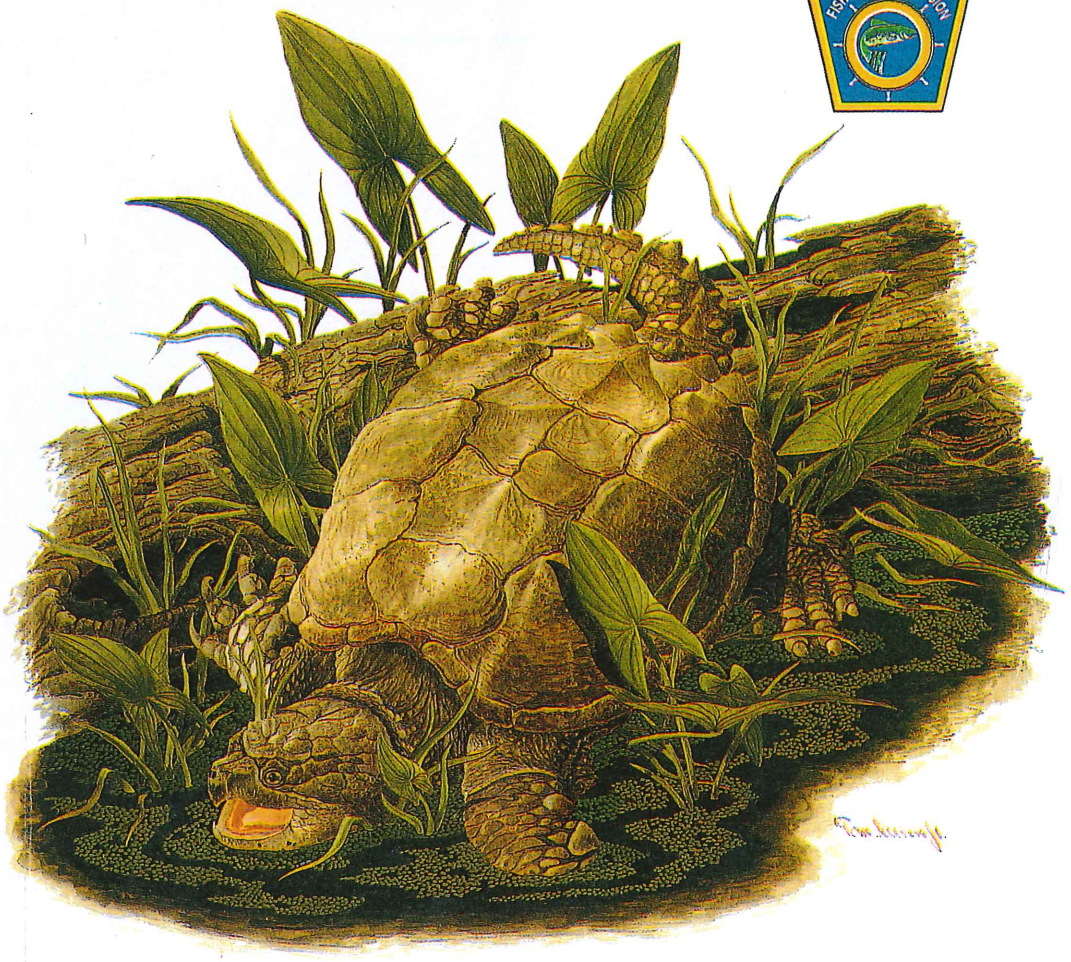
PENNSYLVANIA AMPHIBIANS & REPTILES



by Larry L. Shaffer

Massasauga Rattlesnake
front cover- Common Snapping Turtle

PENNSYLVANIA AMPHIBIANS & REPTILES

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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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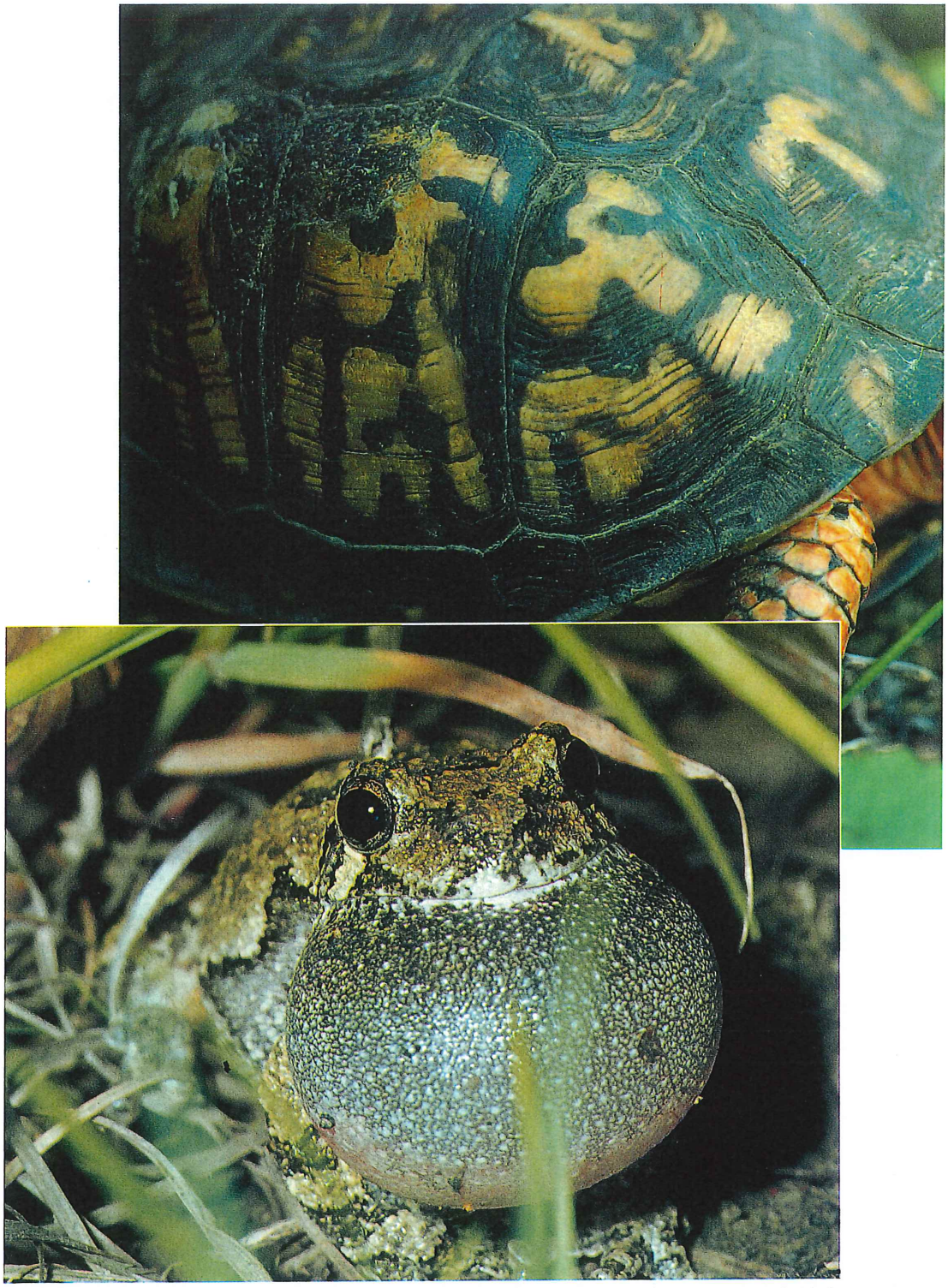


Figure I-2, With its single, bubble-like throat sac inflated, the eastern gray treefrog trills its song on a warm spring evening.

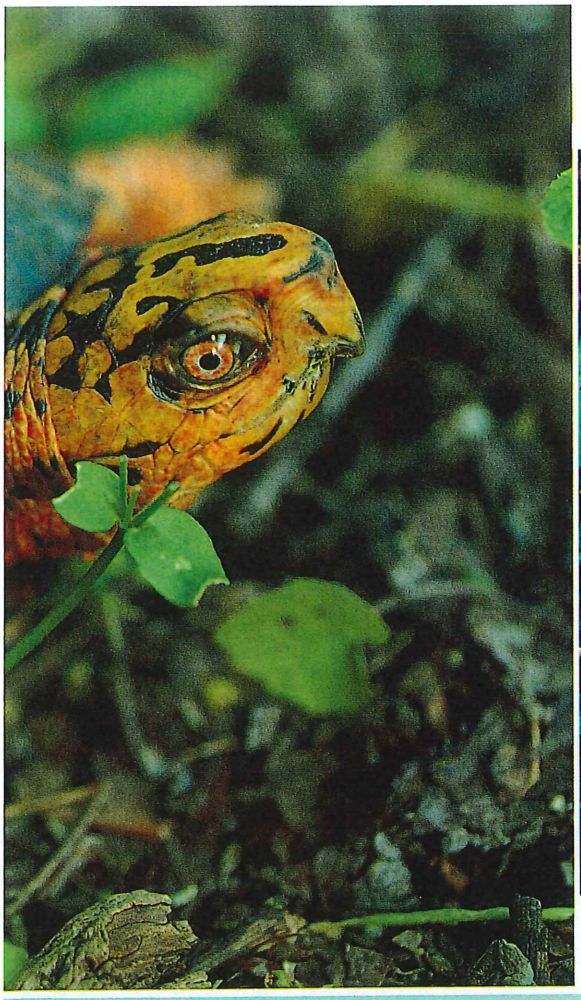


Figure I-1, Mainly terrestrial, the eastern box turtle is a frequent visitor around homes and gardens.

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

Chapter I

INTRODUCTION

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

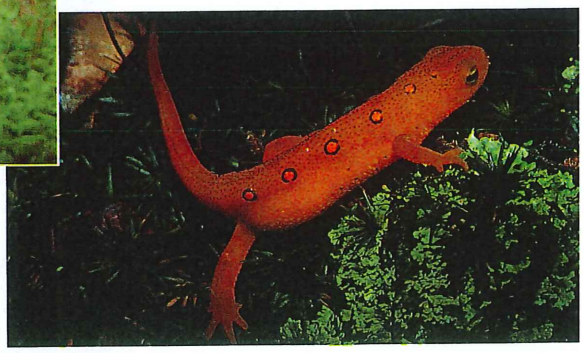


Figure I-3, The red eft is the land-dwelling sub-adult of the aquatic red-spotted newt.

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

Threatened Species

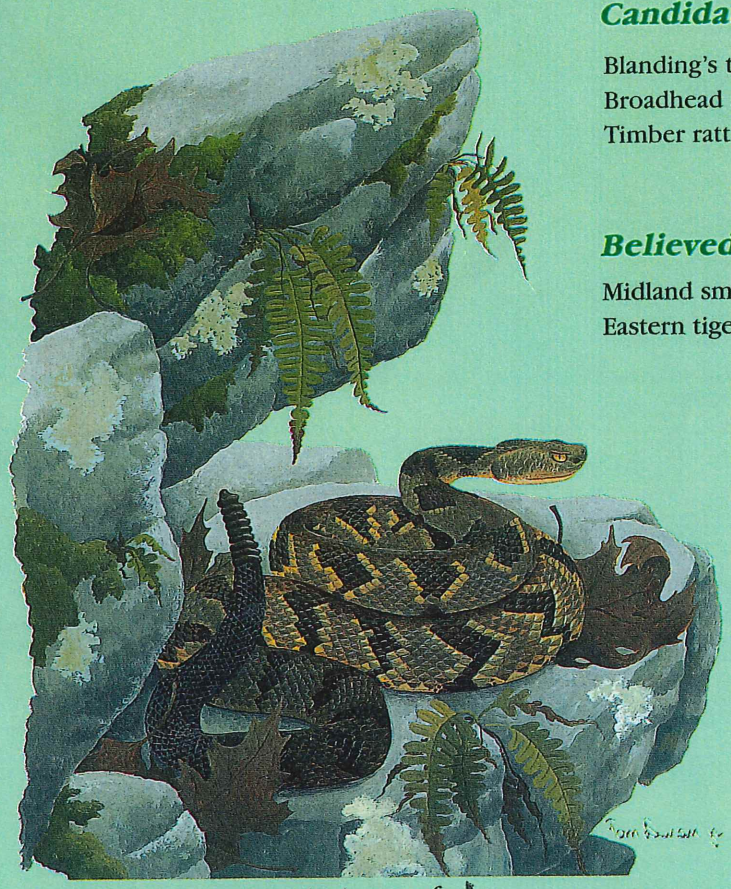
Green salamander
Red-bellied turtle
Rough green snake

Candidate Species

Blanding's turtle
Broadhead skink
Timber rattlesnake

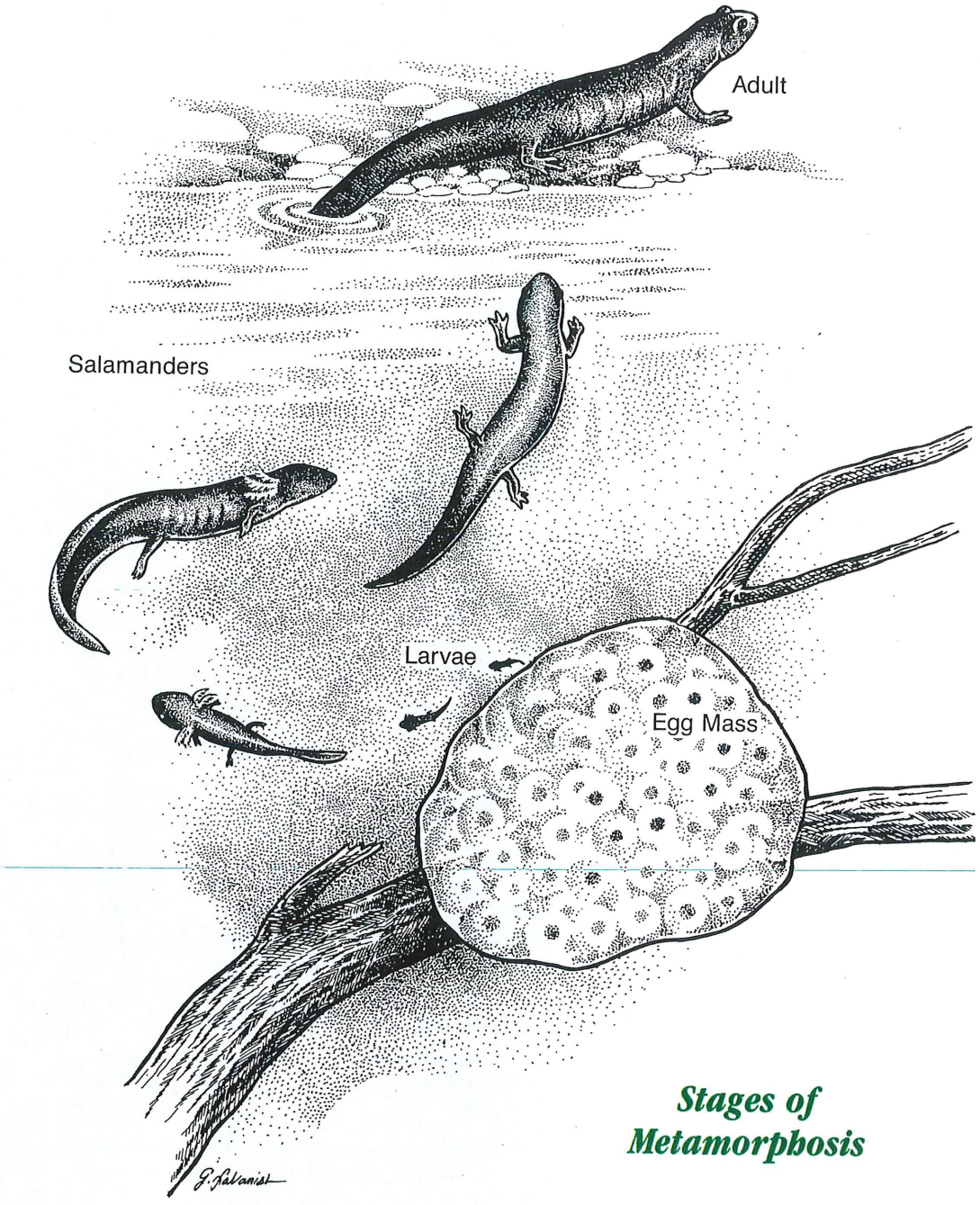
Believed Extirpated

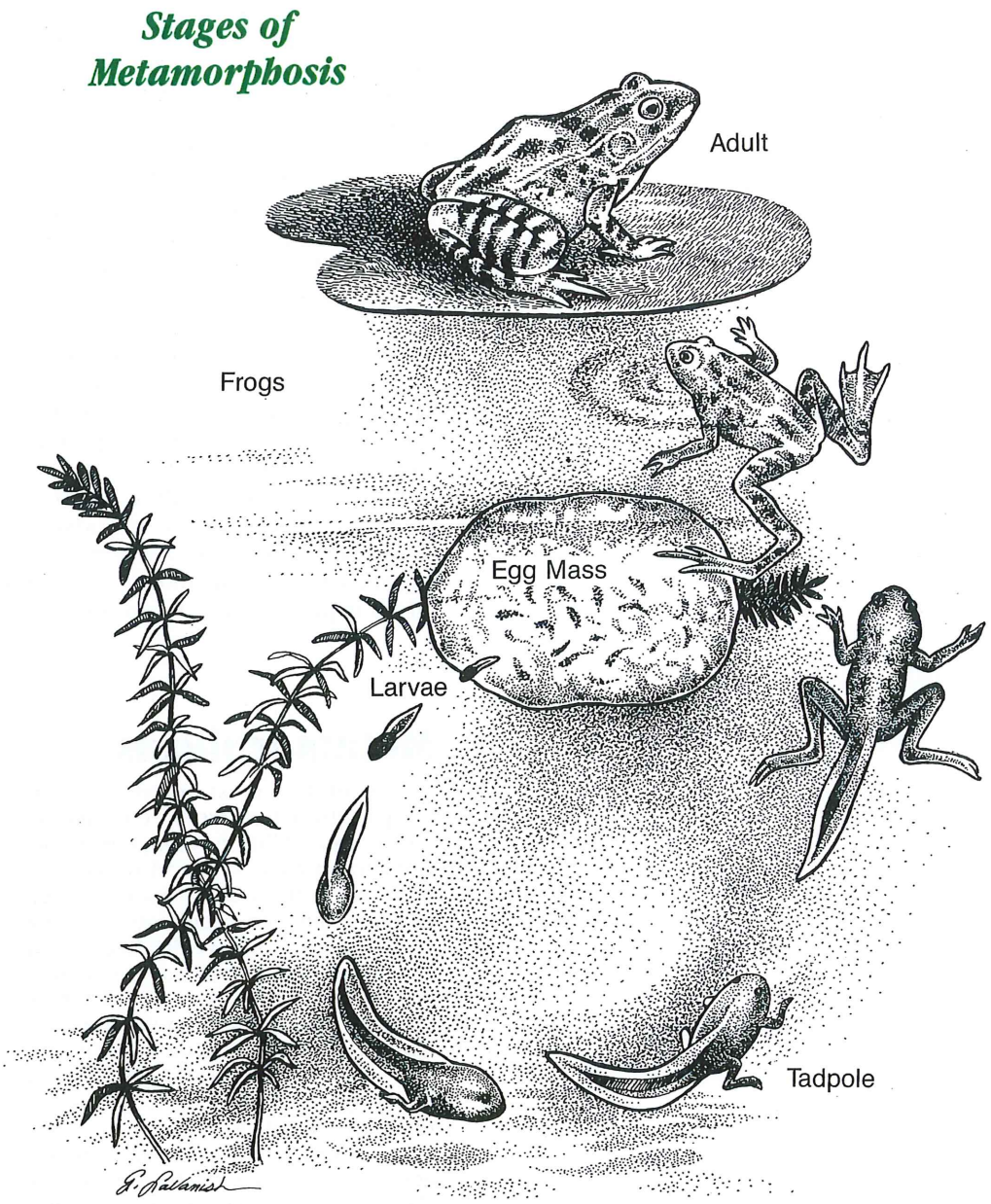
Midland smooth softshell turtle
Eastern tiger salamander



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


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

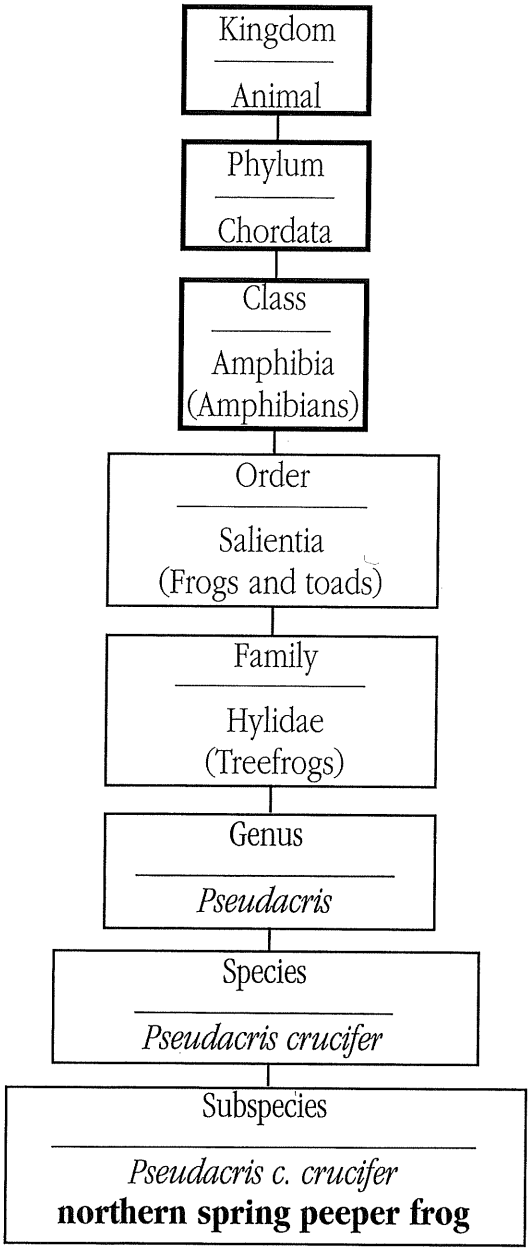


Figure I-9

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

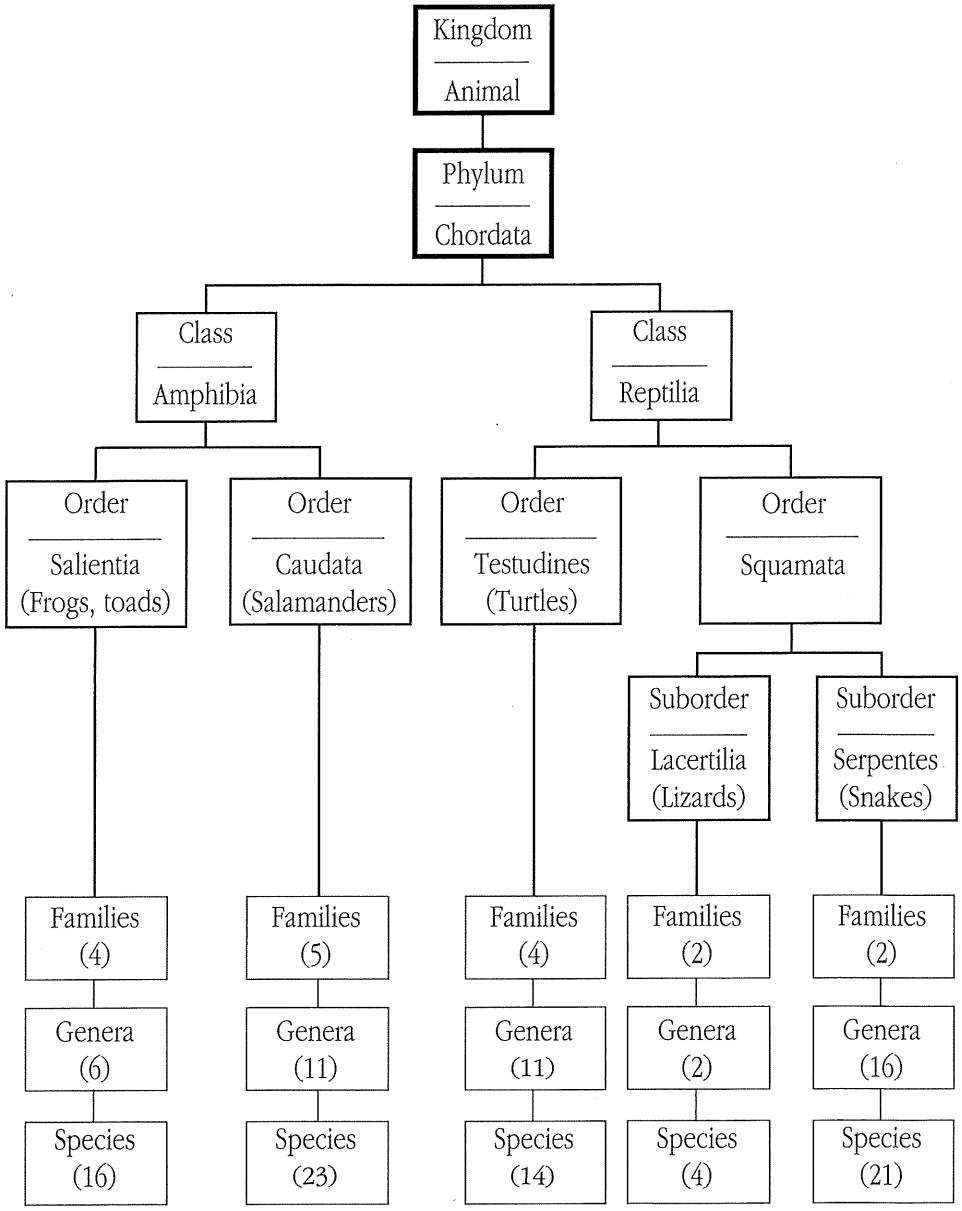


Figure I-8 illustrates how a particular animal, in this case the northern spring peeper frog, is classified through the various levels.

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.

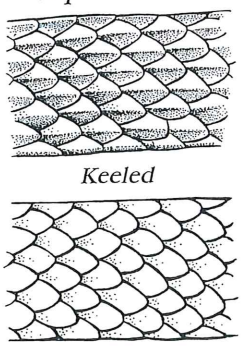
Now only a remnant of a formerly large group, reptiles today number just about 6,000 species worldwide, much less than during the time when reptiles dominated life on this planet. There are some 3,300 species of lizards, more than there are of snakes, which total about 2,200 species. Our oldest group 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

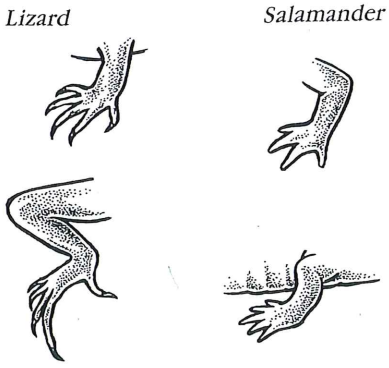


First, amphibians generally have soft, smooth skin. It is moist, glandular and permeable to water. This permeability to water is vital in many cases so that the animal is able to breathe. The skin becomes a respiratory organ allowing oxygen to enter the body while expelling carbon dioxide.

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).

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.

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 ar oviparous, a term used to indicate they produce eggs that hatch outside t

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.