing sound produced as the tail strikes the crisp surface of the leaves is "rattlesnake." If nothing else, this false alarm heightens the senses of the trail walker. Although usually quick to flee, the black racer can become a fierce fighter when cornered or somehow made to feel trapped. Left to itself, it is harmless.

***Identification.*** The black racer grows to become quite long but retains a slender appearance. It is fast, able to cover a lot of ground in a short time,

and it is an agile climber. The northern black racer is slate black above and below, with an almost satiny luster. There is usually a small patch of white on the chin and throat. When born, the young racer is gray and marked with dark spots on the sides and with dark gray, brown or reddish-brown blotches streaming down the middle of the back. This pattern becomes less distinct as the snake grows, and by its third summer it has taken on the shiny single color of the adult. By then it is probably 30 inches long. The scales on the northern black racer are smooth and can be compared to the keeled scales of the black rat snake. The anal plate is divided. The head is narrow and the eyes show the yellow lens common to diurnal snakes.



***Range.*** This long reptile can be found from Maine to Georgia and Alabama. It extends as far west as Tennessee. The northern black racer is a fairly common snake and is distributed statewide in Pennsylvania.

***Habitat.*** This snake is at home in a variety of habitats. It can be found in abandoned fields, grassland, open woods or on wooded hills strewn with rocks. Anglers might see it moving silently along the grassy banks of a stream. The racer spends most of its time on the ground, but it is a good climber, retreating to the branches of a serviceberry or other small tree or shrub. Open areas that are fairly dry appeal to the black racer when it is time to bask in the sun. Dens for hibernating often are found on a rocky hillside and sometimes are shared with other species of snakes.

***Reproduction.*** The northern black racer begins looking for a mate in April to late May, and by mid-June to August the female deposits from five to nearly 30 eggs in a rotting tree stump or sawdust pile. Sometimes the female might find a tunnel burrowed into the soil by a groundhog or other mammal in which to lay her eggs. The eggs are white and leathery to the touch with a rough, granular texture. They are elongated and one to two inches long. The juveniles emerge in six to nine weeks and are eight to 13 inches long, about one-quarter-inch in diameter.

***Food.*** When hunting, the black racer moves swiftly through the grasses, its head elevated above the rest of the body. It hunts down and consumes large insects, lizards, small rodents, other mammals and even other snakes. When possible, the racer preys on birds and their eggs (the ground-nesting killdeer could easily be a potential target) and occasionally takes frogs and salamanders to alter its diet, or perhaps as a last resort to finding a meal.

Figure VI-16

*Though only temporarily abandoned, these killdeer eggs could be easy prey for the swift-moving black racer.*

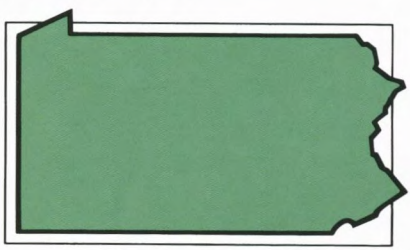
# Northern Ringneck Snake

*Diadophis punctatus edwardsii*

***General characteristics.*** The northern ringneck snake is a secretive animal, not often seen even by persons who spend a great deal of time outdoors. It usually moves about after dark, making it even less likely to be observed. This relatively small snake is harmless, although it can emit a pungent, unpleasant-smelling musk that may help repel an attacker.

***Identification.*** The ringneck snake in Pennsylvania reaches adult sizes of 10 to 24 inches while maintaining a slender build. Its distinguishing characteristic is the golden or yellowish ring that encircles the neck. The back and sides are usually gray, but at times can be black or even brownish. The belly is almost always a uniform yellow, although at times it may have a center row of black dots. The anal plate is divided and the scales are smooth. The smooth scales help distinguish this snake from the juvenile northern brown snake, which also has a collar but which has keeled scales.

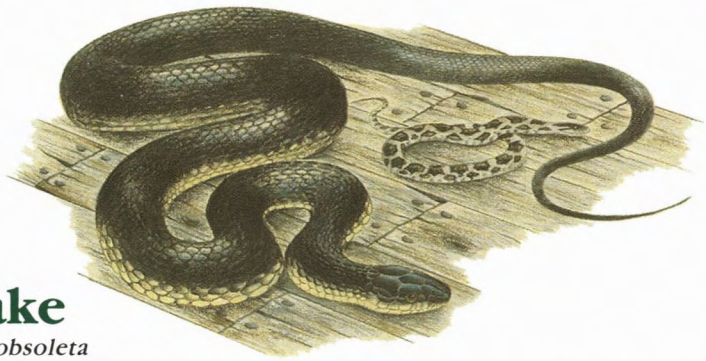
***Range.*** This reptile is found from Nova Scotia to Georgia, west to Wisconsin and down the Mississippi Valley. The northern ringneck snake is found throughout Pennsylvania and is partial to moist areas.



***Habitat.*** It is more at home in a forest than it is in grassland, and a rocky, wooded hillside could easily host this unassuming reptile. It seeks cover under flat rocks and logs or might even wriggle beneath the loose bark of a dead oak.

***Reproduction.*** The ringneck snake mates in the spring or fall. Two to six elongated white or yellowish eggs are laid in June or July, sometimes in communal nesting sites among decayed logs or rocks. Initially about one inch long, the eggs increase in size after being deposited. They hatch in about eight weeks, releasing juvenile ringneck snakes four to six inches in length. The snake matures in two to three years.

***Food.*** At mealtime, the ringneck snake partially constricts its prey before attempting to swallow it. Salamanders are an important part of its diet, but the ringneck snake also takes worms, slugs and lizards. Even newborn snakes can be targeted by a hungry ringneck snake. Insects round out a somewhat varied diet.



# Black Rat Snake

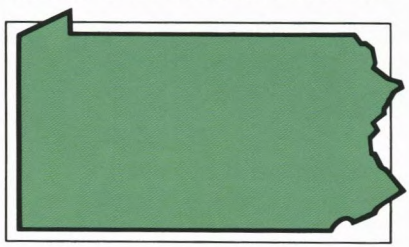
*Elaphe obsoleta obsoleta*

***General characteristics.*** This is the familiar "black snake." The black rat snake is the largest of 21 species generally recognized to be indigenous to the state. Adult lengths of 42 to 100 inches have been recorded. The black rat snake is active during the day throughout the cooler months of spring and autumn. As the long days of summer grow hotter, it becomes more nocturnal in its movements, resting in a cool retreat as daytime temperatures climb. The black rat snake is a powerful constrictor. It uses this physical strength to subdue its prey by suffocation. Musk glands located in the vent can emit a foul-smelling fluid, a defensive trait common among snakes.

***Identification.*** The black rat snake is plain, shiny black. The skin between its scales may be bluish white, yellow, red or orangish, although this coloration is not always evident. The belly of the black rat snake is an even shade of white or yellow with darker mottling of gray or brown. The belly becomes more slate gray as it approaches the tail. The chin and throat areas are a toneless white or cream. The head of the black rat snake is clearly defined in relation to the neck and body. A flattened snout seems to emphasize the head's squarish appearance. Also, the black rat snake does not have the rounded or tubular body common to most snakes. Its belly is flat, meeting the sides at an angle. If one could imagine it viewed from the end, it would resemble a loaf of bread rather than appear circular. The black rat snake has a divided anal plate. The scales are only weakly keeled.

The young black rat snake is deeply patterned down the back and onto the tail. The vivid dark-gray or brown blotches contrast strongly at first with the paler gray body tones, but as the snake grows the pattern darkens. By the time the snake approaches three feet in length (about two years old) these markings are often lost, and it has assumed the uniform black appearance of the adult black rat snake. The pattern, on close examination, can sometimes still be seen.

The black rat snake frequently is confused with the black racer, but several elements can be used to distinguish between the two. First, the head of the black racer is narrow. The black rat has a squarish head, more broad and with a flattened snout. Second, the scales of the black racer are smooth and unmarked with other colors. The scales on the middle of the back of the black rat snake are slightly keeled, and although its scales seem to be edged in bluish white or yellow, the skin between them is the lighter color.



***Range.*** The black rat snake ranges from southern New England and Ontario south to Georgia, and from Wisconsin to

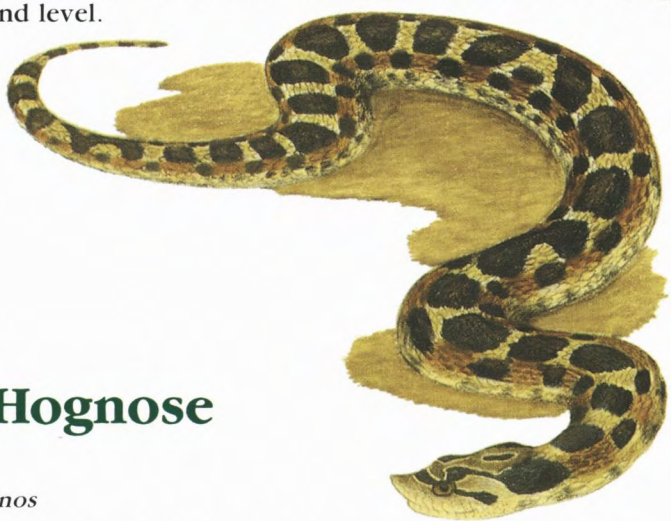
Louisiana. The entire state has some population of black rat snakes, and it is seen quite frequently.

***Habitat.*** The black rat snake occupies a variety of habitats. Anglers, hikers and farmers can expect to see one of these large snakes almost anywhere. It prefers hardwood forests, wooded valleys and hillsides, but the black rat snake might feel just as welcome in an old field, barnyard or active farmland.

Farms might be a favorite because they usually offer a good supply of mice and other small mammals. The black rat snake is an excellent climber and uses small angles protruding from the belly scales to grip the rough bark of a tree. This ability allows easy access to the hollow cavity of an old tree and possible relief from unbearably hot summer temperatures. As winter approaches, the black rat snake seeks shelter underground, sometimes denning with rattlesnakes or copperheads.

***Reproduction.*** The black rat snake locates a suitable mate and breeds in April to June or sometimes not until autumn. By June through August five to 30 eggs are left by the female in decayed logs, piles of leaf litter or under an amply sized rock. The eggs are smooth-shelled and leathery when deposited. They are covered with a moist, glue-like substance that hardens and adheres to the eggs as it dries, becoming slightly yellowish in the process. This causes the eggs themselves to become glued together. The eggs are oblong and 1 1/2 to just over two inches in length. The incubation period takes seven to 15 weeks and ends with the emergence of young black rat snakes 10 to 16 inches long.

***Food.*** The black rat snake hunts on and off the ground because it is capable of climbing with little effort. The young of the species may feed on treefrogs, but also take mice and other small mammals. Birds and their eggs fall prey to the black rat snake, too, so it is evident that not all of its foraging is restricted to ground level.



# Eastern Hognose Snake

*Heterodon platyrhinos*

***General characteristics.*** The hognose snake has been pegged with several formidable-sounding nicknames: puff adder, hissing adder and spreading adder. All arise from a behavior contrived to scare off would-be attackers. When disturbed, the hognose snake widens its neck to take on a hood-like appearance (See Figure VI-17). It does this by flattening the head and neck, spreading long rib bones outward. Then, inflating the body with air, hiss-

ing and striking out, the hognose snake suddenly resembles a fearsome-looking creature, but it is harmless.

If awards in various categories were given to snakes, the eastern hognose snake would win hands down for "most dramatic performance." It alternates between playing dead and performing a series of aggressive-looking maneuvers that ultimately prove to be more of a decoy than anything else.

If approached, the hognose snake may attempt to fool the intruder by rolling over and "playing dead." A few convulsive jerks may first set the stage and then with mouth agape and tongue hanging out, the performance ends with the body frozen in place. If picked up, the snake suddenly goes limp. But returned upright to the ground it again quickly rolls over on its back, apparently forgetting it is "dead."

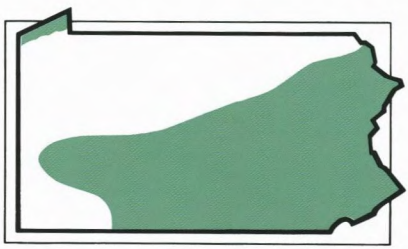
Figure VI-17

*Spreading its neck hood-like is only one ploy used by the eastern hognose snake to scare off an intruder.*

In Pennsylvania, the eastern hognose snake resides in a major portion of the state, although it is not found in abundant numbers. Adult sizes vary from 18 to 45 inches.

***Identification.*** A pointed and slightly upturned snout gives the hognose snake its name. It has a wide neck leading to a stout body. The body color varies and may be yellow, tan, brown, gray or reddish-hued. More or less square blotches appear on the back, alternating on their edges with round dark spots. Some specimens have been observed on which there are no discernible blotches. Instead, they are a uniform black, brown or greenish. The belly is yellow, light gray or pinkish and is mottled with gray or shades of green. The underside of the tail is lighter than the belly. A divided anal plate and scales that are keeled complete the description.

***Range.*** The eastern hognose snake, though limited in numbers, inhabits roughly the eastern two-thirds of the state. Its range arcs from Somerset County in the southwest to Wayne County in the northeast. It also dwells in a portion of the Lake Erie Drainage. Outside of Pennsylvania, its range extends from New England to Florida and west to Minnesota and Texas.



***Habitat.*** The hognose snake likes dry terrain, preferring open areas, thinly wooded uplands or rock-strewn hillsides. Sandy and other dry soil that is easily crumbled attracts the hognose snake, and it occasionally is seen by farmers working their cultivated fields. During the winter months, the hognose snake seeks relief by burrowing deeply into the soil.

***Reproduction.*** Mating can occur in either the spring or fall. The hognose snake lays eggs usually in June or July, but sometimes as late as August. The female deposits from six to 61 eggs in a shallow cavity of loose or sandy

soil. Leathery, white and thin-shelled when released, they are about 1¼ inches in length and elongated. The eggs swell to become more spherical while increasing in size by about one-third. They hatch in 40 to 65 days, producing youngsters of about six to nine inches in length. The hatchlings display the same markings as the adult hognose snake, but tend to be more gray than yellowish brown.

***Food.*** The eastern hognose snake is most active during the day. That's when it feeds. Toads and frogs are the mainstay of the hognose snake diet, although salamanders may be added. The young hognose snake consumes crickets and other insects.

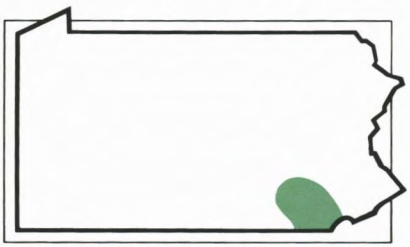
# Eastern Kingsnake

*Lampropeltis getulus getulus*

***General characteristics.*** Although it has been described as an attractive snake, the eastern kingsnake is one of the least sociable, clashing at times with other snakes. It has been known to wrap itself around copperheads and other snakes to suffocate its victims. The kingsnake is reputedly immune to the venom of pit vipers.

The kingsnake becomes nocturnal during the hottest days of summer, but otherwise it is most active during the daylight hours. It shows a particular preference for moving about in the early morning hours and again toward twilight. The kingsnake is a close relative of the more common milk snake. It is a large snake, reaching adult sizes of three to over six feet. It has been known by several other names, such as thunder snake and chain snake.

***Identification.*** Its nickname "chain snake" is descriptive of the bold yellow or white chain-like pattern that laces the body. This design contrasts sharply with the rest of the body, which is chocolate brown to shiny black. Yellow or white blotches often cover the black belly. The kingsnake's narrow head is marked with yellow-white. The neck is distinct and emphasizes the stout, cylindrical body. Smooth scales cover the body. The anal plate is single.



***Range.*** In Pennsylvania, the eastern kingsnake historically has been recorded from a very limited area, in parts of two counties in the southeast. However, no verified specimens exist from Pennsylvania, and the status of this species as a bona fide member of our snake fauna is still questionable. It is known from southern New Jersey to Florida and west to the Appalachians and southern Alabama.

***Habitat.*** The kingsnake is primarily a terrestrial creature, although it makes its way up the trunks and branches of shrubs and small trees every so often. Its preferred habitat consists of rocky, wooded hillsides, especially those

near water. It can be found within swampy areas as well. Stream banks are a favorite haunt because they often are a ready source of turtle eggs and water snakes. The kingsnake is a willing swimmer when the occasion calls for it. Logs, debris and piles of loose rocks offer hiding places for this often secretive reptile.

***Reproduction.*** Seeking and finding a mate from early spring to late June allows the female to deposit from five to more than 20 eggs sometime from June through July. The eggs are leathery and yellowish to creamy white. More or less elongated, the eggs measure 1¼ to nearly three inches long. The female coils herself around the eggs perhaps for a day or two and then departs. After incubating eight to 11 weeks, the eggs hatch to produce a miniature version of the parents. The hatchlings measure nine to 12 inches.

***Food.*** The eastern kingsnake is a strong constrictor and uses this physical power to disable its prey. Its menu consists of other snakes including copperheads and rattlesnakes. It is thought immune to the venom of the state's poisonous snakes and thus can attack these species with little apparent harm to itself. It also pursues lizards, rodents and birds and their eggs.

# Eastern Milk Snake

*Lampropeltis triangulum triangulum*

***General characteristics.*** In Pennsylvania at least, the eastern milk snake is the subject of more tales and is more often mistakenly identified than any other snake. It is among the state's most beneficial snakes, but sadly, is also the most often killed in mistake for a copperhead. Actually, there is only a superficial resemblance between these two snakes. The head of the copperhead is an easily recognized coppery color without any marks. The head of the milk snake is light with brownish marks. The belly of the copperhead is unmarked and a uniform cream or off-white. The belly of the milk snake is white with dark splotches resembling a checkerboard pattern (See Figure VI-18).

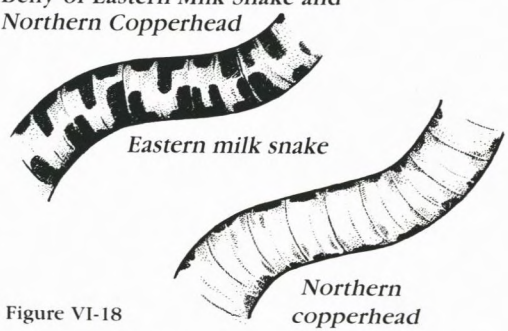



Figure VI-18

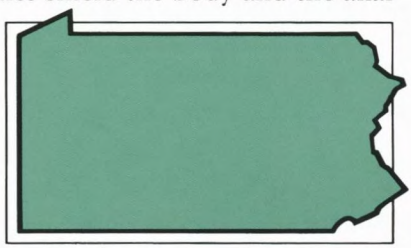
Other snakes confused with the milk snake include the northern water snake with its keeled scales, compared to the milk snake's smooth scales. The northern water snake also has a divided anal plate. The milk snake's anal plate is single. The juvenile northern black racer and black rat

snake, which unlike their adult counterparts are patterned, can be told by the anal plate. Both have divided anal plates compared to the single plate of the milk snake.

The milk snake, contrary to popular belief, does not milk cows. Thus, this alleged habit hardly contributed to its name. Rather, the name probably originated from its habit of spending a lot of time around barns, not a bad idea considering its fondness for mice.

The eastern milk snake, although considered to be more secretive than many other snakes, still is seen quite often. It appears in numbers throughout its range. Adults attain lengths of two to over four feet when fully grown.

***Identification.*** The most important identifying characteristic of the eastern milk snake is its belly. The belly is white or cream-colored with dark more or less square splotches that create a checkerboard effect. This definitive pattern separates the milk snake from the copperhead, which has a uniformly colored white to grayish belly with sometimes mottled markings or cloudy blotches (See Figure VI-18). The body of the eastern milk snake is gray or tan. This color is interrupted with chocolate-brown to reddish-brown blotches or saddles that cross over the back and down each side. These darker saddles are bordered with black. They are widest across the back, nearly rectangular but may become narrower as they continue down the sides. This, too, can be used to distinguish the milk snake from the copperhead, which has dark bands that are at their narrowest across the back, wider at the bottom. Smaller, dark blotches also appear low on the side, near the belly. They fall in place between the bottoms of the larger saddles. A Y-shaped or V-shaped dark mark appears on the nape of the neck, extending onto the head. Smooth scales shield the body and the anal plate is single.



***Range.*** You are likely to run into the eastern milk snake nearly anywhere in the state because it is distributed in all 67 counties. It occurs over much of the Northeast, extending well into Canada and west to Minnesota.

***Habitat.*** The milk snake does not prefer any particular type of habitat and is apt to reside in suburban as well as rural areas. Damp bottomland, meadows and farmland harbor the milk snake. But pine forests, open deciduous forests and rocky hillsides also are acceptable to the milk snake in which to make its home and forage for food. Rotting logs and damp trash offer convenient places for the milk snake to take refuge.

***Reproduction.*** Leaving the den during the spring months, the eastern milk snake immediately begins its search for a mate. In June or July, the female deposits from six to 25 or more elliptically shaped eggs, often in a rotted log. The eggs incubate for six to nine weeks, and in August or September the juveniles emerge. Some five to 11 inches long, they are more brightly colored and their patterns more sharply contrasted than their parents.

***Food.*** The eastern milk snake's favorite prey is small rodents, and mice make up the largest portion of this group. Other snakes, including venomous species, also are taken, and lizards and an occasional bird supplement the diet.

# Northern Water Snake

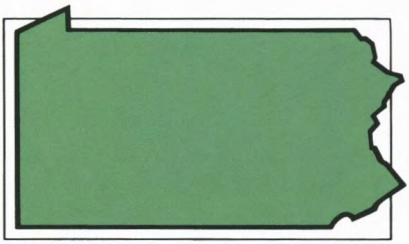
***General characteristics.*** This is the largest of Pennsylvania's three water snakes, reaching an adult size that may range from 24 to over 50 inches. The male is usually smaller than the female.

Often killed by people out of fear, the northern water snake is not a water moccasin and it is not poisonous. The water moccasin, or cottonmouth, common to the South, is not found naturally in Pennsylvania and does not appear farther north than extreme southern Virginia.

The northern water snake has a tendency to display a nasty disposition and becomes quite formidable when angered. It flattens its head and heavy body when striking, and although it flees if it can, it strikes repeatedly if cornered. It has strong jaws, powerful enough to inflict a severe bite. Bites by the northern water snake also may bleed profusely due to an anticoagulant quality of the snake's saliva. It does not inject a poisonous venom.

The northern water snake is active both day and night and appears in sufficient numbers to be seen on a regular basis.

***Identification.*** It is possible to see the northern water snake in an array of colors. On some adults, the patterns may even become obscure, blending into the background color. Generally, the northern water snake is reddish, brown or gray to brownish black. There are dark crossbands on the neck region. These bands become dark blotches, alternating in position from the back to each side as they progress down the body and onto the tail. The dark patterns are wider than the spaces between them. White, yellow or gray covers the belly, which is interspersed with reddish-brown or black crescent-shaped spots. The head of the northern water snake is distinct, well-defined from the neck. Its scales are keeled and it has a divided anal plate.



***Range.*** The northern water snake can be found from Maine, across Quebec, reaching down to Colorado in the west. It extends south to North Carolina. All of the state's 67 counties are host to the northern water snake.

***Habitat.*** Scattered statewide, it is possible to encounter one of these aquatic-loving animals when hiking near a stream or lake, or fishing or boating. It prefers quiet water. Still, the northern water snake is found in fast-moving streams as well as lakes, ponds, bogs and swamps and rivers or slower streams. Submerging, it swims underwater seeking protection among the pondweeds and other aquatic plants. When basking, it likes to drape itself over the branches of a nearby shrub or gather the warmth from a sun-baked rock near the water's edge. It may seek relief from the hottest days of summer by becoming at least partially nocturnal.

***Reproduction.*** As springtime temperatures warm the air, the northern water snake stirs from its winter home in pursuit of its mate. Mating could occur as early as April or as late as June. The northern water snake gives birth to living young. An average litter of 25 young water snakes is produced during the period of August to October. Measuring six to 12 inches at birth, they are a brighter color than the parents.

***Food.*** The northern water snake hunts most of its food in the water. On occasion it leaves the water to search for frogs among the grasses and other vegetation at the water's edge. Salamanders, crayfish and other crustaceans, minnows and slow-swimming, usually sick or disabled fish add variety to the menu of the water snake. Even small mammals have been known to fall prey to this water snake. Rounding out the predator-prey relationship, young northern water snakes are in turn eaten by the larger sport fish.

# Rough Green Snake

*Opheodrys aestivus*

***Endangered Species***

***General characteristics.*** It is easy to understand why this snake carries the nickname "vine snake," considering its color, slight build and penchant for climbing through brush. The rough green snake is a graceful animal, liquid-like in its movements from one tree branch to another. It is mild-tempered and not easily aroused when confronted. At 22 to 32 inches, it is the largest of the state's two green snakes.

***Identification.*** The rough green snake has a slender body with a long, tapering tail. Its body is a consistent light or pale green throughout except for a white to yellowish-green belly. Its color is uniform throughout, and it has

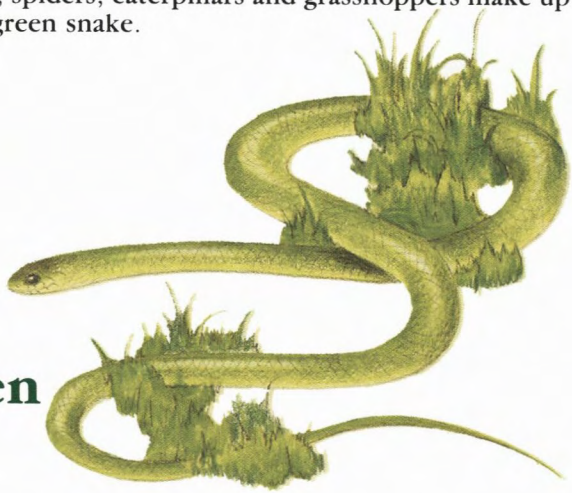
no markings. The divided anal plate is evident, and the scales are sharply keeled, hence its name, the rough green snake.

***Range.*** The rough green snake is found only in two small areas of the state, in each of the southern corners. It extends south to the Florida Keys and west to Kansas and Texas. From here, its range continues into a portion of Mexico. In Pennsylvania, it's a threatened species.

***Habitat.*** It is arboreal because it spends most of its time in brush, trees and vines such as greenbriers. It especially likes dense growth near a stream or lake. It is an excellent climber and it blends well with its background, its green color easily melting into the surrounding foliage. But the rough green snake is also a good swimmer and does not hesitate to glide quickly and silently into the water if disturbed.

***Reproduction.*** The rough green snake locates a suitable mate in spring or fall. It is oviparous, which means that it lays eggs rather than gives birth directly to live young, as do some other snakes. The eggs are deposited in June through August, usually in a depression beneath a well-placed stone or rock. Three to 12 eggs are laid. They are hard and shaped like a capsule about 1 1/2 inches long. They hatch in five to 12 weeks, revealing young grayish-green snakes seven to just under nine inches in length.

***Food.*** The rough green snake forages for food as it moves gracefully through the inner branches of a basket willow or other small tree or shrub. But it seeks prey on the ground as well, moving slowly through the grasses in search of a meal. Crickets, spiders, caterpillars and grasshoppers make up the main diet of the rough green snake.



# Eastern Smooth Green Snake

*Opheodrys vernalis vernalis*

***General characteristics.*** Commonly known as the "green grass snake," the eastern smooth green snake spends most of its time on the ground. It is the terrestrial cousin of the arboreal rough green snake and is slightly smaller. Adult sizes range from 14 to 20 inches. It is said to be the most gentle of all North American snakes.

***Identification.*** The eastern smooth green snake is small and streamlined in appearance with the body ending in a long, tapered tail. Its body is a bright

grass-green above with a plain white belly tinged with just a touch of pale yellow. The anal plate is divided and the smooth scales (keeled scales on the rough green snake) depict the name of the eastern smooth green snake.

***Range.*** From Pennsylvania, the range of this snake extends south through parts of Virginia and West Virginia and north to Canada's Maritime Provinces. Minnesota marks its western boundary. Unlike the rough green snake, the eastern smooth green snake is distributed almost entirely statewide. The only exceptions may be the two small locations where the rough green snake resides.

***Habitat.*** The eastern smooth green snake is largely terrestrial, spending more time on the ground than above it. It can be found in meadows, grassy marshlands, moist, grassy fields and even along the edges of forests. Hikers and others might encounter the eastern smooth green snake because it is most active during the day. A good eye may be necessary, however, because the color and build of the eastern smooth green snake provide excellent camouflage in its grassy domain.

***Reproduction.*** Waiting for the sun to move a bit more northward, the eastern smooth green snake is one of the last to emerge from winter's hibernation. Mating occurs in spring to late summer. Three to about 10 eggs are laid in July to August under a sun-warmed stone, which helps them incubate. Thin-shelled and cylindrical, the eggs hatch in four to 23 days. The snakes that emerge are four to six inches long and dark olive-gray. It is not unusual to find several females sharing the same nesting area.

***Food.*** The eastern smooth green snake is unusually insectivorous, feeding on a variety of insects and larvae. People should consider the eastern smooth green snake a good friend, given its partiality for insects.

# Queen Snake

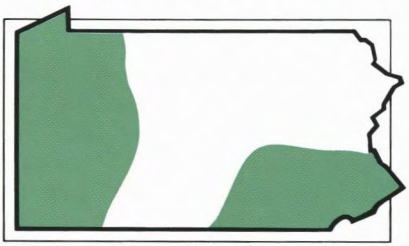
*Regina septemvittata*

***General characteristics.*** Another of Pennsylvania's snakes categorized as "water" snakes, the queen snake in some local areas may be known as the "willow" snake or "leather" snake. It is very much an aquatic animal and an excellent swimmer. If disturbed by an intruder it does not hesitate to slip

quickly into the water for safety. Adult queen snakes are 15 to 36 inches in length.

***Identification.*** The queen snake is an attractive snake and a study in contrasts. The body color can be tan to shades of brown or almost black. A yellow stripe accents the lower side of the body and the belly is yellow with four well-defined brown stripes running its length. Two of these stripes are located near the center. Two larger stripes stretch along the sides of the belly. Some specimens may also have three faded stripes continuing down the back. The scales are keeled and the anal plate is divided.

***Range.*** In Pennsylvania, the queen snake is found in about the western third of the state between the northern and southern borders. The range then splits, jumping the Allegheny Mountains to appear in the southeastern corner, where it extends as far west as Franklin County. Its range takes it to the Gulf Coast. It also is found in the Great Lakes region.

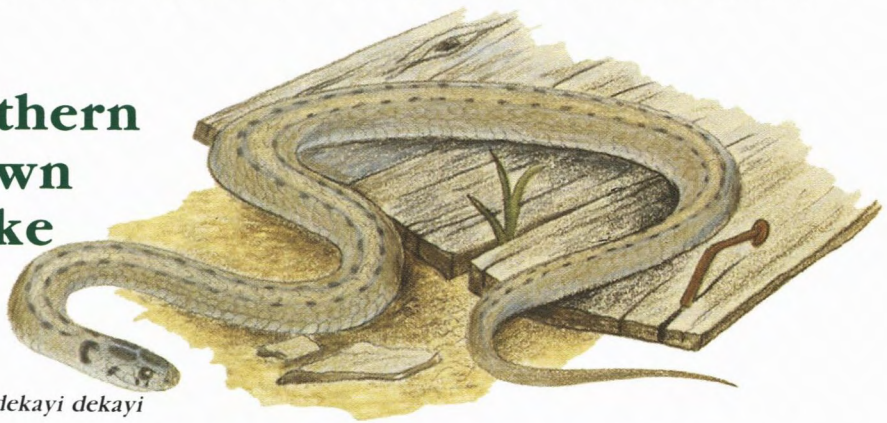


***Habitat.*** The queen snake prefers streams and small rivers as opposed to lakes or ponds, with a preference for those waterways amply strewn with rocks along their bottoms and sides. It does not emerge to bask as much as other water snakes. More often it can be seen swimming along the surface of the moving water or found under shoreline rocks.

***Reproduction.*** The queen snake selects its mate in April or May. The eggs develop internally and the female gives birth to her young in late August to early September. The young may number from five to just over 20 individuals. The newborns range from 7 1/2 to about nine inches in length. They look much like the adult queen snake except that the belly stripes tend to be more clearly defined.

***Food.*** The queen snake has a definite preference when it comes to finding a meal. Considering its aquatic habitat, it's no surprise that the queen snake feeds almost exclusively on crayfish and especially those in the soft-shelled stage.

# Northern Brown Snake



*Storeria dekayi dekayi*

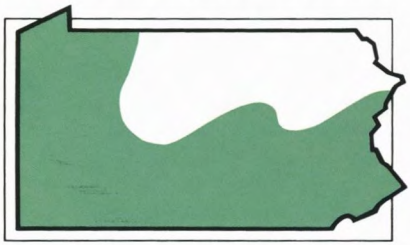
***General characteristics.*** Every so often someone might refer to the northern brown snake as "Dekay's" snake, referring to James Edward Dekay, an early New York zoologist for whom this reptile was named.

Like so many other snakes, the northern brown snake is secretive, prefer-

ring to keep its whereabouts unknown. It is also one of the state's smallest snakes, reaching adult sizes of only nine to 13 inches. For the most part, the northern brown snake is most active during the day. However, when warm weather sets in, it becomes more nocturnal, choosing to roam over its somewhat limited range after the sun has set.

***Identification.*** The northern brown snake is a small snake but with almost disproportionately large eyes. Its back and sides range in color from gray to yellowish brown, brown or reddish brown. It has two parallel rows of small dark spots bordering a wide but indistinct stripe that runs down the center of the back for its full length. The belly can be pale yellow or brown, even pinkish, and it is edged with small black spots. In some specimens, a dark bar extends from just behind the eye downward to the upper lip. The scales of the northern brown snake are keeled and the anal plate is divided.

***Range.*** The northern brown snake is abundant in a major portion of the state, and although this snake is thought to be distributed statewide, that may not be the case. Reported sightings are absent in the northern half of the state east of the Allegheny Mountains. Its natural range begins in Maine and continues south to Virginia.



***Habitat.*** The northern brown snake is usually found near water or areas that remain damp most of the time, settling into moist upland woodland or lowland marshes. Margins of swamps or bogs are acceptable habitat and it has showed up in gardens, even golf courses, parks and other urban environs. Wherever it resides, the northern brown snake takes refuge under downed logs, flat rocks and even trash, if need be.

***Reproduction.*** Mating in either the spring or autumn, the northern brown snake gives birth to three to 30 live young in July through September. Barely three inches to perhaps nearly five inches long at birth, the young Dekay's snake is only a sixteenth of an inch in diameter. The newborn is a bit darker than its parent and has a yellowish collar across the neck. It assumes the adult colors during its first summer.

***Food.*** Food consists mainly of worms, slugs and snails, prey that is usually easy to find in a damp environment. Not much else is consumed by the northern brown snake, which in turn is preyed on by skunks, hawks and owls.

Figure VI-19

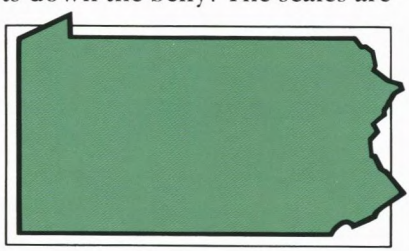
*When possible, hawks and other large birds of prey feed on the brown snake and other small reptiles.*

# Northern Redbelly Snake

*Storeria occipitomaculata occipitomaculata*

***General characteristics.*** A snake of small proportions, the northern redbelly snake rarely exceeds eight to 10 inches. It is secretive and often goes undetected by anglers and others who regularly spend time outdoors.

***Identification.*** The northern redbelly snake may be gray, black, brown or rusty red with stripes that vary in number. A single broad, light stripe may run down the back. Four faint, narrow, darker stripes may be present. In some cases, all five stripes appear. The head has a blackish cast over the body color, and there are three distinct light spots on the nape of the neck. The belly, reddish in most cases, also may be orange or yellow or even blue-black. The belly is unmarked and can be distinguished from Kirtland's snake, which has a double row of black spots down the belly. The scales are keeled and the anal plate is divided.



***Range.*** The northern redbelly snake is most common in the northern tier counties and in other mountainous regions of the state. It is found to a lesser extent west of the Allegheny Mountains. Except for Florida, it is found over nearly the eastern half of the United States. It extends into parts of Canada.

***Habitat.*** The northern redbelly snake likes forested areas, residing in densely covered mountains or hilly woodland. It is also known to dwell in bogs, apparently content in habitat that may range from quite wet to only slightly moist. It hides under a variety of debris and could be found in seclusion among lumber, stone and other objects piled around houses.

***Reproduction.*** The northern redbelly snake comes out of its hiding place during the spring or fall in search of a mate. After breeding, from one to 20 young are born in early June to September. When born, the young redbelly snakes measure from just under three inches to about four inches in length. They mature in two years. The young reptiles resemble their parents in appearance, although the juveniles may be a bit darker, and show more contrast in the pattern.

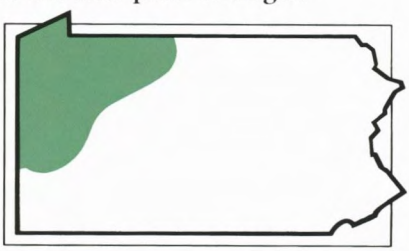
***Food.*** The northern redbelly snake prefers to feed on slugs and worms.

# Shorthead Garter Snake

*Thamnophis brachystoma*

***General characteristics.*** There are three garter snakes that make Pennsylvania their home, the eastern garter snake, the shorthead garter snake and the ribbon snake. The shorthead garter snake, at 14 to 18 inches, averages a bit smaller in size than the eastern garter snake and is not as widely distributed. Still, the shorthead garter snake is quite common in its range. It congregates in large colonies.

***Identification.*** Taking a clue from its name, one could correctly assume that the head is short. Most people would find it difficult to distinguish where the neck ends and the head begins because both are the same diameter. The shorthead garter snake is blackish to dark shades of brown, accented with a well-defined light brownish or tan stripe down the middle of the back and a stripe along each side near the belly. At times, these side stripes are bordered by narrow black lines. The rows of black spots that occur between the stripes on other garter snakes are absent on the shorthead garter snake. The scales are keeled and the anal plate is single.

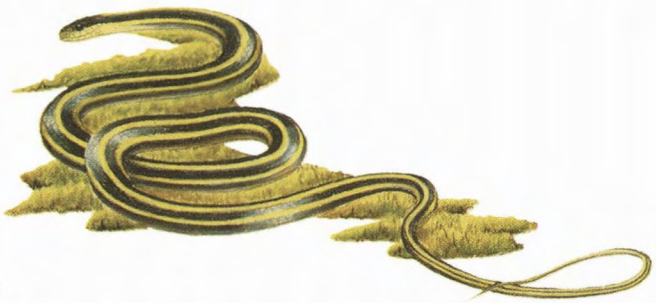


***Range.*** Northwestern Pennsylvania is included in the original range of the shorthead garter snake. It extends into only a small portion of southwestern New York.

***Habitat.*** It is found in the uplands, preferring old fields, meadows and pastures. The shorthead garter avoids woodlands, which its cousin the eastern garter snake will not. It takes shelter in piles of stone and under other debris in open areas, often near water.

***Reproduction.*** The shorthead garter snake seeks its mate in March or April. By late July through September, the female gives birth directly (it does not lay eggs) to five to 15 juveniles. Five to six inches long at birth, they're already one-third their adult size.

***Food.*** Worms make up the primary diet of the shorthead garter snake. Insects and small amphibians round out the menu.



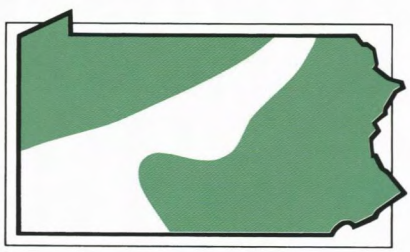
# Ribbon Snake

*Thamnophis sauritus*

***General characteristics.*** This animal is a close relative of the eastern garter snake and shorthead garter snake, but it is considered more aquatic. It attains a size equal to its cousin, the eastern garter snake, roughly 18 to 26 inches. Very agile, the ribbon snake moves quickly and with little effort through thick vegetation. In the water, the ribbon snake glides swiftly across the surface. It rarely dives in the manner of true water snakes. Two subspecies are found in Pennsylvania. The eastern ribbon snake *(Thamnophis s. sauritus)* and the northern ribbon snake *(Thamnophis s. septentrionalis).*

***Identification.*** This snake is slender, with fluid lines and a tail that is quite long. Three bright-yellow stripes, one on the back and one on each side, contrast sharply with a dark body that is reddish brown on the northern ribbon snake and black on the eastern ribbon snake. A dark-brownish stripe marks the margin of the belly. The belly itself is yellowish or greenish and has no markings. There appears just a touch of yellow under each eye. Close examination reveals keeled scales and a single anal plate.

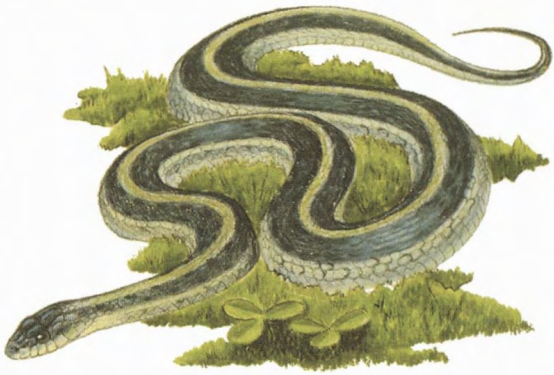
***Range.*** The ribbon snake can be found within a split range in Pennsylvania. The northern ribbon snake resides in the northwestern part of the state. The eastern ribbon snake is found in the balance of the range. Appearing west and east of the Allegheny Mountains, this colorful creature has not populated the mountains or plateaus themselves. It extends south into Georgia and the Gulf Coast.



***Habitat.*** It is at least semi-aquatic, so one could expect to find the ribbon snake in wet meadows, bogs and marshes. It likes the weedy shorelines of lakes and shallow, meandering streams. It normally avoids deep water. It often suns itself draped on the branches of overhanging shrubs or trees. From here it can drop quickly to the water if startled. The ribbon snake seldom wanders far from its watery environs.

***Reproduction.*** Soon after emerging from hibernation in the spring, male ribbon snakes begin looking for a suitable mate. The young are born by late summer, usually July through August. The litter can include anywhere from three to 25 juveniles. They measure seven to nine inches at birth and mature within two to three years.

***Food.*** It should be expected that the ribbon snake would eat animals sharing its aquatic-related habitat. Thus, frogs, salamanders and small fish are the main staple of its diet. Interestingly, the ribbon snake normally does not consume earthworms, a favorite of others of the garter snake group.



# Eastern Garter Snake

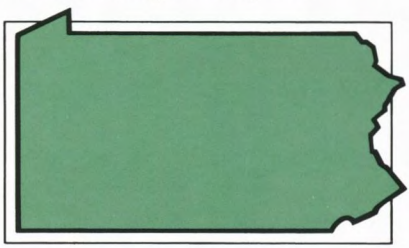
*Thamnopnis sirtalis sirtalis*

***General characteristics.*** The chances are very good that anyone who has spent any time at all outdoors has seen an eastern garter snake at least once. It is the most widely distributed and familiar snake in North America. Adults attain lengths of 18 to 26 inches, a bit larger than the shorthead garter snake, but about equal to the ribbon snake, a close cousin.

Doing most of its traveling and foraging during the day, the eastern garter snake is active over a longer period than most other snakes. Able to tolerate colder temperatures, it leaves the den first in the spring and it's the last to hibernate in the fall.

A built-in defensive mechanism consisting of musk glands may cause potential attackers to have second thoughts. Discharge of a repugnant odor from the gland located in the vent would repel all but the most determined. The garter snake also may assume a defensive posture by flattening its body, hugging itself against the ground as do the water snakes, to which it is related.

***Identification.*** The eastern garter snake is dark greenish to black across the body. Stripes, normally three, trail down the back and sides. They can be yellowish to brown or greenish, but regardless, usually are well-defined. A double row of spots commonly appears between the stripes. The belly of the eastern garter snake varies from greenish to shades of yellow and includes two rows of indistinct black spots. Like the shorthead garter snake, the eastern garter snake displays keeled scales and a single anal plate.



***Range.*** The eastern garter snake appears over a wide range. It is found from Florida and the Gulf Coast north to well inside Canada. It goes as far west as eastern Texas and Minnesota. A statewide resident, the eastern garter snake has been found in all of Pennsylvania's 67 counties.

***Habitat.*** This snake is often seen near water, where it locates some of its favorite food. The eastern garter snake also likes wet meadows, marshes and damp woodlands. It is a frequent visitor to farms and parks where it might be seen hunting food in the midst of moist vegetation. Even an urban area, especially where moisture or damp ground is found, could be a host to this well-known reptile.

***Reproduction.*** The eastern garter snake mates sooner than most other snakes, beginning as early as late March and in some cases continuing into early May. In some instances, it may even mate in the fall. Mating occurs at or near the den where the winter was spent in hibernation. The male

searches for a suitable mate using sensory organs located in small tubercles on the chin. The progeny are born alive from late June to August and could number from as few as seven to as many as 85. In many cases, however, only a few survive. Those that do make it through the early weeks mature in about two years and are ready to mate by their third spring. The young garter snake is five to nine inches long at birth. It subsists on earthworms almost exclusively until its first hibernation.

***Food.*** Even as an adult, the principle food of the eastern garter snake is earthworms. But after emerging from the den its first year it begins to take other food as well. Frogs, toads and salamanders add variety to the diet, as do insects, small mice and an occasional bird.

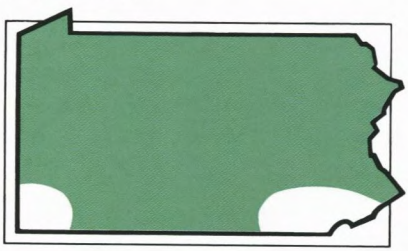
# Smooth Earth Snake

*Virginia valeriae*

***General characteristics.*** At a maximum seven to 10 inches long, the smooth earth snake competes with the eastern worm snake for the "smallest snake in the state" title. In fact, a subspecies is often seen in southeastern Pennsylvania with the worm snake with which it shares similar habitat. A good time to look for the smooth earth snake is immediately after a rainfall. It seems to enjoy a moist if not wet environment. The smooth earth snake is represented in Pennsylvania by two of three subspecies, the mountain earth snake *(Virginia valeriae pulchra)* and the eastern earth snake *(Virginia v. valeriae).*

***Identification.*** The smooth earth snake is reddish brown to gray and has no distinctive markings other than possibly widely scattered small dark flecks over the body; on the eastern earth snake, flecks appear in rows on the back. The belly is unmarked and can be grayish, off-white or yellowish. On occasional specimens there may be a dark area between the eye and nostril. The scales are smooth on the eastern earth snake and very slightly keeled on the mountain earth snake. The anal plate is divided.

***Range.*** In Pennsylvania, the mountain smooth earth snake is distributed along the Allegheny Mountains, beginning in Somerset and Fayette counties. Its range branches out in a funnel-shaped pattern as it goes northward. It extends south into West Virginia. The eastern earth snake appears in the extreme southeastern corner of the state, where its range extends south to Georgia and to the Gulf Coast.



***Habitat.*** Like the worm snake, the smooth earth snake prefers damp areas, especially when associated with a deciduous forest. It also is found in abandoned fields, as well as moist hillsides covered with rocks and timber.

***Reproduction.*** The young of the species are born in August or September, with two to 14 unmarked reptiles included in the litter. They are three to slightly over four inches long at birth. Highly secretive, the smooth earth snake stays underground for long periods, emerging after a cool, heavy rain. Hiding under rocks or stones warmed by the sun is another favorite retreat.

***Food.*** The diet of the smooth earth snake consists of earthworms, soft-bodied insects and their larvae.

# Northern Copperhead

*Agkistrodon contortrix mokasen*

***General characteristics.*** One of only three venomous snakes common to Pennsylvania, the northern copperhead is a close cousin of the cottonmouth or water moccasin found in more southerly aquatic environments. Reflecting its preferred habitat, the copperhead sometimes is referred to as the "upland" or "highland" moccasin. However, the cottonmouth is not indigenous to Pennsylvania.

The copperhead is a quiet creature—some would say almost lethargic—and usually does its best to avoid trouble, quietly stealing to a safe retreat whenever it can. If threatened, and it feels the need to protect itself, the copperhead is capable of striking out most vigorously. If the strike hits its intended victim, poison may be injected through two hollow fangs connected to glands located on each side and toward the rear of the head (See Figure VI-15). The venom-injecting apparatus is similar to that found in the rattlesnake, although the copperhead's fangs tend to be a bit shorter. The venom is a hemotoxin, but with a trace of neurotoxin and as such primarily affects the bloodstream. The bite and resultant injection of venom is painful. But with prompt medical attention, it seldom poses any serious threat to life.

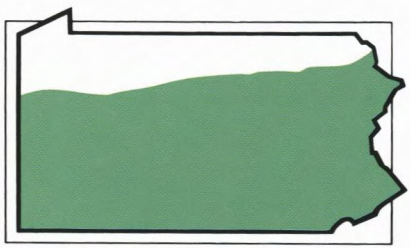
***Identification.*** The copperhead, reaching an average adult size of 24 to 36 inches, is a stout-bodied snake, perhaps heavier than most harmless snakes of a similar length. The body color is copper or hazel-brown, sometimes accented with a tinge of pink or orange. Bold chestnut or reddish-brown crossbands are narrowest across the midline of the back and wider at the sides. They present the appearance of a dark hourglass if one imagines them stretched out flat. There may be small, dark spots between these bands. The crossband patterns on the copperhead are dark, but on the milk snake, a snake often confused with the copperhead, the hourglass-shaped cross-

bands are a lighter color. Thus, the dark pattern on the milk snake is at its widest across the midline of the back, compared to the narrower dark band on the midline of the copperhead.

The belly of the copperhead is a mottled pattern of white to gray. This feature also can be used as an aid in separating the copperhead from the milk snake, which has a black and white belly pattern roughly resembling a checkerboard (See Figure VI-18). The unmarked head, somewhat triangular, is covered with large copper-colored scales.

The pupil of the eye is vertically elliptical (similar to a cat's pupil). It is a feature that can be used to distinguish all of Pennsylvania's poisonous from its nonpoisonous snakes (See Figure VI-14). The pupil is rounded on the nonpoisonous snakes common to Pennsylvania. The copperhead also has the facial pit located between the eye and nostril, common to Pennsylvania's three poisonous snakes. This heat-sensitive organ is missing from the nonpoisonous species in Pennsylvania (See Figure VI-14).

The scales on the copperhead are only weakly keeled. The anal plate is single and the scales on the underside of the tail are in single rows for most of its length, not divided into two rows as they are on the nonpoisonous snakes in Pennsylvania.



***Range.*** The copperhead inhabits the lower two-thirds of the state. Its range generally follows the southern limits of huge glaciers that eons ago scraped and ground their way into the northern hemisphere. Its range extends somewhat southwesterly through the Carolinas into Georgia, Tennessee, Kentucky and southern Illinois.

***Habitat.*** The northern copperhead likes wooded hillsides, especially those that feature rocky outcrops standing guard above a stream or swampy area. The copperhead is attracted to stone walls, piles of rock and other similar debris and is a frequent visitor around farms and abandoned lumber operations. It is fond of curling up in sawdust or rotting logs, and it likes the protection offered by large, flat stones, especially those located near water.

The copperhead, like so many other reptiles and amphibians, enjoys a day in the sun and often basks on a favorite rock, especially on a warm day in the spring or fall. During the hotter days of summer, the copperhead seeks relief from the piercing rays of the sun and becomes more nocturnal in its habits.

***Reproduction.*** Recent studies indicate that the mating period for the copperhead can be anytime from spring to autumn, with the peak time probably mid-summer. One to 14 live young are born in August to early October. Seven to 10 inches long at birth, the young copperhead matures in two to three years. The young snakes learn early in life to fend for themselves by using the tip of their tail as a built-in lure. Usually bright yellow, the tail tip is held upright. Wriggled enticingly, it attracts curious prey to a hungry youngster. By the time it is one hour old, the juvenile copperhead has venom strong enough to paralyze a mouse.

***Food.*** A young copperhead's first food is normally insects, but it soon seeks rodents, the main staple of its diet. Birds, cicadas when available, large caterpillars and an occasional frog or lizard help diversify the menu.

# Timber Rattlesnake

*Crotalus horridus*

***Candidate Species***

***General characteristics.*** Though not the largest snake found in Pennsylvania, the timber rattlesnake has the distinction of being the largest of our three poisonous species. It may reach adult sizes of 36 to 54 inches. It is sometimes called the "banded" rattlesnake or "velvet-tail" rattler.

Like the copperhead and other snakes, the timber rattlesnake would just as soon be left alone. It is not an aggressive creature. The timber rattler is prone to lie quietly or crawl away to safety if given the chance.

The timber rattler stands its ground (like many other animals) if it feels threatened and unable to escape. When striking, venom may be released from glands located in the head and injected into the victim through modified front teeth referred to as fangs. It should be noted that a defensive strike does not always include a release of venom. Venom primarily is used to disable prey.

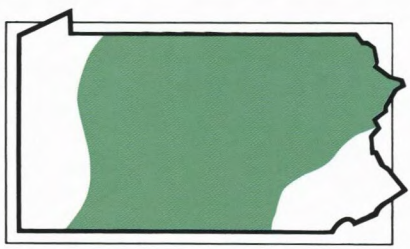
Contrary to popular belief, the timber rattlesnake does not always sound its familiar alarm before striking. In fact, when striking because of fear or the need to defend itself, more often than not the snake strikes without an audible warning. The "rattle," from which this snake obviously gets its name, is an organ of loosely attached, hollow horny segments fastened to the tail. Rapidly vibrating the tail causes these button-like segments to strike one another, producing an unmistakable buzzing sound. The rattle may grow by two to four segments annually, because new segments are added each time the skin is shed. Thus, the number of segments on the rattle, or "cloche," as it is called, cannot be used to determine the age of the snake. However, the larger the snake, the louder the buzzing.

***Identification.*** Timber rattlesnakes are found in two different color phases, black and the less common yellow phase. Each phase is permanent. Coloration does not change

from one phase to the other on any individual snake. On a yellow specimen, black or dark-brown crossbands contrast against a yellow background that might range from dull to a deep lemon. In some cases, the "yellow" tends to be brownish or grayish, but always lighter than the black phase. The crossbands are often V-shaped and tend to break up toward the rear of the body to form a row of dark spots down the back and along each side.

The more common black phase timber rattlers have a heavy stipling or flecking of very dark browns or blacks that covers most of the lighter or yellowish pigments. Completely black specimens are not all that rare in some areas.

The unmarked head of the timber rattlesnake is covered with numerous small, keeled scales. The facial pit is located as usual between the eye and nostril, confirming the timber rattlesnake to be one of the pit vipers (See Figure VI-14). The pupil of the eye is elliptical, not rounded as it is on Pennsylvania's nonpoisonous snakes (See Figure VI-14). The tail is black regardless of the color phase of the body. Unlike our nonpoisonous species, which have two rows of scales on the underside of the tail, the poisonous snakes have one row. The timber rattlesnake is no exception to this rule.



***Range.*** The range of this reptile begins in the north in New Hampshire, extending southward to Georgia. It appears from Illinois to Arkansas and northeast Texas. The timber rattlesnake is found in the central two-thirds of Pennsylvania. Its range does not extend into the counties bordering Ohio or into the extreme southeast. The range follows roughly the major mountain ranges that move diagonally across the state.

***Habitat.*** This snake is at home in timber-covered terrain, especially that of second-growth woodland where an abundance of rodents may be found. It likes wooded hillsides accented with rock outcrops where ledges of stone might provide opportunities for basking (See Figure VI-20). When winter sets in, fissures in these places provide passage to deep dens for hibernation. Slopes with a southern exposure are preferred.

The timber rattlesnake seeks winter protection below the frost line, preferably in dens that maintain a temperature of around 50 degrees. In the spring, as daytime temperatures approach 60 degrees, the rattlers begin to emerge to bask near the den site. Although later they may travel some distance from the den to take up residence in more open areas, shaded areas will always be nearby to provide protection as summer temperatures turn hot. Each fall the timber rattlesnake returns to its original den, even though it may have wandered several miles during the summer months.

Figure VI-20

*Warm temperatures entice this timber rattlesnake from its den.*

Basking in the warm rays of the sun is an important and necessary function. By causing the

body temperature to increase, the snake ensures proper functioning of several organs while ridding the body of disease and parasites. The female's basking also allows for full, proper development of eggs and embryos.

***Reproduction.*** Breeding takes place in July, August or September with the female giving birth to live young in August or September of the following year. Five to 17 young are born, reaching 10 to 13 inches in length. The brood may include individuals of both yellow and black color phases.

The female matures in four to five years and breeds for the first time at five or six years of age. The female breeds only every two to three years and thus may bear a litter perhaps 10 to 15 times in her lifespan of 30 to 50 years. The intervening years are needed to store sufficient body fat to sustain her during the second summer the progeny are developing. It is believed she does not feed during the summer of her year-long gestation period. While carrying her young, she consumes only rainfall, gathering the precious liquid from small deposits caught by leaves or depressions in rocks. Decreasing populations have made it a candidate species.

***Food.*** Mice and other rodents make up the majority of the food eaten by the timber rattlesnake. Squirrels, rabbits, chipmunks and even small birds add variety to the diet, as do frogs or lizards on rare occasions. The prey is captured as it wanders into striking range of the hunter, coiled and ready and usually hidden near a log or other object. Venom injected into the prey becomes an effective tool in satisfying the need for food.

# Eastern Massasauga

*Sistrurus catenatus catenatus*

***Endangered Species***

***General characteristics.*** The eastern massasauga is a rattlesnake. It is the smallest of Pennsylvania's three poisonous snakes, but the one with the biggest problem. Reflecting concern for its dwindling numbers, this reptile has been placed on Pennsylvania's List of Endangered Species. It is illegal to possess, kill, sell or offer for sale this or any other animal on the endangered list.

The biggest problem facing this small rattlesnake is loss of habitat. A resident of swampy areas, much of its habitat has been drained or dried up. In some cases, new or widened highways encroached into its wet domain and with each new lane of traffic, acres of vital habitat were lost.

Its common name, *massasauga*, is said to be derived from a Chippewa

Indian word meaning *great river mouth*. It alludes to what was typical Chippewa country, which often included swampland surrounding the mouths of rivers.

***Identification.*** Reflecting its preferred habitat, the massasauga rattlesnake sometimes is referred to as the "swamp" rattler. It does not grow much larger than 20 to 30 inches.

The massasauga is brownish gray to almost black on its back and sides with a row of rounded, dark-brown or black blotches running down the middle of the back. Usually three rows of smaller and lighter blotches or spots stretch along each side. A dark bar, bordered with a lighter color, extends from the eye to the rear of the jaw, and several dark bars start at the top of the head and flow onto the neck. The facial pit is in its usual position between the eye and nostril. The belly is black with scattered white or yellowish markings. Nine plates (actually large scales) cover the crown of the head, compared to the timber rattlesnake's numerous small scales. The tail is stocky or stout, ending in a moderately developed rattle. The underside of the tail has a single row of scales, similar to the other poisonous snakes in Pennsylvania. The anal plate is single; the scales over the back are keeled.

***Range.*** In Pennsylvania, the eastern massasauga is found in portions of only five or six counties in the westcentral section of the state. It extends into Ohio and as far as Illinois and Iowa. It runs northward to Wisconsin and Michigan.

***Habitat.*** It shows a distinct preference for marshy areas with swampland, flood plains and other wet areas adjacent to drier old-field uplands providing favorite haunts. Even so, there are occasions when the massasauga may stray from these areas and be found in dry woodlands.

Typical of most cold-blooded animals, the massasauga suns itself on mild days, allowing the warming rays of the sun to raise the body temperature to levels beneficial to its functioning. During the hottest part of the summer, the massasauga becomes crepuscular, taking advantage of the cooler twilight hours to roam and feed.

***Reproduction.*** The massasauga breeds primarily during July and August, giving birth to its young between July and early September. A typical litter contains two to nearly 20 youngsters measuring six to nine inches long. At birth, these young rattlers are well-patterned, although a bit paler than the adults. The juveniles have an unmistakable yellowish tail tip.

***Food.*** As might be expected, given its favorite habitat, frogs and other amphibians top the massasauga's menu. Although amphibians may be preferred, lizards, small rodents and small birds are taken from time to time as well. This rattler uses much the same method as that used by the timber rattlesnake in capturing its prey. Venom is injected to immobilize the prey before it is swallowed. The only difference is that the venom produced by the massasauga is not quite as toxic as the venom of its larger cousin.

## *Chapter VII*

# An Abbreviated Look at Pennsylvania's Amphibians and Reptiles

. . . A quick reference to interesting and informative facts about the amphibians and reptiles of the Commonwealth of Pennsylvania. For more complete information, refer to the text.

| *THE SUBJECT IS . . .* | *THE FACT IS . . .* |
|---|---|
| **Aquatic plants** | . . . they are important to reptiles and amphibians. They are a source of food, support egg masses and provide a place to hide. |
| **Bale** | . . . the word refers to a group of turtles. |
| **Banded rattlesnake** | . . . this nickname refers to the timber rattlesnake, Pennsylvania's largest poisonous snake. |
| **Basking** | . . . this habit helps rid the body of diseases and aids the development of eggs and the proper functioning of organs. |
| **Black snake** | . . . this common name is often applied to the black racer and black rat snakes. |
| **Calls** | . . . frogs and toads have true vocal chords and together produce a great variety of calls used to attract a mate or defend territory. Salamanders sometimes squeal, but do not actually produce a call. |
| **Chain snake** | . . . it's simply a nickname for the eastern kingsnake. |
| **Chewing food** | . . . not where snakes are concerned, at least. Their teeth are not designed for chewing and thus they must swallow their prey whole. |
| **Claws** | . . . lizards and turtles have them; salamanders and frogs and toads do not. |
| **Cold-blooded animals** | . . . like fish, the body temperature of amphibians and reptiles approximates that of their environment. Temperature is not regulated internally. |
| **Colors and patterns** | . . . they are helpful, but not always an accurate or complete method to identify the various species. |
| **Cottonmouth** | . . . this water moccasin does not live in Pennsylvania. It is not related to our northern water snake. |

| *THE SUBJECT IS . . .* | *THE FACT IS . . .* |
|---|---|
| **Death at sunset** | . . . muscle contractions could cause a snake to "move" for several hours after death, but it does not "wait until sunset" to die. |
| **Detached tail** | . . . many lizards can lose theirs to an attacker and grow a new one. |
| **Devonian Period** | . . . it goes 300 million years back in time, when the first amphibians appeared on earth. |
| **Dry strike** | . . . poisonous snakes do not always inject venom when they land a strike on an intended victim. |
| **Eft** | . . . this is the land-based sub-adult stage of the newt and the second of its three life stages. |
| **Eggs** | . . . amphibians' eggs have no shell, but are protected by a capsule or jelly-like substance; reptile eggs have a shell, usually hard or nearly so. |
| **Eyelids** | . . . on lizards, they're movable; snakes have eyelids or shields that are clear, but fixed. |
| **Eyes** | . . . they often are important identifying characteristics and can, among other things, help sort poisonous snakes from non-poisonous snakes and spadefoot toads from true toads. |
| **Facial pit** | . . . this pit, found between each eye and the nostrils on our poisonous snakes, is sensitive to heat. |
| **Fangs** | . . . these are actually long, hollow, modified teeth. |
| **Garden snake** | . . . this term sometimes is used when we actually are referring to the garter snake. |
| **Garden toad** | . . . it's a common name for the American and Fowler's toads, frequent visitors around homes. |
| **Grass snake** | . . . this name often is used to refer to our two green snakes. |
| **Hearing** | . . . some amphibians and reptiles have external ear openings. Snakes, however, "hear" by feeling ground vibrations. |
| **Hoptoad** | . . . it's a common term attached to toads that "hop," rather than leap, as do the frogs. |

| *THE SUBJECT IS . . .* | *THE FACT IS . . .* |
|---|---|
| **Hypnotic trance** | . . . contrary to belief, snakes do not hypnotize their prey. Their steady gaze is a result of unmovable, transparent eyecaps. |
| **Insects** | . . . they are a favorite food of many amphibians and reptiles; humans should appreciate that fact. |
| **Jefferson salamander** | . . . a U.S. president gave his name, through a Pennsylvania college, to this amphibian. |
| **Largest frog** | . . . in Pennsylvania, at up to six inches, the bullfrog captures the top honors. |
| **Largest lizard** | . . . in Pennsylvania, the broadhead tops the list at about 12 inches. |
| **Largest salamander** | . . . the eastern hellbender is the largest in Pennsylvania, reaching up to 20 inches. |
| **Largest snake** | . . . these honors in Pennsylvania go to the black rat snake at up to 100 inches. |
| **Largest toad** | . . . the American toad could attain 3 1/2 inches. |
| **Largest turtle** | . . . the softshell turtles may measure up to 17 inches. Although shorter on average, snapping turtles probably weigh more. |
| **Larvae** | . . . depending on species, they could take a few days to years to transform into the adult stage. |
| **Leopard frog** | . . . this amphibian can reside in brackish water as well as fresh water. |
| **Loggerhead** | . . . this term is sometimes applied locally to the snapping turtle. |
| **Loss of fangs** | . . . that's no problem. A new pair is usually ready to drop into place. |
| **Lungless salamanders** | . . . it's an accurate description for they have no lungs, but "breathe" instead through the skin. |
| **Milk snake** | . . . it does not milk cows, as some believe, but it does search for mice around barns, a favorite hangout. |
| **Missing teeth** | . . . turtles lost them sometime during their evolution, to be replaced by a hard, horny beak. |
| **Moles** | . . . they gave their name to the mole salamander family, which, like this mammal, spends most of its life underground. |

| *THE SUBJECT IS . . .* | *THE FACT IS . . .* |
|---|---|
| **Mole salamanders** | . . . they do not have the nasolabial groove extending from the lip to the nostril; the lungless salamanders do. |
| **Mudpuppy** | . . . it remains a larva and will always have gills. |
| **Newt** | . . . this is the aquatic adult and final stage of three life stages; the larva and terrestrial eft precede it. |
| **Northern water snake** | . . . it is not a water moccasin, nor is it poisonous. |
| **Pit vipers** | . . . they include the poisonous snakes, so named for the heat-sensitive facial pit. |
| **Plastron** | . . . the turtle's lower shell is equipped on some species with a hinge to swing open or shut. |
| **Rain** | . . . sufficient rainfall is often crucial. A lack of it may cause the eggs of some species of amphibians to lay dormant until the next spring. |
| **Rattles** | . . . the number of segments does not reveal the age of the rattlesnake. A new segment is added with each shedding of skin, perhaps several times a year. |
| **Scales** | . . . reptiles—turtles, lizards, snakes—have them; amphibians—salamanders, frogs, toads—do not. |
| **Scent** | . . . this trait is often used by amphibians and reptiles to seek out a mate. |
| **Shedding skin** | . . . in order to grow, snakes and frogs must molt. |
| **Skin** | . . . it is generally smooth, soft and moist on amphibians. On reptiles, it is dry and usually covered with scales. |
| **Skinks** | . . . they are actually lizards with skin that is smooth and shiny. |
| **Slimy salamander** | . . . it perhaps isn't slimy, but extremely sticky instead. On this species, skin glands secrete a gluey substance. |
| **Slimy snakes** | . . . snakes are not slimy, not even when wet. |
| **Smallest frog** | . . . barely an inch long, the northern cricket frog is our smallest. |
| **Smallest lizard** | . . . the northern fence lizard, at four to 7¼ inches, wins these honors. |
| **Smallest salamander** | . . . as an adult, the four-toed could be as short as two inches. |
| **Smallest snake** | . . . it's a tie. The smooth earth snake and the worm snake, at seven to 10 inches, take the prize in Pennsylvania. |

| *THE SUBJECT IS . . .* | *THE FACT IS . . .* |
|---|---|
| **Smallest toad** | . . . all of our toads could measure as little as two inches as adults. |
| **Smallest turtle** | . . . the bog and eastern mud come in at three inches on occasion as adults. |
| **Snake stings** | . . . snakes cannot sting, including with their tails as some people suppose. |
| **Softshell turtles** | . . . the shells of these turtles are just that—soft. They're covered with leathery skin rather than bony plates. |
| **Spadefoot toad** | . . . it carries its own shovel. The spade on the hind feet is a useful and often-used digging tool. |
| **Spreading adder** | . . . this, along with puff adder and hissing adder, is a name given to the hognose snake due to its habit of spreading its neck into a hood-like shape. But it's all a ploy used by this harmless snake to scare off predators or intruders. |
| **Springs** | . . . their clean, cool waters are a favorite, and sometimes extremely important, area for many amphibians and reptiles. |
| **Stinkpot turtle** | . . . its name bespeaks the foul odor produced from musk glands. |
| **Striking position** | . . . snakes do not have to be coiled. They can strike if lying in an S-shape. |
| **Swamp rattler** | . . . the massasauga rattlesnake, its more common name, is an endangered species in Pennsylvania. It's this state's smallest poisonous snake. |
| **Tadpoles** | . . . this general term is given to the larvae of frogs and toads, but not of salamanders. |
| **Tails** | . . . they assist many animals, but would probably hamper frogs and toads in moving about with leaps and jumps. |
| **Terrapin** | . . . these usually are the aquatic, hard-shelled turtles. |
| **Toe pads** | . . . these sticky discs are found under the toes of treefrogs and aid their moving and perching on trees and shrubs. |
| **Tongues** | . . . they're used effectively by some amphibians to catch insects. On snakes, the tongue cannot penetrate the skin of prey, but is used to sample air particles. |
| **Tortoise** | . . . this general term usually refers to large land-dwelling turtles. |

| *THE SUBJECT IS . . .* | *THE FACT IS . . .* |
|---|---|
| **Toxic substances** | . . . many amphibians secrete a substance from skin glands that can be irritating even to humans. Mucous membranes are especially vulnerable. |
| **Tree cavities** | . . . as they do for several mammals and birds, cavities provide protection and home to the broadhead skink and numerous snakes. Allow a few snags to stand on your woodlot. |
| **Treefrogs** | . . . in spite of their common family name, many species seldom climb trees, spending most of their time on the ground. The spring peeper and gray treefrog are the exceptions. |
| **Turtles** | . . . they are the oldest living reptiles; they go back some 200 million years. |
| **Upland moccasin** | . . . it's better known in Pennsylvania as the northern copperhead. It's related to the water moccasin, which does not live in Pennsylvania. |
| **Vertebrae** | . . . they number less than 10 in frogs to several hundred in some snakes. |
| **Vocal sac** | . . . one or two are found on most frogs and toads, and when inflated become a source of air in helping produce a call. |
| **Warning rattle** | . . . don't count on it. Rattlesnakes have been known to strike without warning. |
| **Warts** | . . . although they are common on toads, they cannot be spread to humans. |
| **Wehrle's salamander** | . . . it's named for R. W. Wehrle, a resident of Indiana, Pennsylvania, who played a key role in describing this species. |
| **Wood frog** | . . . this frog can adapt to cold; it is found north of the Arctic Circle. |
| **World continents** | . . . all except Antarctica, have some population of snakes. |

Figure VII-1 *The spring peeper is one of several species of treefrogs.*

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# Glossary

Definitions are included here as they relate to the subject matter of this book.

**Ambient** Surrounding; encompassing.
**Amphibian** Of the class Amphibia; cold-blooded vertebrates having gilled aquatic larvae; skin is moist, smooth and without scales.
**Amplexus** Position assumed by the frogs and toads while mating. The male clasps the female around the back with one or both pairs of limbs; the male then fertilizes the eggs as they are released by the female.
**Anal plate** On snakes, the scale covering the vent.
**Anticoagulant** Substance that impedes clotting of blood.
**Aquatic** Living in or frequenting the water.
**Arboreal** Relating to trees and shrubs; hunting, climbing, dwelling in.
**Autotomy** Reflex separation of body parts; breakage of a lizard's tail as an escape mechanism.
**Bask** To lie in or expose the body to the sun's rays; repose.
**Brille** Transparent covering or shield over the eyes of snakes.
**Candidate species** A species that could become endangered or threatened.
**Carapace** Upper shell of the turtle.
**Carboniferous Period** That period of time dating from 280 to 345 million years ago.
**Carnivore/Carnivorous** Flesh eater; feeds on animal tissue.
**Class** Classification or taxonomic category ranked above Order.
**Cloaca** Chamber that opens through the vent into which the reproductive, digestive and urinary systems empty.
**Cloche** Segments or rattle located on the tip of the tail of the rattlesnake.
**Clutch** A quantity of eggs usually deposited in a nest.
**Columella** Bone that carries vibrations from the lower jaw or eardrum to the inner ear.
**Constrictor** Snakes that kill their prey by suffocation with the body coiled tightly around the prey.
**Costal grooves** On salamanders, vertical grooves in the skin, located on each side between the limbs.
**Cranial crest** Bony ridge on the head of some toads.
**Crepuscular** Active at twilight.
**Cutaneous** Process used by some amphibians and reptiles by which oxygen is absorbed through the skin and the surfaces inside the mouth and throat.
**Deciduous forest** Of trees (usually hardwoods) that lose their leaves each autumn.
**Detritus** Loose, fragmented material, as on a stream bottom.
**Devonian Period** That period of time dating from 345 to 395 million years ago.
**Diurnal** Occurring during the day; active during the daylight hours.
**Dorsal** The back; upper surface of the body.
**Dorsolateral ridge** A fold of raised skin where the back and sides meet.
**Ecdysis** Molting or shedding of the skin.
**Ecosystem** Environmental or natural community and its dependent relationships.
**Embryo** The young in an early stage of development; in many amphibians and reptiles, the stage before hatching of the egg.
**Emergent** Plant rooted on the bottom of a body of water but with most of its growth above the water.
**Endangered species** A species whose population is low enough that it may be on the verge of extinction.
**Erythristic** Totally red.
**Extirpate** To eliminate; to lose; no longer existing in a particular area.
**Facial pit** Heat-sensitive organ; deep pit located between the nostril and the eye of the pit viper subfamily of snakes.

**Family** Classification or taxonomic category ranked above genus.
**Fang** Long, sharp hollow tooth.
**Fauna** Animals living in a particular area.
**Fertilization** The combining of egg and sperm that leads to the development of the embryo.
**Genus (pl. genera)** Classification or taxonomic category ranked above species; forms the first part of the scientific name.
**Gills** Organs through which oxygen is absorbed from water.
**Ground color** Primary or major background coloration.
**Hemotoxin** Poisonous substance affecting the bloodstream.
**Herbivore/herbivorous** Plant eater; feeds on plants.
**Herpetology** The study of amphibians and reptiles.
**Herpetofauna** Reptiles and amphibians of a particular area.
**Hibernation** Spending the winter months in a dormant or resting state in which bodily functions slow.
**Indigenous** Occurring naturally; native.
**Insectivorous** Feeding on insects.
**Intergrades** Intermediate subspecies with a combination of their characteristics, that occur in zones of contact or overlap between subspecies.
**Invertebrate** Animals without a spinal column (backbone).
**Jacobson's organ** Chemically sensitive organ providing a sense of taste-smell; it is used in conjunction with the tongue.
**Keel; keeled** Ridge on the dorsal scales of some snakes; length-wise ridge on the carapace of some turtles.
**Larva(e)** Early stage of an animal after hatching that differs in appearance from the adult.
**Metamorphosis** Transformation from the larval to the adult stage.
**Molt** To shed the skin.
**Montane** Relating to mountains or mountainous habitat.
**Morphology** Branch of biology dealing with the form and structure of animals.
**Musk** A substance with a penetrating, persistent, often offensive odor.
**Musk glands** Special glands that secrete musk.
**Nares** Nasal cavities; nostrils.
**Nasolabial groove** Small groove extending from the edge of the upper lip to the nostril; found on lungless salamanders.
**Neurotoxin** Poisonous substance affecting the nerves or nerve tissue.
**Nocturnal** Active during the night.
**Omnivorous** Feeding on both animal and plant matter.
**Order** Classification or taxonomic category ranked above family.
**Oviparous** Reproduction by eggs that hatch outside the female's body, producing young after the eggs are laid.
**Parotoid gland** Wart-like gland on the shoulder or behind the eyes in toads.
**Permeable** Capable of being penetrated.
**Phylum (pl. phyla)** Classification or taxonomic category ranked above class.
**Plastron** Lower shell of the turtle.
**Plate** Large scale, especially found on the shells of turtles; anal scale of snakes.
**Progeny** Offspring; descendant.
**Rectilinear Locomotion** Caterpillar-like movement used by snakes to move in a straight line by alternately gripping and pushing with its belly scales.
**Reptile** Of the class Reptilia; cold-blooded vertebrate without gill-breathing stage; skin is dry, usually covered with scales.
**Reticulations** Worm-like, wavy lines creating a network pattern across the body.
**Scale** Thin, flattened structure that covers at least a portion of the body of reptiles (and fish).
**Scute** Large scale; sometimes called a plate.

**Serpentine Locomotion** The alternate relaxing and contracting of muscles used by snakes to move rapidly. Appears as undulating S-curves of the body.
**Spade** Horny tubercle on each hind foot of the spadefoot toad.
**Species (pl. species)** Except for subspecies, the lowermost category in the classification of animals; forms the second part of the scientific name.
**Spermatophore** Jelly-like structure containing sperm deposited by male salamanders.
**Tadpole** Larva of a frog or toad.
**Taxonomist** Scientist who specializes in taxonomy.
**Taxonomy** The science of classification or arrangement of animals and plants according to their orderly natural relationships.
**Terrestrial** Residing or living on land.
**Threatened species** Any species likely to become endangered within the foreseeable future.
**Transformation** Changing from one life stage to another; metamorphosis.
**Tubercle** Small knob or protuberance on the skin.
**Tympanum** The eardrum.
**Venom** Poisonous substance or matter secreted by specialized glands of some animals.
**Vent** Anal opening.
**Vermiculation** Irregular wavy, worm-like lines.
**Vertebrae** Segments comprising the spinal column.
**Vertebrate** Animals having a backbone or spinal column.
**Viviparous** Reproduction through the birth of living young that develop within the mother.
**Vocal sac** Inflatable pouch on the throat of male frogs and toads; filled with air, it resonates during calling.

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**Bold** numbers indicate illustrations within text.
*Italicized words are scientific names*


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ISBN 1-930369-00-X