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OF THE

DIVISION OF ZOOLOGY

FOR AUGUST AND SEPTEMBER.

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THE SERPENTS OF PENNSYLVANIA.

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DIVISION OF ZOOLOGY.

PROF. H. A. SURFACE, *Economic Zoologist, Editor.*

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PREFACE.

This Bulletin is issued as a Preliminary Report upon the Snakes of Pennsylvania, with special reference to their Food and Economic Features. It is designed more as a popular treatise upon this subject than as a deep scientific production. Owing to the fact that we could obtain but a few specimens of many of the species of serpents here discussed, and in many cases their stomachs were entirely empty, it is impossible to issue at this time a Report sufficiently full to be called Complete or Final. We are therefore continuing our investigations with all possible care, and as soon as we have sufficient material to justify it, we intend to publish a Second Report, which will contain many scientific features not given in this Preliminary Report. For example, there has been much confusion with the various scientific names for the same species of reptile, and to avoid this our Second Report will contain a full list of synonyms or different scientific names used, as well as bibliography or reference to the literature upon the various species discussed. It will also contain full scientific and popular descriptions of the different species of serpents found in this State, with illustrations of each, and detailed discussions of the variations actually found in a study of the different specimens from the different parts of the State, in comparison with typical specimens and descriptions. This local variation is of considerable interest to the student of species, and will be of great value to scientists as well as to others. It could not be put into this Preliminary Report, because we did not have enough specimens to justify drawing final deductions.

The Second Report will also contain as much as can be obtained from various observers and correspondents upon the haunts and habits of reptiles of this State, and will especially contain larger tables and charts concerning their food and breeding habits. More material is needed to advance these studies. We desire notes or written reports of observations, as well as specimens.

A copy of the Preliminary Report has been promised and is herewith sent to each person who has prior to its publication, sent us one or more specimens or serpents, turtles, lizards, frogs, toads or salamanders. It is hoped that all our obligations are herewith met in full. Persons desiring a copy of the Complete Report are requested to send us more specimens to aid in its completion. These

should be killed and sent by express at our expense or when packages are small by mail, for which postage will be refunded. A copy of the Report will be sent free to each person aiding our investigations by sending us written reports or specimens. The date of issue of the next Report will depend upon the number of specimens received. All persons desiring it are invited to contribute further specimens or written observations.

H. A. SURFACE,
State Zoologist.

Harrisburg, Pa.

ACKNOWLEDGMENTS.

In this Bulletin recognition should be made of the very valuable services rendered by my Assistants, especially Mr. Alfred F. Satterthwait, of Chester county, Clerk in the office of the Economic Zoologist. Mr. W. R. McConnell, Indiana county, Assistant, and Mr. P. H. Hertzog, of Lancaster county, Assistant, have taken great interest in this subject and have rendered valuable help that was essential in working out the details of this Bulletin. To the intelligent and indefatigable industry of Mr. Satterthwait, my clerk for more than a year, much credit is due.

We wish also to recognize the generosity and help that was given us by Mr. W. H. Fisher, 1318 Bolton street, Baltimore, Md., who contributed many of the excellent photographs of the living specimens which are used in making the plates for the Bulletin, and which give it an added interest.

We should also acknowledge the free use that has been made of the "Manual of Vertebrate Animals of the Northern United States," by President David Starr Jordan, and such literature as the publication of "Reptiles of Allegheny County, Pa.," by D. A. Atkinson, in the *Annals of Carnegie Museum*, Vol. I, and the Report of the Amphibians and Reptiles of New Jersey, by Dr. Witmer Stone, Philadelphia Academy of Science, in the *American Naturalist* for March, 1906, and other literature which will be cited in detail in the Second Report.

Acknowledgment should also be made of the assistance of such persons as Dr. Witmer Stone, Philadelphia, Mr. D. A. Atkinson, Carnegie Museum, Dr. R. L. Walker, of Carnegie, Pa., and others. Special mention should be made of the industry and skill of Mr. W. R. Walton, the artist in our office, who has taken an unusual interest in this subject and has been at great pains to have the charts and drawings which were made by him exactly accurate in all their details.

H. A. S.

CLASS REPTILIA. THE REPTILES.

A Reptile may be defined as a cold-blooded Vertebrate, breathing air all its life, never having gills, never using the oxygen in water, with a three-chambered heart, one condyle or lump on the base of the skull, and body covered with scales or plates. Strictly speaking they are not cold-blooded but are of the temperature of the surrounding air or water or objects on which they are found. Experiments in our office, with thermometers inserted in the throats of the reptiles, have shown that the temperature of the animals does not vary much from that of their surroundings.

There are three Orders of Reptiles represented in the State of Pennsylvania, which may be distinguished by the following Analytic Key:

A. Legs not developed. Order I. Ophidia. The Serpents.

AA. Four legs developed.

B. Body elongate, covered with small scales, teeth present. Order II. Lacertilia. The Lizards.

BB. Body shorter, broad, enclosed in a shell; no teeth. Order III. Chelonia. The Turtles.

(N. B. The Lizards and Turtles of Pennsylvania will be discussed in a future Bulletin. Many more specimens are desired. H. A. S.)

ORDER I. OPHIDIA. THE SERPENTS.

Serpents are animals which in their structure show by degradation, a highly specialized type or condition, and yet they are perfectly adapted to the apparently lowly life they lead.

Ignorance, mythology and superstition have combined to surround them with an atmosphere of dread. It is not only superstition but also ignorance and unnecessary fear which have rendered it impossible for many persons to study them carefully. As a consequence there are no other group of animals in this State concerning which there is so much fear and ignorance, and toward which there is so much cruelty almost uniformly shown in a relentless and unjust warfare.

Among the myths, fallacies or folk lore of serpents current in some parts of this State are the following:

1. Snakes sting with their tongues.
2. Snakes charm birds and people.
3. The green serpents are venomous.

4. There is such a creature as a Hoop Snake, which rolls like a hoop.

5. There is a Horn Snake, with a venomous horn at the end of its tail.

6. Snakes are blind once per month, and regularly during "dog days."

7. Snakes molt or shed their skin each month.

8. Serpents can blow out or spit poison.

9. Snakes chase and attack people without provocation.

10. Serpents and other reptiles are slimy.

11. Certain kinds of snakes milk or suck cows.

12. When snakes are killed the tails do not die until the sun goes down or until it thunders.

13. Kill a snake and turn it over to bring rain.

14. Snakes spring or jump from the ground at their victims.

15. Snakes strike from a truly coiled position.

16. When a firearm is pointed at the snake the reptile draws its own head and it is impossible to miss it or shoot it anywhere but in the head.

17. The yellow rattlers are females and the black, males.

18. A snake can be made to put out its legs by dropping it into fire.

19. Snakes lose their venom by being deprived of water for six days or more.

*20. Snakes are supposed to have medicinal properties as follows:

(a) Galls of snakes recommended for their bite.

(b) Their oil for rheumatism, baldness and deafness.

(c) Their skin worn for rheumatism and stiffness.

(d) A snake heart, oil or blood for consumption or other ills.

(e) Its flesh to be eaten for blood disorders or other troubles.

(f) A second bite of the same snake in the same place to cure or counteract its first bite.

(g) The rattles of snakes as charms.

(h) Other parts of serpents for various cures, preventives or charms.

The myths concerning serpents are numerous, and new bits of local folk lore of reptiles come to us every week. For example, it is a popular belief that snakes sting with the tongue. This may be due to the Scriptural expression, "stingeth like an adder." The Scripture did not say the stinging is done by the tongue, or is not done by the tooth, and the reader at once infers that the tongue is the stinging organ, and thus falls into a serious error.

*Since this Bulletin was set in type we have heard of the common belief that Snakes, Lizards, Frogs, Salamanders, etc., live in the human stomach. After many efforts this belief can not be verified, and we consider it a decided error.—H. A. S.

The tongue of the snake is its organ of touch, taste and perhaps in part also of smell, and possibly even of hearing. It is by this that it investigates the objects immediately around it. When it is seen to stick out its tongue it is making a critical inquiry of the surrounding objects and is not attempting to sting anything.

It is also popularly believed that snakes have the power to charm birds and the lower animals and even mankind, but with the most careful investigation, we can not find satisfactory evidences of the truth of this. It is true that some creatures, such as birds, and even some persons, become so terrified at suddenly seeing a snake that they act more or less helpless but this is quite different from being charmed.

Another common error is the belief that the green snakes are venomous because they are supposed to be filled with a poison that makes them look green. Of the three or four species of green snakes to be found in this State not one is of a dangerous type.

The old story of the Hoop Snake, which is supposed to take its tail in its mouth and roll down hill like a hoop, striking dead anything into which that venomous horn may fly, is very common but entirely without any foundation of truth. No specimen of Hoop Snake has been collected, notwithstanding an offer of a reward of $500.00 for one. Persons who believe such things have not considered that this habit would result in bringing all such reptiles down into the valleys where they must be found, as they would be unable to roll up hill again. Who will say he has seen a Hoop Snake rolling?

The Horned-snake is another myth, and although it has formed the basis for many newspaper stories, it has no truth. While there is a snake to which there is given the name of "The Horned Snake," it is quite harmless, and there is no such reptile as the mythological creature with a poisoned horn in the end of its tail, which it is able to stick into living objects, even trees, causing death or even milder injury, which is an absurd story frequently published. We shall pay well for specimens of Hoop Snakes or Horn Snakes.

No snakes are able to eject, throw or "spit" poison, nor by their blowing or hissing are they able to blow any poison or venom upon their victims. This is generally believed, notwithstanding the facts to the contrary.

A common error is the term "slimy," applied to serpents and other reptiles. Snakes are not slimy, nor are their bodies naturally moist, being covered with dry scales. One of the easily recognized differences between Lizards, which are Reptiles, and Salamanders, which are Amphibians, is that the latter are slimy and the former are not.

Another common belief is that the constricting species of ser-

pents wrap themselves around the necks of human beings and choke them. All stories of this kind, so far as we have been able to learn by the most careful investigation, are the results of active imaginations. Even the stories of snakes chasing people are, as a rule, generally exaggerated. It is true that blacksnakes will sometimes pursue timid persons who have disturbed them. That seems to be one of Nature's bluffs however, as the same reptiles will turn tail and depart in the most vigorous manner possible, when the pursued person has the courage to turn on it. Even if they do chase a person, they will not overtake nor attack him.

Among the myths must be classed the common belief that snakes milk or suck cows. This feat is not possible, and in our honest opinion never was performed. A recent newspaper article gave the name of a Connecticut farmer who was reported as having seen the Milk Snake sucking his cattle. We wrote to him for details, and he replied "A reporter lied about me."

How common is the absurd belief that a snake's tail does not die until sundown or until it thunders! When we were at home with the country boys we firmly believed with them that to kill a snake and turn it upside down would bring rain. Who knows other beliefs of this kind which they are willing to mail to us for our collection of literary curiosities?

Another popular erroneous belief is that snakes jump or spring from the ground at their victims. No snake is able to jump or spring but merely strikes from its zigzag coil, which is like the letter "S" placed horizontally. It can then only reach the distance that it is able to strike out from this double curve, which is rarely more than half the length of its body, and probably never more than three-fourths of its total length. No snake springs clear from the ground as it strikes, and none jumps through the air to its victim, although occasionally the blow may be delivered with such force as to turn the reptile over.

It is also believed by some persons that serpents coil in a regular manner, like the coil of a rope, and strike from such a coil. We have seen mounted specimens and drawings representing snakes coiled like a rope and ready to strike at their supposed victims, but these do not represent the truth. If a serpent should attempt to strike from a uniform coil, like a pile of rope, it would be obliged to turn over as many times as it was coiled, in order to make a straight line to the intended victim. While reptiles do coil partially, they keep the front part of the body free for striking from a zigzag or horizontal letter "S" position. It should also be remembered that no serpent can strike while stretched out or in an extended position.

A common belief is that when a gun or pistol is pointed toward a snake, the reptile puts its head in such a position as to draw the "bead" or line of sight to its own head, and thus it is thought to be impossible to shoot at a serpent which sees the weapon without hitting it. This is false, as we have seen demonstrated. Also it is commonly said that it is impossible to shoot a snake in any part excepting the head, on account of the common belief that the eye of the reptile keeps in line with the sites of the weapon. We have known where rattlers and other serpents have been shot through the body and not through the head, and this proves the error of another myth.

It is also commonly said that the yellow color of the Rattle Snake denotes a female individual, while the black color always indicates a male. Our dissections have proven that this is not always the case, although these colors appear to predominate or be more common in each sex respectively.

From ancient times until the present there has been a common saying that snakes can be made to throw out their legs by dropping them into a fire. This is purely a myth and without any other foundation than the probability that the sudden contraction of the muscles of the body may force out certain internal organs.

We have recently 'earned that there is a common saying in the northern part of the State that if a rattle snake or a copper head be deprived of water for six days they will lose their venom, or in other words their poison becomes ineffective. There is no truth in this for the tendency would be to make the poison stronger rather than less efficient.

There is a general belief in the medicinal qualities of certain parts of snakes. It is enough to say that these are founded in superstition, and that no part of any serpent has any medicinal value. Nevertheless we frequently hear of a person recommending such remedies as the gall of a snake for snake bite; its oil for rheumatism, baldness and deafness; and its skin to be worn like the skin of an eel for similar troubles. It is a remarkable fact that in some parts of this State the oil of snakes has a very high commercial value for its supposed curative qualities. It is thought to be a sovereign remedy for deafness, but there is no reason why this is any better than any other oil. We have recently learned of the heart of a Rattle Snake being swallowed while fresh for consumption, and the flesh and blood have been recommended for certain ills. It is also generally believed, not only in America but in other parts of the earth that if a snake can be made to bite a second time in the same place it will, by so doing, cure the ills inflicted by its first bite. This is, of course, nonsense, as are the

other superstitious beliefs and quack remedies above outlined. No snake and no part of any snake has any curative or medicinal quality whatever, and persons who trust in them are doing so at the peril of their own welfare.

We recently learned that a family in Lancaster county took a long journey into Schuylkill county to obtain the oil of a rattle snake to mix with whiskey as a remedy for consumption. In this particular instance the person who was afflicted with the disease did not recover, and this is a proof of the ineffectiveness of such quack remedies.

Queer Facts.

1. Some serpents swallow their young for temporary protection.
2. Some snakes play "possum," or act dead, as a means of defense.
3. Some snakes lay eggs; others bear young.
4. Fangs of serpents are renewed or grow in again after being extracted.
5. The young Black Snake is gray and spotted and often mistaken for the Spotted Adder, Water Snake or Copperhead.
6. Snakes can live a year or more without food.
7. Serpents often eat one another.
8. Some species of snakes are beneficial as insect-eaters and others as destroyers of mice and other obnoxious rodents (mice, rats, etc.).
9. Two-headed snakes aré not uncommon.
10. Snakes and other reptiles are not "cold-blooded," but are the temperature of their surroundings.

Concerning serpents there are many things that are true which are as interesting, and in fact as marvelous, as the many myths that are generally accepted. Among these is the fact that some snakes are known to swallow their young for temporary protection, as has been observed and reported to us by several reliable persons. While we have not been so fortunate as to have observed this personally, yet we can not deny that certain species of snakes afford temporary refuge in time of danger to their own young, which run down the throat of the parent. It is not known as yet just what species or kinds of snakes have this habit and what do not, but it is known to be true of the Garter Snake and probably also of the Water Snake. Prof. W. L. MacGowan, superintendent of the schools of the city of Warren, reported to us that he had seen a Garter Snake swallow her young for protection no less than four times in his life, and an Erie county school teacher reported that an old Garter Snake with her family of young lived under a bank

on the hill near the school house and nearly every day at noon some of the pupils would go up the hill and frighten the old Garter Snake to see the young ones run down her throat. She would then go into a hole and no doubt permit them to escape at once from their living cell.

Professor MacGowan said that in those which he had observed the young remained in the body of the parent about five minutes. It is probable that this habit is confined mostly, if not entirely, to those species of serpents which bear young rather than reproduce by laying eggs. We wish to make further observations along this line and consequently request readers to send us for dissection recently killed specimens of all kinds that may be suspected of having swallowed their young for protection.

Few people know that the Hog-nosed Adder or Blowing Viper has the habit of acting dead or "playing possum" when it thinks there is no other means of escape. This peculiarity is described more at length in one of the following pages.

It does not appear to be generally known that the fangs of serpents when pulled or drawn to render them harmless, will develop and become dangerous again within a few weeks after pulling. If these be drawn, others will grow again, and this will be repeated several times. It is lack of this knowledge which sometimes results in injury for persons who have pulled the fangs of venomous serpents and then considered themselves safe to keep them as pets for some time.

There is a great variation in the colors of snakes, and but few persons know that the young Black Snake is light in color and spotted with gray in such a manner as to be mistaken frequently for the Spotted Adder or House Snake and sometimes for young Copperheads.

The fact that serpents are able to live a year or even more without food is demonstrated in a specimen of Copperhead which we have recently received and which before being sent to us was kept for a year and three months without eating any of the food that was offered to it. It is also interesting to know that snakes are cannibals, as some kinds at times devour individuals of other species.

In the text books, snakes and other reptiles are called cold-blooded and there is a common impression that they are truly so, but the fact is that these animals are the temperature of their surroundings. We have tested this several times recently with a thermometer and can say that the temperature of such serpents does not differ from that of its surroundings where it has remained long enough to become of the same temperature.

Molting or Shedding, and Color.

It is often believed that snakes go blind during dog days, and that they are blind once each month at the least, and that molting or casting off the skin occurs each month, etc. There is just enough truth in this belief to keep it in existence. Snakes do molt or cast off the epidermis, or outer skin which becomes dry or hard, and without being shed or cast off the owner could not grow. This molting is generally not more than two or three times a year and depends on the rate of growth of the reptile, which, in turn, depends upon the supply of food. At such times the clear glassy cuticle which passes over the eye, without an opening, becomes loosened from the eye and assumes a milky appearance. It is then that the snake is temporarily blind but only for a short time.

The color of snakes varies greatly, even in the same species and depends more upon the stage of molting than upon anything else. The snake which has recently shed its skin has very bright colors, and as it becomes older it becomes darker and duller in appearance. This molting take place by the outer skin becoming loosened around the lips and turning backward inside out. Sometimes the entire "skin," or epidermis, is left whole or unbroken. However, at the tip of the tail, around the eyes, and around the mouth, can be seen very plain evidences that it has been turned inside out in the process of shedding. This provides not only for a new coat but especially for the growth of the former wearer.

How Snakes Feed.

The method of feeding is very peculiar and interesting, as they frequently swallow objects which are much larger around than themselves. They are the only creatures which are able to do this. This possibility is due to their being provided with an extra bone called the Quadrate bone, hinging between the upper and lower jaws, which makes it possible for the mouth to open to an extreme extent, while the lower jaw itself will separate at the front edge by spreading sidewise, allowing the jaws to spread open in two directions when necessary. In capturing their prey, some species, known as the constrictors, squeeze it until it is killed and then proceed to swallow it. Others strike their food and hold it, and by an imperceptible movement of the jaws they gradually work it around so they can swallow it lengthwise. Some species of the poisonous reptiles may strike their prey with the poison fangs and thus kill it before eating, but when it is possible they avoid wasting the venom and do not kill their food by poison before eating. It should here be added that the venom of the two venomous species in this State,

the Rattle Snake and the Copperhead, is not an internal poison, or is not injurious if taken inwardly (unless an internal scratch should let it into the blood), and its fearful effects occur only when the poison is injected into the blood system.

Some of the serpents which kill their prey before eating, cover it with a slime before swallowing, if it be of large size. We know definitely of snakes covering rabbits with slime before attempting to swallow them. It is probable that only those animals which are covered with hair or feathers, or are very dry, like the toad, are thus treated before they are swallowed.

How Snakes "Run" or Move.

A serpent literally walks on the ends of its ribs. That is to say, the ribs are jointed to the back bone, and as they extend down over each side of the body their ends are in connection with the ventral plates, which have projecting edges at their rear margins. As these plates hold to the objects beneath the animal its body is brought forward upon the supporting and movable ribs. In this method of locomotion is to be found the explanation of why snakes can not run on smooth glass nor upon such objects as brussels carpet. Glass is so smooth that the ventral plates are unable to hold to it, and after they have been thrown forward the animal can not carry itself along. In attempting to crawl on brussel carpet the surface of which is composed of small upright stiff threads, the piling springs backward by the pressure of the ventral plates when the reptile attempts to move itself forward, and it thus fails to find a leverage, just as upon the smooth glass.

Do Snakes Lay Eggs?

This is a question commonly asked, the answer to which many persons do not understand. It is known that some species of serpents lay eggs, as farmers often plow them up and upon opening them they find the embryonic snake within the leathery covering. The eggs of the same species vary in size and shape, but are almost always oval in outline, and covered with a thick, soft, pliable, light-colored leathery membrane. As a rule, it is the constricting snake, or those which kill their prey by squeezing it, that lay eggs. However, there are other species of snakes that bear living young, or more strictly, give birth to young which are enveloped in a very thin membrane at the time they are born, and thus their method of reproduction is to be compared to the laying of an egg which hatches the time it is laid. The egg-laying species are called oviparous, and those species that bear living young are called ovovi-

viparous. Scientists make a distinction between those animals bearing living young which represent the laying of an egg that hatches at the time it is laid, and those bearing young which have been nourished by direct connection with the circulatory system of the parent. An animal with the former method of reproducing the young is called ovoviviparous. In this the embryo or undeveloped young is nourished by a yolk within the thin membrane, and this embryo remains and develops until the yolk is all absorbed, when it is practically hatched and born at the same time. There is no vital nourishing connection as in the case of the viviparous animal, such as the mammals or hairy quadrupeds. With this explanation we can say that snakes are oviparous or ovoviviparous, and are not to be called viviparous, although bearing living young. In this State no reptile produces more than one brood of young per year. The oviparous or egg-laying species, as a rule, produce many more offspring in a brood than do the ovoviviparous species of the same size. One reason for this is that with the latter the young are much larger than the eggs would be, and occupy a great deal more space. Thus, in making provision for the increased size of the undeveloped young, the only thing that nature can do is to reduce the number.

The relationship, which we believe only general, but of which we have seen no published statement, is that most of the oviparous or egg-laying species of serpents belong to the constricting group, which kill ther prey by squeezing it; while most of the ovoviviparous serpents are species which take their prey with their mouths, and do not kill by constricting. The explanation for this may be that if the serpents of the latter group should exert pressure sufficient to kill their victims it would also crush the embryos or undeveloped snakes, which are protected only by a thin membrane. Thus the constrictors, like the Black Snakes, lay eggs that are covered with thick protecting membranes, which are soon laid, and the embryos of which are not injured by the pressure which is often needed for the parents to kill their prey.

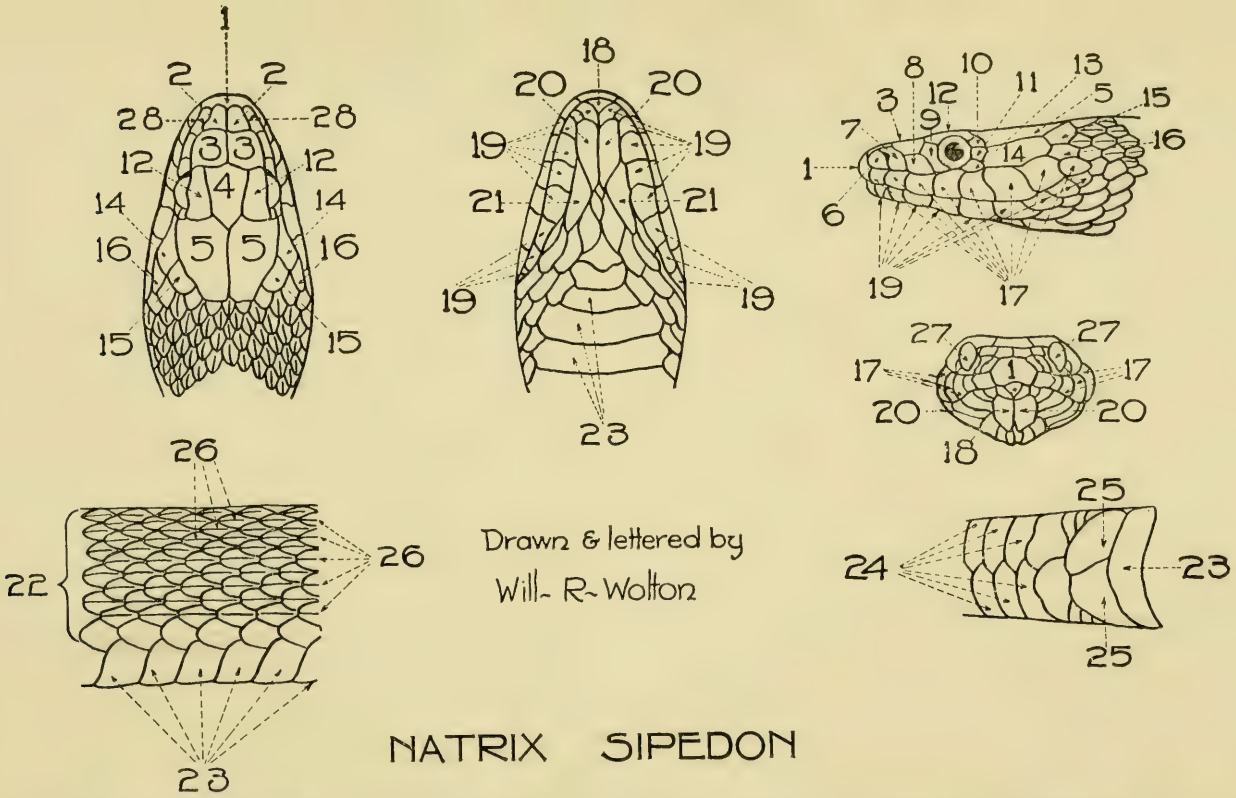
Remedies for Snake Bites.

Remedies for snake bites are of considerable importance, as it must be remembered that two venomous snakes, the Copperhead and the Rattler, are abundant in certain parts of this State, and even during this summer there have been reports of human beings dying from the bites of rattlers as well as copperheads within the Commonwealth of Pennsylvania. We have verified these reports by correspondence and must recognize their accuracy.

When a person is bitten by a venomous snake the first thing to do is to place a ligature as tightly as possible between the wound

and the heart to keep the poison from being carried to the heart in the circulatory system. This can often be done by tearing some article of clothing into strips, tying it tightly around the bitten member between the bite and the heart, and twisting it as tightly as possible with a stick put through the band of ligature. The next step is to suck or squeeze out all the poison possible. This is greatly aided by opening the wound with a knife or other sharp instrument. The third step is to rub permanganate of potash into the wound. This is the best possible remedy for snake bites, and in places where venomous snakes are found permanganate of potash should be at hand ready for immediate use by any one who is exposing himself to their attacks. It is well for persons on fishing or berrying expeditions, or on outings, to carry with them some of this material, which is very inexpensive, and is easily carried wrapped in paper. No evil effects to the human system will come from using too much of it, and thus it is perfectly safe in the hands of an unskilled person. The fourth and last step in the treatment of snake bites it to give a good heart stimulant, the best of which is the injection of one-twentieth of a grain of strychnia. Most cases of death or serious results from snake bites are due to the effects of the poison on the heart, and this is why whisky is so often regarded as a sovereign remedy. It is entirely wrong for a person who is bitten by a venomous snake to fill himself with whisky and expect this to be the only remedy necessary. In most cases it may be a decided help, but it should be a last resort rather than a first. Wherever it is possible the services of a physician should be secured, although the treatment mentioned above should be given as far as possible as soon as the poison has been injected. It is useless to depend upon some of the reputed remedies, such as the gall of the snake taken internally, or a second bite by the same snake at the same place, or powwows of any kind. Prompt action and common sense will do more to prevent evil effects from snake bites than anything else.

We wish here to call attention to the idiotic practice of some persons who try to be smart by frightening others with snakes, whether they be dead or alive, harmless or otherwise. Severe punishment should be administered to the boy who attempts to frighten others, especially girls, with snakes however small or harmless they may be. While the fear of snakes is generally based on ignorance, we should respect the feelings of others and remember that serious results may come from being thus frightened. One example should be enough to put an end to this practice forever. Some years ago some school children were playing in a school yard near the centre of this State and the boys found a small snake. There



NATRIX SIPEDON

PLATE XV.—Showing Structural Characters Used in the Classification of Serpents, as Illustrated by the Spotted Water Snake (*Natrix sipedon*).

1, Rostral plate; 2, Internasal plates; 3, Prefrontal plates; 4, Frontal plate; 5, Occipital plates; 6, Anterior nasal plates; 7, Post nasal plates; 8, Loral plates; 9, Preorbital plates; 10, Upper postorbital plate; 11, Middle postorbital plate; 12 Superciliary plates; 13, Lower postorbital plate; 14, Temporal plates; 15, Upper post temporal plates; 16, Lower post temporal plates; 17, Upper labial plates; 18, Mental plate; 19, Lower labial plates; 20, Anterior inframaxiliary plates; 21, Posterior inframaxiliary plates; 22, Scales, or "Dorsal Scales;" 23, Gastrosteges, or "Ventral Plates;" 24, Urosteges or "Tail Plates;" 25, Anal plate (Divided); 26, Keels on scales; 27, Eyes; 28, Nostril. Natural Size. Drawn in the office of the Economic Zoologist.

PLATE XVI.—Ground Snake (*Carphophiops amœnus*).
Photographed alive and in Natural Surroundings by Mr. Wm. H. Fisher, Baltimore, Md.

PLATE XVII.—DeKay's Snake or Rock Snake (*Storeria dekayi*).
Photographed alive and in Natural Surroundings, by Mr. Wm. H. Fisher, of Baltimore.

PLATE XVIII.—Ribbon Snake (*Thamnophis sauritus*).
Photographed alive and in Natural Surroundings, by Mr. Wm. H. Fisher.

was one boy in the group who was inexpressibly afraid of such creatures, and to tease him the boys threw it at him. It wrapped itself around the neck of the timid boy, while he fell to the ground in a faint. It was regarded for a moment as a great joke, but as the boy did not recover readily it became more serious. That boy is to-day a raving maniac in one of the insane asylums of Pennsylvania. He was at one time a bright and happy boy, and had it not been for the thoughtlessness of his companions he might have been to-day a most useful citizen instead of a man with dethroned reason.

KEY TO PENNSYLVANIA FAMILIES OF THE ORDER OPHIDIA.

A. No pit between the eye and nostril; pupil of eye circular; no erectile fang nor poison gland in upper jaw; plates under tail divided by a middle line; body generally slender and tail long. Family 1. Colubridæ. Colubrine or Constricting Snakes.

AA. Pit between the eye and nostril; pupil of eye vertically elliptical; erectile fangs with poison glands in each upper jaw; plates under tail (urosteges) not divided by line, but extending clear across; body always heavy and tail always short. Family 2. Crotalidæ. The Rattle Snakes and Copperheads. (Page 185.)

Family 1. *Colubridæ.* The Colubrine or Constricting Snakes.

This is the family to which all serpents of this State belong except the Rattle Snake and the Copperhead, which belong to the Crotalidæ. (Page 175). The Colubrine Serpents, or members of this Family, can be known by (a) entire absence of the perforated fangs, (b) only solid teeth present in the upper jaw, (c) no poison or poison glands, (d) the subcaudal plates (urosteges) arranged in pairs by being divided along the middle line under the tail by a line or suture, (e) no pit between the eye or nostril, (f) the pupil of the eye always circular in shape, and (g) the tail always as large as the length of the body.

They do not all attack their prey by constricting or squeezing, but all the constrictors belong here. It is a large family, with over 700 known species, found in nearly all parts of the world. There are about 21 species of this family to be found in this State. Some of them are oviparous, and some ovoviviparous, or bear young nourished by a yolk enclosed in a thin membrane. The habits of each will be discussed in turn under its own specific name.

KEY TO THE SPECIES OF COLUBRIDÆ OR COLUBRINE SNAKES IN PENNSYLVANIA.

(a). SYSTEMATIC STRUCTURAL KEY.

1. Head not distinct from body, which iscylindrical and rather rigid. 2.
   Head more or less distinct from body, which is not especially rigid. 3.
2. Scales in 13 rows; Nasal single. No.1. *Carphophiops amœnus* (Say). Page 133.
   Scales in 15 rows; Nasals two. No. 2. *Virginia valeriæ* (B. & G.) Plate XV.
3. Rostral plate normal, not recurved nor keeled. 4.
   Rostral plate long, upturned. No. 21. *Heterodon platirhinus* (Latr.) Page 180.

4. Anal plate divided. 5.
   Anal plate not divided. 17.
5. Dorsal scales keeled more or less. 6.
   Dorsal scales not keeled. 15.
6. Nostril between two nasal plates. 7.
   Nasal single, pierced by nostril. 14.
7. Prefrontals two. 8.
   Prefrontal single. No. 3. *Haldea striatula.* (L.) Plate XV.
8. Loral plate present. 9.
   Loral plate absent. 13.
9. Scales on back and sides all keeled. 10.
   Scales on sides not all keeled. 12.
10. Scales 19 to 21 rows.
    Scales in 23 rows. No. 11. *Natrix sipedon* (L.) Page 152.
11. Without yellow lateral stripe; lower row of scales smooth. No. 9. *Reginia rigida* (Say). Page 150.
    With yellow lateral stripe; Scales all keeled. No. 10. *Reginia leberis* (L.) Page 150.
12. Scales in 27 rows. No. 12. *Callopeltis obsoletus* (Say). Page 157.
    Scales in 25 rows. No. 13. *Callopeltis vulpinus* (B. & G.) Page 161.
13. Scales in 15 rows. No. 4. *Storeria occipitomaculata.* (Storer). Page 136.
    Scales in 17 rows. No. 5. *Storeria dekayi* (Holbr.) Page 138.
14. Scales in 19 rows. No. 6. *Clonophis kirtlandi* (Kenn). Page 140.
    Scales in 17 rows. No. 14. *Opheodrys aestivus* (L.) Page 162.
15. Nasal single. No. 15. *Liopeltis vernalis* (DeKay). Page 164.
    Nasals two. 16.
16. Head flat, preoculars equal in size. No. 18. *Diadophis punctatus* (L.) Page 171.
    Head not degressed; upper preocular larger than lower. No. 16. *Bascanion constrictor.* (L.) Page 166.
17. Dorsal scales all or part of them keeled. 18.
    Dorsal scales not keeled. 20.
18. Scales 29. No. 17. *Pituophis melanoleucus* (Daudin). Page 171.
    Scales 19.19.
19. Lateral stripes on 3rd and 4th rows of scales. No. 7. No. 7. *Thamnophis saurita* (L.) Page 141.
    Lateral stripes on 3rd and 4th rows of scales. No. 8. *Thamnophis sirtalis* (L.) Page 143.
20. Ventral plates 210 to 240, chiefly black with yellow lines. No. 19. *Lampropeltis getulus.* (Say). Page 174.
    Ventral plates 180 to 210, grayish with black borders around brown blotches. No. 20. *Lampropeltis doliatus var. triangulus* (Boie). Page 174.

(For the Key to Crotalidæ or the Venomous Snakes, see page 186).

(b). SIMPLE STRUCTURAL KEY.

A. Scales not keeled, or AA.
B. Anal plate bifid or divided, or BB.
C. Scales in fewer than 20 rows, or CC.
D. Scales in 13 rows. No. 1. Ground Snake. Page 134.
DD. Scales in 15 to 17 rows.
E. Ventral plates not as many as 165, or EE.
F. Ventral plates about 120. No. 2. Valeria's Snake. Page 135.
FF. Ventral plates about 140.
G. Blackish, with yellow collar. No. 18. Ring-necked Snake. Page 171.
GG. Green, no collar. No. 15. Grass Snake. Page 164.
EE. Ventral plates more than 165, about 185. No. 16. Black Snake. Page 166.
CC. Scales in 25 or 27 rows. (Middle scales slightly keeled.)
D. Scales in 27 rows. No. 12. Pilot Snake. Page 157.
DD. Scales in 25 rows. No. 13. Fox Snake. Page 161.
BB. Anal plate entire.

C Ventral plates 210 to 240. No. 19. King Snake. Page 174.
CC. Ventral plates 180 to 210. No. 20. Milk or House Snake. Page 174.
AA. Scales keeled.
B. Anal plate entire, or BB.
C. Scales 29. No. 17. Pine Snake. Page 171.
CC. Scales 19. (The Garter Snakes; Thamnophis). Page 141.
D. Lateral stripe on third and fourth rows of scales. No. 7. Ribbon Snake, Striped Garter Snake.. Page 141.
DD. Lateral stripe on second and third rows of scales. No. 8. Garter Snake, Common. Page 143.
BB. Anal plate bifid or divided.
C. Scales in fewer than 20 rows, or CC.
D. Scales in 15 to 17 rows, or DD.
E. Green; tail 1-3 of length. No. 14. Green Snake. Page 162.
EE. Brownish (never green); tail not 1-3 length.
F. No black dots on back; loral plate present. No. 3. Brown Snake. Page 135.
FF. Black dots on back; no loral plate.
G. Scales in 15 rows. No. 4. Red-bellied Snake. Page 136.
GG. Scales in 17 rows. No. 5. Rock Snake. Page 138.
DD. Scales in 19 rows.
E. Spots both above and beneath. No. 6. The Red Snake. Page 140.
EE. Stripes but no spots.
F. Lower row of scales smooth. No. 9. Rigid Queen Snake. Page 150.
FF. Scales all keeled. No. 10. Striped Water Snake. Page 150.
CC. Scales in more than 20 rows.
D. Snout not flat, pointed nor keeled, or DD.
E. Ventral plates fewer than 160. No. 11. Spotted Water Snake. Page 152.
EE. Ventral plates more than 200.
F. Scales in 27 rows. No. 12. Pilot Snake. Page 157.
FF. Scales in 25 rows No. 13. Fox Snake. Page 161.
DD. Snout flat, pointed and keeled. No. 21. Spreading Adder. Page 180.

(For the key to our species of Crotalidæ—Rattlers and Copperheads—see Page 186.

(c). COLOR KEY FOR PENNSYLVANIA SNAKES.

1. Without fangs; no pit between eye and nostril. 2. Family 1. Colubridæ.
   With fangs, and pit between eye and nostril. 25. Family 2. Crotalidæ.
2. Body uniformily colored above, without other markings. 3.
   Body with spots or stripes above 8.
3. Color brown. 4.
   Color greenish or black. 5.
4. Scales not keeled—smooth. No. 1. Carphophiops amœnus (Say). Ground Snake. Page 134.
   Scales keeled—rough. No. 3. Haldea striatula (L.) Brown Snake. Page 135.
5. End of snout pointed and upturned. No. 21. Heterodon platirhinos (Latr.). Spreading Adder. Page 180.
   End of snout not pointed nor upturned. 6.
6. Color green or greenish. 7.
   Color black or bluish black. 6a.

6a. Belly slaty blue. No. 16. Bascanion constrictor (L.). Black Snake, Page 166.
   Belly with dark blotches. No. 12. Callopeltis obsoletus (Say). Pilot Snake. Page 157.

7. Scales smooth. No. 15. Liopeltis vernalis (DeKay). Grass Snake. Page 164.
   Scales keeled. No. 14. Opheodrys æstivus (L.). Green Snake. Page 162.
8. Tip of snout upturned. No. 21. Heterodon platirhinos (Latr.). Spreading Adder. Page 180.
   Tip of snout not upturned. 9.
9. Top of head bright copper-colored. No. 13. Callopeltis vulpinus (B. & G.).

Fox Snake. Page 161.
Top of head not coppery. 10.

10. Belly reddish or salmon-colored. 11.
Belly not reddish. 13.

11. Uniform color below, without markings. 12.
With two rows of black spots below. No. 6. Clonophis kirtlandi (Kenn.). Little Red Snake. Page 140.

12. Three pale spots on back of head; scales keeled. No. 4. Storeria occipitomaculata (Storer). Red-bellied Snake. Page 136.
Yellow band around neck; scales smooth. No. 18. Diadophis punctatus (L.). Ring-necked Snake. Page 171.

13. Stripes above, but no large spots nor blotches. 14.
Above with stripes and spots or spots alone. 18.

14. Yellowish below. 15.
Greenish below. 16.

15. Belly with two brown bands; lower row of scales smooth. No. 10. Regina leberis (L.) Striped Water Snake. Page 150.
Belly blotched; scales all keeled. No. 9. Regina rigida (Say). Rigid Queen Snake. Page 150.

16. Dots bordering dorsal stripes. No. 5. Storeria dekayi (Holb.). Rock Snake. Page 138.
Dots not bordering dorsal stripes. 17.

17. Lateral stripe on third and fourth rows of scales. No. 7. Thamnophis saurita. (L.). Ribbon Snake. Page 141.
Stripe on second and third rows of scales. No. 8. Thamnophis sirtalis (L.). Garter Snake. Page 143.

18. Scales smooth. 19.
Scales rough. 21.

19. Markings grayish with scattered minute black dots. No. 2. Virginia valeriæ. (B. & G.). Valeria's Snake. Page 135.
Markings in the form of spots or blotches. 20.

20. Black, with small yellowish spots or narrow yellowish lines. No. 19. Lampropeltis getulus sayi (Holb.). King Snake. Page 174.
Grayish, with brown blotches. No. 20. Lampropeltis doliatus triangulus (Boie). House Snake. Page 174.

21. Spots not distinct; blackish; scales white-edged. No. 12. Callopeltis obsoletus (Say). Pilot Snake. Page 157.
Spots distinct. 22.

22. Ground color whitish. No. 17. Pituophis melanoleucus (Daudin). Pine Snake. Page 171.
Ground color dark. 23.

23. Belly blotched. No. 11. Natrix sipedon (L.). Spotted Water Snake. Page 152.
Belly not blotched. 24.

24. Stripes and squarish spots. No. 8a. Thamnophis sirtalis sirtalis (L.). Striped Garter Snake. Page 141.
Spots, but no stripes. No. 8b. Thamnophis sirtalis ordinatus (L.). Spotted Garter Snake. Page 143.

25. With no rattles at end of tail. No. 22. Agkistrodon contortrix (L.). Copperhead Snake. Page 186.
With rattles at end of tail. 26.

26. Blotches on back in seven series; rattles small. No. 23. Sistrurus catenatus (Rafin.). Prairie Rattle Snake. Page 190.
Blotches on back in three rows, forming zigzag cross-blotches; rattles large No. 24. Crotalus horridus (L.). Common Rattle Snake. Page 191.

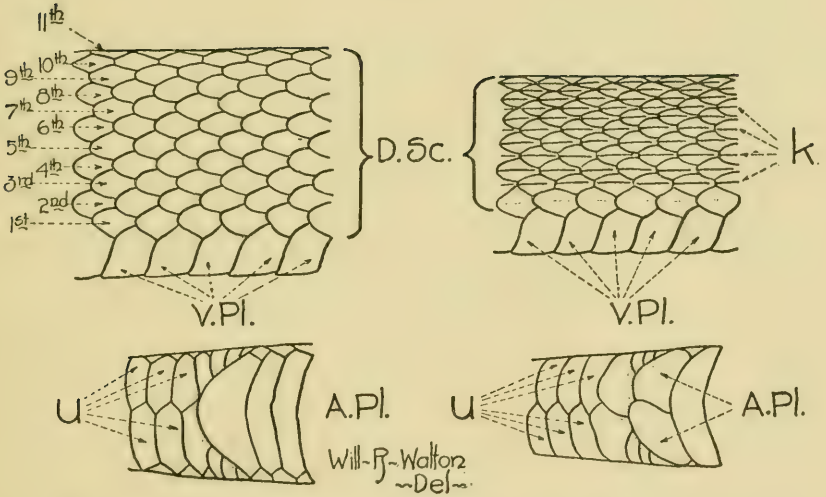


PLATE XIV.—Structural Characters Used in the Classification of Serpents.

A. Pl., Anal Plate (undivided at left, divided at right); D. Sc. Dorsal scales (keeled at right, smooth at left); K. Keels on Scales; U, Urosteges or Tail-plates; V. Pl., Ventral plates or Gastrosteges; 1st, 2nd, 3rd, etc., rows of scale, showing order of counting. Drawn natural size under supervision of the Economic Zoologist.

EXPLANATION OF THE FOOD DIAGRAMS.

The Food Diagrams and Tables in this Bulletin express the results of our dissections of all specimens collected or sent us prior to August 1, 1906, and are, of course, reliable as far as they go. The greatest criticism on them is that we have not been able to study enough specimens to get all the facts of the case for each species. We shall continue these studies from each specimen sent us, and in the Second Report, which will be issued just as soon as we have enough specimens to justify it, there will be new charts and tables showing the newly derived facts.

Each chart or circle represents the total number of serpents containing food, as 100 per cent., and each division of the circle represents the per cent. or relative number of the specimens of the respective species which we found had eaten the food material expressed in that division. Sometimes one serpent contained several articles of food, and most of them contained two or more. These facts had to be considered in making out the charts, and it became quite complex. The bulk or relative amount of food of each kind taken by the reptiles is not shown in these charts, as each division stands for the relative number of this species of serpents examined which contained each food item, respectively.

DISCUSSION BY SPECIES.

No. 1. *Carphophiops amœnus*. (Say.) **Ground Snake. Plates XVI, XXX, Fig. b.**

This rare little snake is known by the various common names of Ground Snake, Red Snake and Worm Snake. It is to be distinguished by the smooth scales on the back (Plate XIV), arranged in thirteen rows, and the ventral plates (Plates XIV and XV), about one hundred and thirty in number, the bifid or divided anal plate (Plates XIV and XV) glossy brown color, small head, absence of constriction on neck, and salmon-red color beneath.

It is found in the United States from Massachusetts to Illinois and southward, although it is not a common species. In this State it must be very rare, because we have before us only one Pennsylvanian specimen, and that was collected in Huntingdon county, Pa., under a stone, by Mr. P. H. Hertzog, July, 1903. Dr. Witmer Stone, in the American Naturalist, Vol. XL, No. 471, Mar., 1906, states that there are specimens of C. Amœnus in the collection of the Academy of Natural Sciences from Chester and York counties, Pa.

There is very little known about its haunts or habits, beyond the fact that it is a burrowing snake and is found in loose soil and under leaves, etc. It is probably one of the egg-laying species, reproducing by laying eggs, and it no doubt feeds during its entire life mostly

upon insects, earthworms, slugs and snails. Dr. D. A. Atkinson has found earthworms in it and says that it also feeds upon insects.

When full grown it is rarely more than a foot long. It is entirely harmless at all times, and is one of the species that is beneficial to mankind, while nothing is known against it from an economic point of view.

No. 2. *Virginia valeriæ.* (B. & G.) **Spotted Ground Snake, or Valeria's Snake.**

It is only upon the printed reports of authors that we include this rare species in the list of Snakes of Pennsylvania. We have neither seen nor collected specimens of it, and we find but one definite record of its collection within the borders of this State, although it has been taken several times in Maryland and Delaware.

Dr. D. A. Atkinson, in his publication on the "Reptiles of Allegheny County," Pa., Annals of the Carnegie Museum, Vol 1, 1901, records taking one specimen at Wilkinsburg, Pa., June 19, 1899, eleven inches in length, and adds: "This is the only record for the occurrence of this snake in Western Pennsylvania." We find no other definite record of it in this State.

It is to be known by its smooth scales (Plate XIV) arranged in fifteen rows, and about one hundred and twenty to one hundred and thirty ventral plates. Its color above is grayish brown with minute black dots often in two rows, and beneath yellowish. It is another of our small snakes, being only twelve inches or less in length, and living in grass, weeds, and brush or under stones or logs. In the United States it is found from Maryland to Illinois and southward, and consequently Pennsylvania is its nothern limit. However, it should be collected in the southwestern and southeastern corners of this State, and we request observers to send us small serpents of all kinds from their regions that we may continue to study these rare species.

It is non-venomous and entirely harmless in every regard, and feeds mostly upon insects, earthworms, slugs and other very small forms of animal life. Mr. Max Morse in a Bulletin on "The Reptiles of Ohio," reports having found "worms and insects" in specimens he examined in Ohio.

We are at present entirely unable to state how, when or where this species reproduces, as these facts are not known to anyone.

No. 3. *Haldea striatula* (L.) **Brown Snake.**

This species, which is rare, if at all found in our State, can be recognized by the keels on the scales (Plate XIV K, and Plate XV 26) and the bifid or divided anal plate (Plate XV 25), the scales

arranged in 17 rows, two loral plates present and the tail one-third of the total length, which is not over twelve inches. The head is long, neck small, eyes large, color reddish-gray above and salmon-red beneath.

While the preceding species is known as a southern serpent, this one occurs in western localities, living from Virginia to Wisconsin and Texas. It should be found in the southern part of Pennsylvania, but we find no record where it has been collected in this State, and we have no specimen of it. We insert it here upon the authority of reliable although earlier writers upon the subject, and hope that our friends who have the good fortune to live in the southern part of this Commonwealth will help to make our search for this species successful. While we have been unable to examine any specimens, and find no author mentioning its food, it no doubt feeds upon insects, earthworms, mollusks and very small frogs and toads. Concerning its manner of reproduction we are unable to find any indications or reports.

No. 4. *Storeria occipitomaculata* (Storer.) **Red-bellied Snake.**

The Red-bellied Snake, of course, receives its name from the color of the under side, which is salmon red. However, this character should not be relied upon too closely, as all specimens of this species do not have such well-marked red colors beneath, and specimens of certain other species, especially the next, and the preceding, are often reddish below. Its generic name, "Storeria," is given it in honor of Dr. David Humphreys Storer, an early and noted writer on Reptiles. The specific name, "occipitomaculata," means "spotted occiput," or top of head, and refers to the three pale blotches which are quite constantly present on the occiput or back of head.

The Red-bellied Snake is described as follows: "Grayish or chestnut brown, usually showing a paler vertebral band bordered by blackish dots; obscure dots on one side; occiput with three pale blotches (a very constant feature); belly salmon red; scales in fifteen rows; ventral plates one hundred and twenty to one hundred and twenty-five; length twelve inches." (Jordan.)

This little snake rarely reaches more than twelve inches in length, and is often not more than three or four inches long. It is, of course, entirely harmless and lives under rocks, in woods, and along fences, throughout the entire State of Pennsylvania. We have received specimens from contributors in the following counties of Pennsylvania:

Bedford County, ...Yont, G. W., ... Osterburg.
Blair County, ...Reddle, (Miss) Bertha, ...Bushman.
Bradford County, ...Wilcox, E. A., ...Sugar Run.

Cambria County,	Brubacker, F. M.,	Johnstown.
Clarion County,	Welch, W. Y.,	Clarion.
	Kauffman, M. M.,	Clarion.
Clearfield County,	Rapp, A. C.,	Kylerstown.
Erie County,	Mixer, E. W.,	Waterford.
	Laurie, C. F.,	Erie.
Indiana County,	Wehrle, R. W.,	Indiana.
Jefferson County,	Luther, Paul,	Pekin.
Lycoming County,	Spencer, Douglas,	Williamsport.
McKean County,		Port Allegany.
Schuylkill County,	Miller, A. B.,	Barnesville.
Sullivan County,	Wieland, W. S.,	Nordmont.
Tioga County,	Nelson, A.,	Canoe Camp.
Warren County,	Whitcomb, Mrs. F.,	Corydon.
	Wright, B. B.,	Sugar Grove.
Wayne County,	Bullock, W. H.,	Honesdale.

This does not mean that it is not found in other counties, as we expect to receive it from all of them in the course of time, but it would indicate a greater abundance in the central and western parts of the State. In the United States it is to be found from Minnesota eastward to Massachusetts, and from those two states southward to Georgia. It is very abundant in portions of its range, and is one of the common small, harmless and in fact beneficial snakes of our State.

Fig. 4.—Diagram showing the percentage of Food Items of Red-bellied Snake (*Storeria occipitomaculata*): 100 per cent. Slugs.

Although common, it is not often seen. The reason for this is that it is a quiet, retiring little snake, protected by its grayish or

chestnut brown colors, living among leaves and sticks and not observed by most persons, even in localities where it occurs.

Of the specimens of this species which we have received, only five contained food, and this was entirely slugs or shelless snails. It is important to note that in the five stomachs were twelve slugs, which are so very destructive to garden plants, especially cabbage, lettuce, beans, peas and young plants of nearly all kinds, when growing close together in beds. Therefore, in reply to the many inquiries we have received, asking how to get rid of slugs we recommend introducing and preserving this harmless and valuable little snake. It is interesting to know that this is the first and only definite publication upon the food of this species, previous authors not even venturing suggestions upon it.

Owing to the fact that all the food which we have yet found in their stomachs consists of slugs, and these mollusks feed mostly by night rather than by day, we may conclude that the Red-bellied snake is nocturnal in habits, and no doubt it remains concealed during much of the day time and comes forth at night to take as food those creatures which have the habit of crawling and feeding on vegetation by night, and finding concealment in the daytime. Perhaps this species feeds in daytime in places of concealment, as under logs, boards, stones, etc., where slugs may be found hiding by day.

From our anatomical dissections of this serpent, we find nothing significant concerning its manner of reproduction. The other species of this genus is ovoviviparous, hence we believe this species reproduces in the same manner. No available literary reference contains any statement on this point. If we could receive enough specimens during July and August, it would soon be settled.

The largest specimen we have received was No. 3117, from Jefferson county, which was fourteen inches long, and showed the singular variation of having the belly blue-black instead of salmon-red, in accordance with most individuals of this species. The smallest specimen we have received was six inches in length, which is our No. 4131 a, from Port Allegany, McKean county, Pa.

No. 5. *Storeria dekayi* (Holb.). DeKay's Snake or Rock Snake. Plate XVII.

DeKay's snake must be very similar to the Red-bellied Snake, since it belongs to the same genus: *Storeria*. It consequently agrees with No. 4 in having keels on the dorsal scales and a bifid anal plate, the tail not one-third of the entire length, the loral plate absent, and the color brownish; but it has seventeen rows of scales instead of fifteen, as in No. 4, and generally has a gray dorsal band bordered by lines of dots, and is grayish below instead of

salmon-red. Thus, in general, it should not be difficult to distinguish each of these two species of the same genus.

This small serpent, which is about a foot long, is found in the Eastern United States, westward to the Rocky mountains, and is not especially rare in this State, although it is not often seen. We have received specimens from the following counties: Bucks, Dauphin, Erie, Huntingdon, Luzerne, Monroe, Montour, Northampton and Venango. A comparison of this with the former species shows a tendency toward its eastward rather than westward distribution. It lives among brush and stones and is protected by its coloration.

Comparatively little is known of its habits, although it is not one of the egg-laying species, but is ovoviviparous, as our dissections show with certainty. From the specimens examined, we are sure in saying that it bears its young from the latter part of July to the last of August. It is no doubt mostly nocturnal in its habits, finding concealment during the day beneath rocks and stones, and coming forth at night for food.

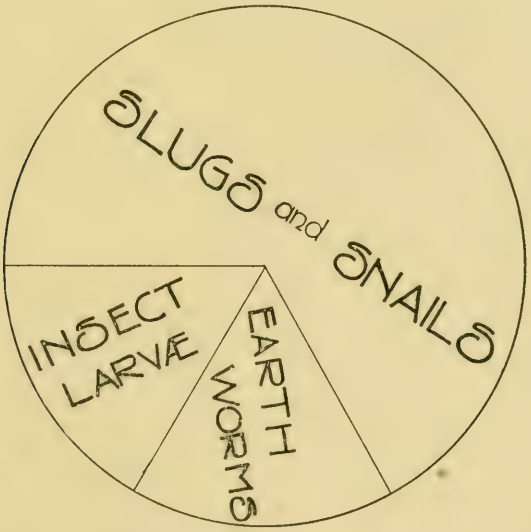


Fig. 5.—Diagram showing the percentages of Food Items of Rock Snake (*Storeria dekayi*): 67 per cent. Slugs and Snails; 16 per cent. Insect Larvæ; 17 per cent. Earth Worms.

Of the twenty-one specimens which we have examined, only four contained food. This material was found to consist of earthworms, slugs, snails and insect larvæ. The details are as follows: Earthworms in one; slugs in three; undetermined snails in two; and undeterminable insect larvæ in two. This shows that these little serpents

are beneficial rather than obnoxious. They are not poisonous, and in every way should be protected.

Holbrook, in 1842, published that it ate "insects, grasshoppers and crickets," and a few other writers have followed him, but this was only a supposition. We can find no other published notes on the food of this harmless and beneficial little serpent.

The summary of our collection of this species in Pennsylvania is as follows:

Bucks County,	Kreiss, P. S.,	Benjamin.
Clinton County,	Singer G. P.,	Lock Haven.
Dauphin County,	Stevenson, A.,	Harrisburg.
	Wise, Norman,	Harrisburg.
	Anderson, C. S,	Harrisburg.
	Fickes, Howard,	Harrisburg.
Erie County,	Laurie, C. F.,	Erie.
	Mixer, E. M.,	Waterford.
Huntingdon County,	Payne, W. S.,	Orbisonia.
Lycoming County,	Van Housen, Chas.,	Williamsport.
Luzerne County,	Campbell, E. W.,	Pittston.
Monroe County,	Schock, H. M.,	Effort.
Montour County,	Dieffenbacher, D. N.,	Danville.
Northampton County,	Rice, A. J.,	Easton.
	Mack, J. A.,	Bethlehem.
Venango County,	Blatt, W. O.,	Oil City.
Washington County,	Couch, Merle,	Hickory.

No. 6. *Olonophis kirtlandi* (Kenn.) **Little Red Snake.**

The Little Red Snake is a western species, being found mostly from Ohio to Illinois. We have received only one specimen of this species from Pennsylvania. It is our No. 1411, sent by Mr. L. Christie, of West Sunbury, Butler county, September 28, 1904. As the stomach was empty nothing can be said about its food, and the only published statement we can find is by Dr. Atkinson, who merely says that in captivity it ate slugs. It is to be sought and no doubt found in the western and especially the southwestern parts of Pennsylvania, and we hope that interested persons in that part of the State will watch for it and send us specimens.

The Little Red Snake is to be distinguished from all others by the fact that all the scales are keeled and arranged in nineteen rows, and the anal plate is bifid or parted. The ventral plates are about one hundred and thirty-five in number, and the head is small, black and shining. The color above is light reddish brown with four series of round black spots, and the belly is reddish with a row of black spots on each side. This coloration will distinguish it, as other species do not have the spots. Comparatively little is known of its habits or food. Our specimen is fifteen inches in

length and contained six embryos, one of which was measured and found to be four and one-half inches long. Thus, it is proven to be ovoviviparous. It doubtless feeds upon insects, earthworms, mollusks, etc., as do the species previously discussed in this Bulletin. The average length is about sixteen inches, and it is non-venomous and entirely harmless in every regard.

We shall make a special effort to reciprocate favors with persons who send us specimens of this and other of these rare reptiles, and invite naturalists to send us notes upon their occurrence, and particularly to give us information of dates and places of capture and collections in which they are now to be found. These facts are to be recorded in full in our next Report upon this subject.

No. 7. *Thamnophis saurita* (L.) The Ribbon Snake. Plate XVIII.

The Ribbon Snake, or the Striped Garter Snake belongs to the genus *Thamnophis*, the same as the other Garter Snakes. This genus is characterized by all species having the dorsal scales more or less keeled, the anal plate entire or not divided, the scales arranged in nineteen to twenty-one rows, the ventral plates about one hundred and fifty-five in number, and the coloration mostly arranged in stripes. There is only one pair of frontal plates and two nasals, and although the posterior teeth are rather large, this is for the purpose of holding their prey rather than for injecting poison. The snakes of this genus or The Garter Snakes, are all non-venomous or harmless species and are also ovoviviparous, or bearing living young.

This species, which is designated by the common name Ribbon Snake or Swift Garter Snake, is distinguished from the other Common or Garter Snake (*T. sirtalis*) found in this State by having the lateral stripe on the third and fourth rows of scales, rather than on the second and third, as in No. 8, and also by the scales being little or not spotted; a plain dorsal band present, stripes all alike in color, and the body very slender. This snake is a dirty chocolate color, with three yellow stripes and light brown color below the lateral or side stripes. The entire body is about three and one eighth times the length of the tail. The colors are bright and striking in appearance, and the length is from two to three feet.

The Ribbon Snake or Swift Garter Snake is ovoviviparous, or produces living young, and according to the evidences which we have they are born during the month of August. It is one of the species that is known to swallow their young for protection and then as quickly as possible run to a place of safety and permit them to escape.

The following are our Pennsylvanian contributors of this species:

Beaver County,	Fennell, Thos.,	Cannelton.
Berks County,	Becker, W. D.,	Fleetwood.
Blair County,	Bohn, Dr. D.,	Altoona.
Erie County,	Mixer, E. M.,	Union City.
Lebanon County,	Bohn, J. G.,	Onset.
Luzerne County,	Campbell, E. W.,	Pittston.
Tioga County,	King, L. K.,	Westfield.
Wayne County,	Bullock, W. H.,	Honesdale.
Wyoming County,	Kerney, F. B.,	Laceyville.

Fig. 6.—Diagram showing the percentages of Food Items of Ribbon Snake (*Thamnophis saurita*): 37½ per cent. Salamanders; 25 per cent. Insects; 12½ per cent. Spiders; 12½ per cent. Earth Worms; 12½ per cent. Tree Toads.

This species belongs to the Eastern United States, being found mostly east of the Alleghenies, especially near streams. It likes to live in rocky woodlands, in shady, narrow, watered valleys and to plunge into water when frightened. It is not poisonous nor venomous, and in its feeding habits it preys mostly upon beneficial Batrachians, and is consequently objectionable because these animals are the enemies of obnoxious insects. In our dissections only four were found containing food and the analysis of their stomach contents is as follows: One specimen contained earthworms only; one contained a salamander, a tree frog, and fragments of insects and spiders; one contained a salamander and insects, and the fourth contained two salamanders, and insects. Beyond any reasonable doubt all the insects and spiders in the stomachs of these serpents came from the batrachians which had eaten them previously to the time of the snake making its meal upon the devourer of insects.

A detailed table of the food contents of these serpents is as follows:

No. of Snakes Eating:	Kind of Food Material:
1	Earth worms.
1	Spiders.
1	Undet. Insect fragments.
2	Insect fragments with salamander remains.
1	Insect fragments with frog remains.
2	Undet. Beetles.
2	Black Ants.
1	Red Ants.
1	Undet. Salamander.
2	Plethodon cinereus (Salamander).
1	Spelerpes belineatus (Salamander).
1	Hyla versicolor (Tree Frog).

Formerly published statements report this serpent as feeding upon the following material:

Toads (De Kay, in N. Y. Geological Report, and Morse, in Ohio Bulletin), Frogs (De Kay), Insects (De Kay and Morse), Worms (Morse).

There is no evidence that those or other authors actually observed this reptile eating these creatures. The only report of positively observed food that we have found was recorded by Dr. Atkinson who published that he has found tadpoles, beetles and crickets in their stomachs.

From the study of our tables it can be seen that the chief food of those we have examined is the salamanders, and this is something that has not been mentioned before by anyone in connection with this species. It is also apparent that the insects mentioned above, as well as those observed by others, may have been taken originally with the batrachians which had previously captured them.

No. 8. *Thamnophis sirtalis* (L.) **Common Garter Snake. Plate XXII.**

Owing to the fact that there are several varieties of this species of snake and these varieties are distinguished more by the variations in color than in any other way, it is variously known as the Striped Snake, Spotted Garter Snake, Blue Spotted Snake, and other common names besides that of the Garter Snake and Common Garter Snake and Lond Schlong (Pennsylvania German). As it belongs to the same genus as the preceding, the distinguishing generic characters are the same as those there given. However, it differs from No. 7, the Ribbon Snake, in having the lateral or side stripes, when present, on the second and third rows of scales (from below) instead of on the third and fourth, and also in having a heavier or stouter body, the tail about one-fourth the total length,

and the stripes often obscure. The general color is olive, with a narrow dorsal stripe and three series of small dark spots on each side, about seventy being found between the head and base of tail.

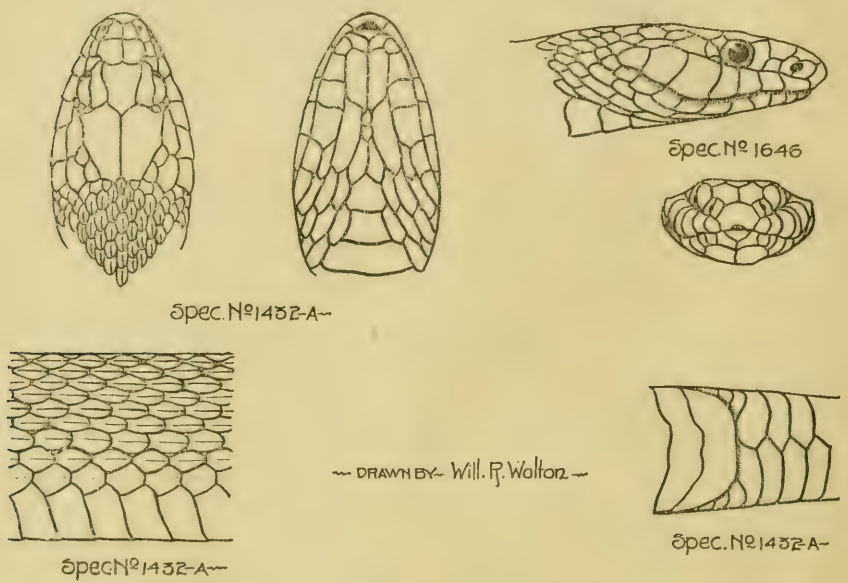


Fig. 7. Structures of Garter Snake (*Thamnophis sirtalis*). Natural Size. Drawn under the Supervision of the Economic Zoologist.

The sides and belly are greenish, and the side stripes are rather broad and often almost entirely obliterated or broken into small spots. The colors are much duller than in the preceding species.

The Garter Snake is by far our most common snake, and is found almost everywhere in the United States except in California. It is found everywhere in Pennsylvania, and commonly occurs near the abode of man. This has earned for it the occasional name of "Garden Snake." This seems to be a reptile which has not yet settled down to a fixed type of coloration, as there are at least three or four prominent varieties in this State and these are distinguished by additional varietal names, *Thamnophis sirtalis ordinatus*, or the Ordinary Spotted Garter Snake, shown in Plate XX, has the stripes obscure or wanting, and the spots distinct; also spots are present on the sides of the ventral plates. It is northeastern variety. *Thamnophis sirtalis dorsalis* (Baird and Girard), shown in Plate XIX, or the Spotted and Striped Garter Snake, has the dorsal stripe broad and two rows of distinct spots on each side of it. This is a common North American species and is found abundantly in this State.

Another variety which is given the scientific name *Thamnophis*

PLATE XIX.—Garter Snake, variety Spotted and Striped. (*Thamnophis sirtalis dorsalis*).
Photographed alive and in Natural Surroundings, by Mr. Wm. H. Fi[illegible]r

PLATE XX.—Garter Snake, Spotted Variety (*Thamnophis sirtalis ordinatus*).
Photographed in Nature by Mr. Wm. H. Fisher.

PLATE XXI.—Striped Garter Snake (*Thamnophis sirtalis parietalis*).
Photographed in Nature by Mr. Wm. H. Fisher.

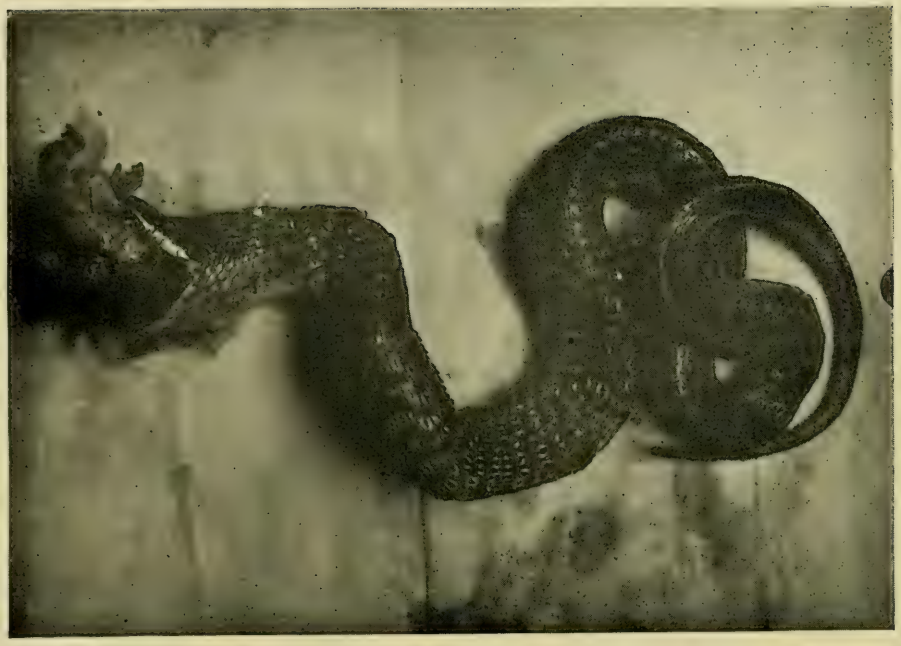


PLATE XXII.—Garter Snake (*Thamnophis sirtalis*) Swallowing Toad.
Photographed one-third Natural Size in the Office of the State Zoologist of Pa.

PLATE XXIII.—Queen Snake or Striped Water Snake (*Regina leberis*).
Photographed in Nature by Mr. Wm. H. Fisher.

PLATE XXIV.—Spotted Water Snake (*Natrix sipedon*).
Photographed alive and in Natural Surroundings by Mr. Wm. H. Fisher, Baltimore.

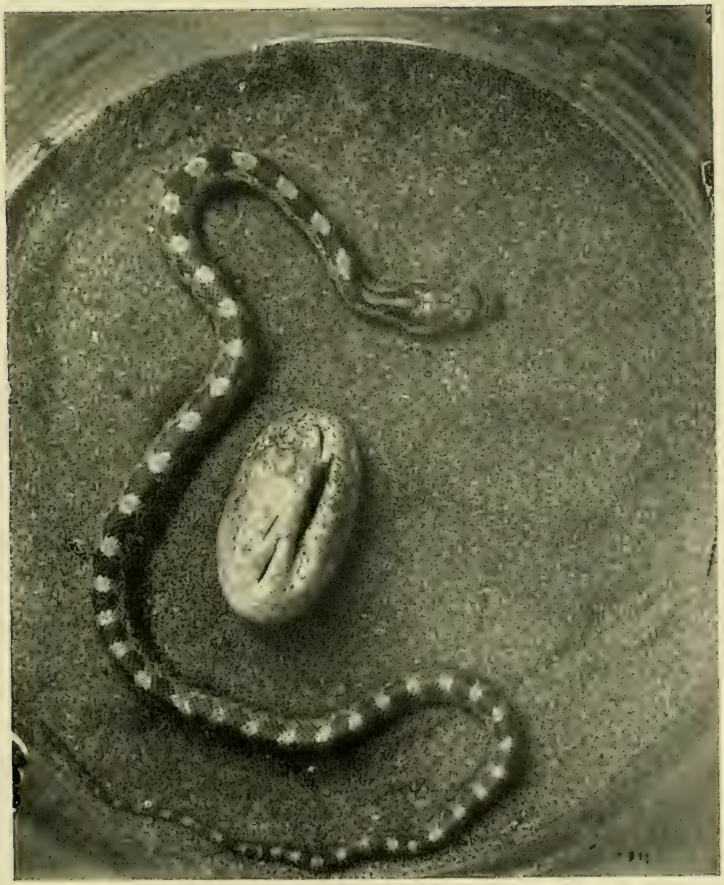


PLATE XXV.—Young Pilot Snake (*Callopeltis obsoletus*), and Egg from which it has just hatched. Three-fourths natural size.

Hatched and photographed alive in the office of the State Zoologist of Pa.

PLATE XXVI.—Green Snake (*Opheodrys æstivus*).
Photographed Alive and in Natural Surroundings by Mr. Wm. H. Fisher.

sirtalis parietalis (Say), is known as the Green-striped variety of Garter Snake (See Plate XXI), because the stripes are dull greenish and the space between the spots on the side is brick red in color. This is a very beautiful Garter Snake and is a western variety, being found mostly from Indiana westward.

The Garter Snakes are all entirely harmless, having no poison nor poison glands, and being unable to inflict any injury whatever upon mankind. The stories that are sometimes told about their attempting to choke persons are entirely without foundation, and there is no reason why superstition and ignorance should combine to crush out the life of this animal. It is partly nocturnal in its habits, although it can often be seen sunning itself during the day. It invariably retreats in the most quiet manner when disturbed by mankind, and attempts to conceal itself in holes or beneath stones or logs.

All Garter Snakes are ovoviviparous, bringing forth living young. The eggs of the Garter Snake begin to develop in May and when one-half inch in length they show the spiral of the embryo. These continue to develop until they reach a length of six inches, when the yolk is absorbed and the snakes are born. The young of the Garter Snakes are born between the 25th of July and the 25th of August. This is shown by our specimens No. 1073 (d), No. 3062 (c), No. 3127, and No. 7127 (a). The old snake lives near the young and guards them during the fall. They pass the winter in rubbish, in the earth, beneath stones, or in hollow logs, and in the spring the young shift for themselves.

The many stories that are told concerning these and similar serpents swallowing their young for protection must have truth as their basis, but by the most careful efforts we have up to the present time been unable to find any evidence of this excepting from the reports of other persons. In over two hundred specimens which we have examined and dissected we have never yet found any young in the stomach of the parent, although we have often found the unborn young in ovaries. If any person be able to kill and send us a specimen which has been seen swallowing its young, we shall reward him well for his trouble. We wish them sent dead, but with the young in the stomach just as they were swallowed at the time the observation was made and the parent killed.

We have received the following specimens from the following counties in the State, but desire others of this and other species for continuing our studies:

Allegheny County, ...Davison, Dodds, ...Union Station.
Johnston, Stewart, ...Pittsburg.
Cruikshank, O. T. (Dr.), ...Swissvale.
The Borroughs Club of Amer.,.Wilkinsburg.

Beaver County,	Wright, F. R.,	Smith's Ferry.
	Dawson, H. D.,	Smith's Ferry.
Bedford County,	Hunter, W. H.,	Bedford.
	Walls, R. B.,	Saxton.
Berks County,	Seidel, J. J.,	Shoemakersville.
	Neithamer, E. F.,	Reading.
	Becker, W. D.,	Fleetwood.
Blair County,	Harvey, W. C.,	Altoona.
Bradford County,	Wilcox, E A.,	Sugar Run.
Bucks County,	Tomlinson, F.,	Eden.
	Franklin, Titus,	Wismer.
	Bewley, Anna K.,	Forest Grove.
	Harstine, D. L.,	Ferndale.
Cameron County,	Blinzler, E.,	Emporium.
Carbon County,	Gallagher, E. L.,	Lansford.
	Solt, N. E.,	Weissport.
	Murphy, J. H.,	Summithill.
Centre County,	Williams, G. W. R.,	Lemont.
	Thompson, J. H.,	State College.
Chester County,	Paxson, O. S.,	Devon.
	Brill, J. G.,	Berwyn.
	Robinson, (Miss) Mona,	Paoli.
Clarion County,	Arnold, F. M., Jr.,	Clarion.
Clearfield County,	Hurd, W. E.,	La Jose.
	Rapp, A. C.,	Kylerstown.
Clinton County,	Laudenslager, D. M.,	Mackeyville.
	White, A. P.,	Lock Haven.
Columbia County,	Creasy, H. B.,	Catawissa.
	Stahl, Harrison R.,	Lightstreet.
	Beam, W. G.,	Catawissa, R. No. 3.
	Klingman, E.,	Beaver Valley.
Crawford County,	Hanks, A. J.,	Cochranton.
	Gilmore, L. B.,	Saegerstown.
Cumberland County,	Cressler, G. E.,	Shippensburg.
	Hull, R. J.,	Lisburn.
	McKinley, H. J.,	Kerrsville.
Dauphin County,	Barrington, H.,	Harrisburg.
	Rouf, F.,	Hummelstown.
	Phelps, S. A.,	Harrisburg.
	Rutherford, A.,	Harrisburg.
Delaware County,	Peddrick, W. E.,	Bellevue.
	Pennell, F. W.,	Wawa.
	Pearson, L. S.,	Wayne.
	Redfield, A. C.,	Wayne.
Erie County,	Mixer, E. W.,	Erie.
Franklin County,	Branthaver, G. M.,	Chambersburg.
	Delong & Atkinson,	Mont Alto.
Fulton County,	Palmer, A. C.,	Warfordsburg.
Huntingdon County,	Gibbs, E. E. C.,	Huntingdon.
	Swoope, I. P.,	Huntingdon.
Indiana County,	Palmer, L. D.,	Black Lick Station.
	Likert, H. W.,	Black Lick Station.
	Wehrle, R. W.,	Indiana
Jefferson County,	Brian, Chas.,	Brockwayville.

Lackawanna County,	Winship, Lionel,	Moscow.
Lancaster County,	Miller, E. G.,	Columbia.
	Kautz, E. M.,	Lancaster.
Lawrence County,	Hawthorne, L. H.,	New Castle.
Lebanon County,	Mell, J., Jr.,	Richland
	Bohn, J. G.,	Onset.
	Boeshore, Alfred,	Jonestown.
	Bean, W. J.,	Bunkerhill.
	Hain, H. G.,	Lebanon.
	Strauss, C.,	Fredericksburg.
Luzerne County,	Shuman, E. F.,	Glen Lyon.
	Angus, W.,	Stoddartsville.
	Campbell, E. W.,	Pittston.
Lycoming County,	Mulford, E. R.,	Okome.
	Ulmer, R. D.,	Cogan Station.
	Van Housen, Bruce,	Williamsport.
Monroe County,	Allegar, I. L.,	Shawnee.
	Carey, T. H.,	Cresco.
	Blakeslee, J. A.,	Blakeslee.
Montgomery County,	Harley, R. E.,	Pottstown.
	Keim, W. P.,	Pottstown.
	Haines, M. M.,	Cheltenham.
	Kratz, E.,	North Wales.
	North, G. W.,	Prospectville.
Northampton County,	Green, J. W.,	Easton.
	Bedford, G. H.,	Nazareth.
	Reitz, Rev. J. J.,	Walnutport.
Northumberland County,	Leitzell, C. W.,	Northumberland.
	Leitzell, E. A.,	Northumberland.
Perry County,	Brightbill, H. A.,	Marsh Run.
	Brightbill, Mrs. M.,	Marsh Run.
	Brightbill, H. A., Jr.,	Marsh Run.
	Kugler, J. W.,	Duncannon.
Philadelphia County,	Bernicker, I. L.,	Philadelphia.
	Simon, E.,	Philadelphia.
Potter County,	Kidney, M. F.,	Raymond.
Snyder County,	Snyder, E. W.,	Selingsgrove.
	Bordner, H. H.,	Shamokin Dam.
	Bingman, E.,	Beavertown.
	Apple, P. A.,	Middleburg.
Somerset County,	Suhrie, J. E.,	Crumb.
Sullivan County,	Wieland, W. S.,	Nordmont.
Susquehanna County,	Clough, J. H.,	Montrose.
	Gere, C. E.,	Brooklyn.
Tioga County,	Barnes, O. J.,	Mansfield.
	Andrews, S. F.,	Wellsboro.
	King, L. K.,	Westfield.
	Cook, Wright,	Austinburg.
	Nelson, A.,	Canoe Camp.
Venango County,		Oil City.
Washington County,	Couch, Merle,	Canonsburg.
	Couch, Jos.,	Canonsburg.
Wayne County,	Bullock, W. H.,	Honesdale.
Westmoreland County,	Schell, J. M. B.,	Jeanette.

Wyoming County, ...	Gardner, T. L., ...	Meshoppen.
	Kerney, F. B., ...	Laceyville.
York County, ...	Gable, J. G., ...	Stewartstown.
	Baker, B. W., ...	Turnpike.
	Leber, Chas., ...	Wrightsville.
	Johnson, J. Q., ...	Slab.

In literature the food of the Garter Snake is reported as follows: Toads (Holbrook, De Kay and Morse), Frogs (De Kay), Tadpoles (Garman in Ill. Bulletin), Small Quadrupeds (De Kay), Small Reptiles (Holbrook), Fish (Garman), Insects (Morse and Garman), Worms (Garman), and Mice, Shrews, young Birds and Eggs (New International Encyclopedia).

None of these authors states definitely that he has observed such food of the Garter Snake, but Dr. Atkinson says he found that its food consists of batrachians, chiefly the common toad.

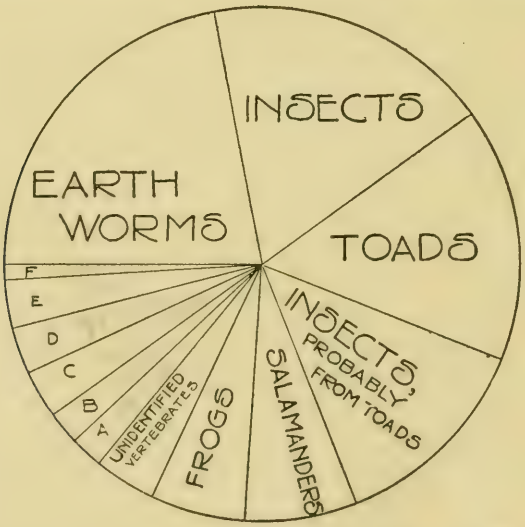


Fig. 8.—Diagram showing the percentages of Food Items of Garter Snake (*Thamnophis sirtalis*): 22 per cent. Earthworms; 18 per cent. Insects; 16 per cent. Toads; 13 per cent. Insects from Toads; 7 per cent. Salamanders; 6 per cent. Frogs; 4 per cent. Unidentified Vertebrates; 2 per cent. Snails; 2 per cent. Insects, Probably from Frogs; 3 per cent. Tree Toads; 3 per cent. Unidentified Batrachians; 3 per cent. Probably Toad; 1 per cent. Probably Sparrow.

The following is a tabulation of the food materials found in the study of the Garter Snake:

No. Specimens:	Food Materials:
1	Undet. worm.
22	Earth worms.
1	Stenotrema (Snail).
2	Undet. Snails.

No. Specimens:	Food Materials:
1	Spider.
1	Millipede.
8	Undet. Insect fragments.
7	Insects with toad remains.
7	Insects with toad remains (probably).
2	Undet. Species Orthoptora.
2	Acrididæ.
1	Locustidæ.
1	Common Cricket.
1	Undet. Lepidoptera.
2	Undet. Larvæ (Diptera).
7	Undet. Beetles.
3	Undet. Ground Beetles.
1	Calosoma scrutator (The Searcher).
1	Black Ground Beetle (Harpalus).
1	Rove Beetle.
1	Lady Bird.
2	Fire Flies.
1	Scarabaeidæ.
1	Bumble Flower-Beetle.
3	Col. Potato Beetles.
2	Weevil or Snout Beetles.
1	Undet. sp. Hymenoptera.
4	Black Ants.
1	Red Ants.
5	Undet. Vertebrates.
1	Undet. Batrachian.
1	Plethodon cinereus (Salamander).
4	Plethodon glutinosus (Salamander).
17	Common Toad.
2	Pickering Tree Frog.
1	Undet. Frog.
2	Leopard Frog.
2	Woods Frog.
1	Green Frog.
1	Sparrow.
5	Undet. Mammals.

It will be seen that these reptiles fed to a great extent on earthworms, and a great many contained insects or fragments of insects. However it must be acknowledged that a great many of these insects were taken inside of the toads and other batrachians which the Garter Snake had eaten. While there is quite a list of insects in the above table the Garter Snake must be regarded as one of the chief enemies of the toad, and this animal is one of the most important insectivorous creatures on the premises. Thus the economic value of the Garter Snake is decidedly questionable. It is our opinion that the destructive insects which are eaten independently by this reptile do not counterbalance the harm done in destroying the toads and salamanders. It is true that in the above list we

find such objectionable creatures as snails, grasshoppers, locusts, crickets and larvæ of moth, besides potato beetles, weevils, and ants. On the other hand, among the beneficial creatures must be recognized the earthworms, spiders, ground beetles, rove beetles, lady birds, salamanders, toads, tree frogs and frogs. We found no evidence of fish in any of the entire number studied.

No. 9. *Regina rigida* (Say). **Rigid Queen Snake.**

There are two species of the genus Regina or Queen Snakes found in the State of Pennsylvania, although both are rare. They are to be distinguished by the keels on all of the dorsal scales, the bifid or two-parted anal plate, scales arranged in nineteen rows, ventral plates about one hundred and fifty, striped colors, and haunts near water. They are ovoviviparous, bearing young.

The common name, "Rigid Queen Snake," is but a translation of the scientific name of the genus and species, *Regina rigida* and is given as the common name of this snake because no other has been suggested and none is in general use either by writers or by country people. This species may be called the Brown-banded Leather Snake from the two brown dorsal bands. It is greenish brown in general color. Besides the bands along the back, it has a brown spot on each scale on the sides, causing the sides to present a speckled appearance; the belly is yellowish and blotched with darker, and the outer or lower row of scales is smooth. This snake reaches a length of about twenty-four inches and is harmless and probably beneficial in feeding habits. Nothing is published nor known with certainty concerning the details of its habits or food. It is inserted in this list upon the published authority of Dr. O. P. Hay. The Rigid Queen Snake is found from Pennsylvania to Georgia, chiefly south of the mountains and westward to central Illinois. This makes it more of a southern species than most of those found in our State. As Pennsylvania is its northern limit we see why it is rare in this State. It is to be expected where the Carolinian fauna extends into the southeastern and southwestern corners of this State, and possibly along the entire southern border. Persons in those regions are requested to give us special aid in our efforts to learn and disseminate some information about it.

No. 10. *Regina leberis* (L.) **Queen Snake or Striped Water Snake. Plate XXIII.**

This is a common water snake which generally is not distinguished by any common name in this State. In his published statement in 1882 in "The Reptiles of Ohio," W. H. Smith refers to this species as the Yellow-bellied Snake or Leather Snake. Doubtless

the reason for ignoring its distinction is that many persons regard this as the Common Water Snake. It is distinguished from Garter Snakes by the anal plate, which is bifid or parted in this species and entire in the Garter Snakes. It also lacks the spots often seen on Garter Snakes. It differs slightly from the Water Snake (No. 11) in its general smaller size and the absence of spots.

The Striped Water Snake is dirty chestnut in color, with a yellow band along the lower part of each side, which becomes a narrow stripe along the neck, with a yellow spot on the base of each upper jaw. There are three narrow dorsal stripes, often inconspicuous, and the head is small and dark in color above the middle of the eye. The belly is yellow with two broad bands, but without the reddish spots, as seen in the Water Snake. The true scales are all keeled and are arranged in nineteen rows. The average length of this snake when full grown is twenty-four inches, although younger specimens, smaller in size, are often seen.

The Queen Snake or Striped Water Snake is another species that is ovoviviparous, or bears young. In this State it reproduces during the month of September, and brings forth from 6 to 12 young, which it remains near, according to the manner of the Garter Snake.

This species is much more common in this State than the preceding. We have received nineteen specimens from the following counties listed in our records:

Allegheny County,	Couch, Witmer,	Carnegie.
Berks County,	Witman, May,	Reading.
Dauphin county,	Sober, Miss Martha G.,	Dauphin.
Fayette County,	Lange, W. H.,	Belle Vernon.
Lancaster County,	Wistar, J. J.,	Columbia.
Lebanon County,	Bohn, J. G.,	Onset.
Montgomery Countty,	Benner, Raymond,	Telford.
	Benner, W. M.,	Telford.
Washington County,	Couch, Jos.,	Hickory.
	Couch, Merle,	Canonsburg.

This table shows that it is well scattered over the State, and it is probable that proper search would reveal it in all the counties. It is found throughout the United States and Canada, and appears to be perfectly at home in and under water.

The literature at hand does not contain any references whatever of the probable food of this species, but Dr. Atkinson says he found in their stomachs crayfish, fish and small frogs.

Of the fifteen specimens which we have examined, four contained crayfish, and one contained a toad. Judging only from these known facts of its feeding habits, it would not be considered beneficial to mankind from an economic standpoint, because it destroys

creatures that are desirable, such as the crayfish and fish, which are utilized by mankind or are food for larger fishes. The crayfish is also beneficial from an economic standpoint, as it is an

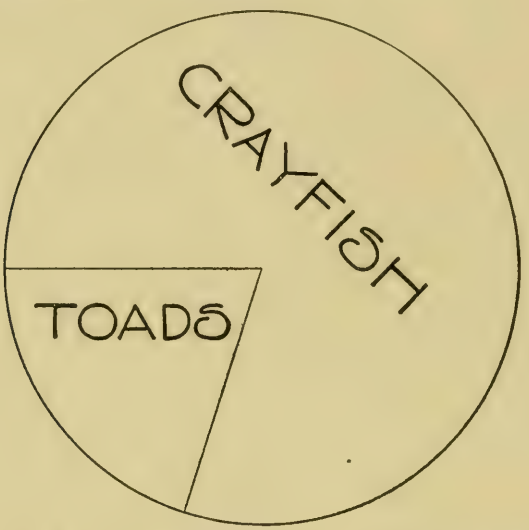


Fig. 9.—Diagram showing the percentages of Food Items of Striped Water Snake (*Regina leberis*): 80 per cent. Crayfish; 20 per cent. Toads.

important element in the food of bass, eels, and other fishes; and toads and frogs are among our most valuable insectivorous creatures. However, the Queen Snake is entirely non-venomous and as it is an interesting and beautiful form of animal life and is rather rare in this State, we do not find sufficient justification to sanction any attempt at its extermination.

No. 11. *Natrix sipedon*. **Water Snake. Plate XXIV.**

This is the most common Water Snake, and is consequently known as "The Water Snake," or "Wasser Schlange," in Pennsylvania German. It is sometimes called The Brown Water Snake, although this common name would as well apply to the preceding species. It is also sometimes called the Moccasin, but this name is misleading and should never be given to any species of snake found in Pennsylvania. The true Water Moccasin is a southern species of snake, not occurring north of Virginia, and it is an exceedingly poisonous or venomous species, as it belongs to the same genus as the Copperhead. Although our Common Water Snake has a violent temper when angered, and strikes viciously at its captor, it is not poisonous in the least. It has sharp teeth, which are used in holding its prey, and these may cause bleeding, but need not be the source of any alarm. We know personally

whereof we write in this regard, as we have been bitten by this snake until the blood flowed and no more pain was felt than would be experienced by scratching with a very sharp needle.

The Common Water Snake is to be distinguished by the keels on all scales and the number of rows, which is twenty-three. They have about one hundred and sixty ventral plates, with large reddish or brownish spots on the under side, and the anal plate bifid. Strange to say, this harmless snake is often mistaken for the Copperhead and sent to us for that very poisonous species, but it has no fangs nor venom and in fact does not belong to the same family as the Copperhead or Rattle Snake. It is to be distinguished by its long slender tail, and especially by its lack of the pit between the eyes and nostrils, which is found only in venomous serpents, and also by the divided urosteges or plates beneath the tail (Plate XIV and XV), which in the venomous reptiles are not divided (Figs. 20 and 22).

The general color of the Water Snake is brownish, with a dorsal row of large square dark blotches and a row of smaller blotches on each side, which are so arranged that they alternate with the dorsal blotches. However, these blotches may at times be almost obliterated, and it is then nearly a uniform brown above. The under side is blotched with triangular reddish-brown blotches on a background which is generally pale yellow. The adult reaches from thirty to fifty inches in length, and of course, younger specimens are shorter.

The Water Snake is found abundantly along streams from New England to Kansas and southward and is one of the most common serpents in this State. We have received specimens from thirty-three counties of this State and do not doubt its existence in considerable numbers in all the other counties. Our present records are as follows:

Adams County,	Miller, P. E.,	Heidlersburg.
	Hoffnagel, H.,	New Oxford.
	Osborm, C. L.,	Aspers.
	Michner, Anna and Ray,	Aspers.
Allegheny County,	Couch, Witmer,	Carnegie.
Berks County,	Sauler, Mary,	W. Leesport.
	Sherman, J. M.,	W. Leesport.
	Neithamer, F.,	Reading.
	Whitman, Mary,	Reading.
	Fritz, Mary E.,	Boyertown.
	Grim, W. H.,	Hamburg.
Bucks County,	McGarvey, R.,	Richboro.
	Oppenlander, Dorothea,	Paseer.
	Atkinson, J. W.,	Buckingham.
	Bewley, Anna K.,	Newton.
Cameron County,	Blinzler, E.,	Emporium.

Carbon County,	Salt, N. E.,	Weissport.
Chester County,	Lawrence, Jno.,	Coatesville.
	Baldwin, O. H.,	Parkesburg.
Crawford County,	Morris, C. L.,	Mosiertown.
Cumberland County,	Robbins, Jesse,	Carlisle.
Dauphin County,	Sober, Miss Martha G.,	Dauphin.
	Ruof, F.,	Hummelstown.
	Weast, W. W.,	Stony Creek.
	Lauffer, M.,	Middletown.
Delaware County,	Robertson, A.,	Sharon Hill.
	Pearson, L. S.,	Wayne.
	Satterthwaite, O.,	Wawa.
Erie County,	Seldon, F. H.,	Cranesville.
	Mixer, E. W.,	Erie.
Fayette County,	Lange, W. H.,	Belle Vernon.
	Lyons, W. T.,	Cheat Haven.
Franklin County,	De Long, C. A.,	Mont Alto.
	Hopkins, E. D.,	Mercersburg.
Fulton County,	Palmer, A. C.,	Warfordsburg.
	Jackson, Robt.,	McConnellsburg.
Huntingdon County,	Black, Joel,	Huntingdon.
	Gibbs, E. E. C.,	Huntingdon.
	Ballinger, J. L.,	Huntingdon.
Lancaster County,	Heiserman, J. J.,	Lititz.
Lebanon County,	Baeshore, A.,	Jonestown.
	Bohn, J. G.,	Onset.
	Mell, J., Jr.,	Richland.
	Derickson, S. H.,	Annville.
Lehigh County,	Dickenshied, F. S.,	Zionsville.
Luzerne County,	Angus, Wm.,	Stoddartsville.
Lycoming County,	Rothrock, B. P.,	Williamsport.
	Spencer, R. D.,	Williamsport.
Monroe County,	Allegar, I. L.,	Shawnee.
	Coggler, B. G.,	Tobyhanna.
Montgomery County,	Behner, W. M.,	Telford.
Montour County,	West, Mrs. G. P.,	Danville.
Perry County,	Brightbill, H. A.,	Marsh Run.
	Hooke, B. P., Jr.,	Landisburg.
	Showalter, C. E.,	Landisburg.
	Bowers, M. R.,	Landisburg.
	Shumaker, A. J.,	Blain.
Philadelphia County,	Blake, J. F.,	Fox Chase.
Schuylkill County,	Schwaler, E.,	Valley View.
Susquehanna County,	Brown, N. S.,	Springville.
Tioga County,	Mulford, E. R.,	Wellsboro.
Venango County,	Bean, Lavella,	Emlenton.
Warren County,	Weld, R. W.,	Sugar Grove.
Wayne County,	Bullock, W. H.,	Honesdale.
York County,	Frey, G. T.,	Emigsville.

The Water Snake is to be seen singly or in numbers, basking in the sunshine on brush or bushes over water into which it plunges and finds concealment when disturbed. It takes its food both under water and out, and both pursues it and lies in wait for

it. We have more than once observed the sagacity of this serpent as it captured a catfish or some other fish and carrying it out of the water to the rocks on the shore, where the fish was helpless and more easily devoured. We saw one very small specimen of Water Snake on the shore of Cayuga Lake, Ithaca, N. Y., which was vainly trying to swallow a wriggling catfish, *Ameiurus nebulosus*, or Bullhead, which was several times its own diameter, but which it had captured by seizing the lower jaw in its mouth and had taken from the water to the rocky shore a few feet away.

In literature we find the food of Water Snakes reported as follows: Frogs (Harlan, Holbrook and De Kay), toads (Holbrook and Morse), Batrachians (Atkinson), fish (Holbrook, De Kay, Morse, Garman and Atkinson), insects (Morse), and crustaceans (Atkinson). The above are references to reports which have not stated definitely that writers have seen or known it eating any of these creatures. Of definite statements we find one by De Kay in which reports he found a Water Snake eating a young pike, and one by Surface.

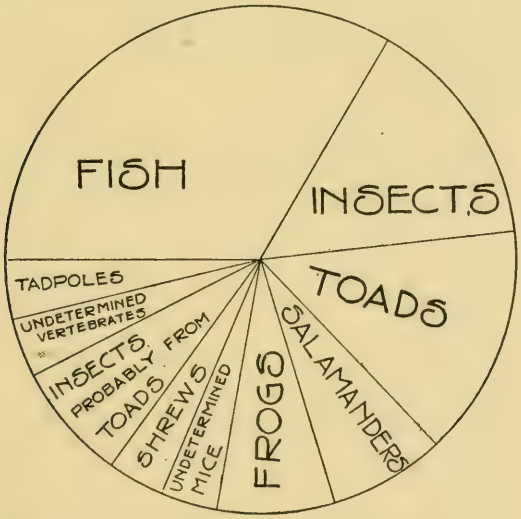


Fig. 10.—Diagram showing the percentages of Food Items of Spotted Water Snake (*Natrix sipedon*): 33 per cent. Fish; 15 per cent. Insects; 15 per cent. Toads; 7 per cent. Salamanders; 8 per cent. Frogs; 4 per cent. Undetermined Mice; 3 per cent. Shrews; 7 per cent. Insects, Probably from Toads; 4 per cent. Undetermined Vertebrates; 4 per cent. Tadpoles.

H. A., "On Removal of Lampreys from the Lakes of New York," 1896, in which he states he found it feeding on the Lake Lamprey, the Bullhead or Black Catfish, the Brook Trout and White Suckers.

While the food of this serpent is generally supposed to be fishes

and frogs, there seems to have been nothing published heretofore concerning the fact that it feeds extensively upon insects and mammals, in addition to fishes and amphibians. These features of its feeding habits should give it a high place in the regards of the husbandman, and while it is one of the most destructive animals in fish ponds and along trout streams, our investigations prove that it may at times have a practical economic value in the destruction of grasshoppers, crickets and meadow mice. Also, while the Water Snake is justly charged with the destruction of Trout at times, it must be recognized that it feeds mostly upon such fishes as White Suckers, Catfish and Star Gazers or species which are enemies of Trout, because they feed upon their eggs and young whenever possible. The evidences, here shown for the first time that it also feeds upon salamanders, tadpoles and toads, as well as frogs, are against it from an economic standpoint, because these creatures are valuable in destroying insects and slugs. On the whole, the Water Snake, although harmless from a physical point of view, must be regarded as one of our objectionable reptiles from the economic standpoint.

The table of food of this species from the seventy specimens which we have examined is as follows:

No. Specimens:	Food Materials:
2	Insect fragments with Toad remains.
1	Undet. Species Orthoptera.
2	Two-striped Grasshoppers.
1	Striped Brown Cricket.
1	Undet. Ground Beetles.
2	Undet. Vertebrates.
6	Undet. Fish.
2	Catfish.
1	White Sucker.
1	Cottus richardsoni.
1	Cottus ictalops.
1	Undet. Salamander.
1	Plethodon cinereus (Salamander).
1	Tadpole.
4	Toads.
2	Green Frogs.
1	Undet. Mammal.
1	Meadow Mouse (Microtus pennsylvanicus).
1	Common Shrew (S. personatus).

The Water Snake is ovoviviparous, bearing its young very late in the season. We have examined specimens of living young in the parent as late in the season as the last of September. From our examinations of the reproductive bodies in the Water Snake we derive certain conclusion as follows:

The undeveloped gonads or eggs are about seven-sixteenths of an inch in diameter, and do not commence to develop until May,

during which month they double in size. In July the yolk is growing smaller and the embryos become one and one-half inches in length. In August the embryo continues to enlarge until it reaches the length of six inches or a little more, and practically absorbs the yolk. In September the yolk is not left, and the young snake reaches the length of eight and one-half inches, at which time it is born.

No. 12. *Callopeltis obsoletus* (Say). **Pilot Snake. Plate XXX.**

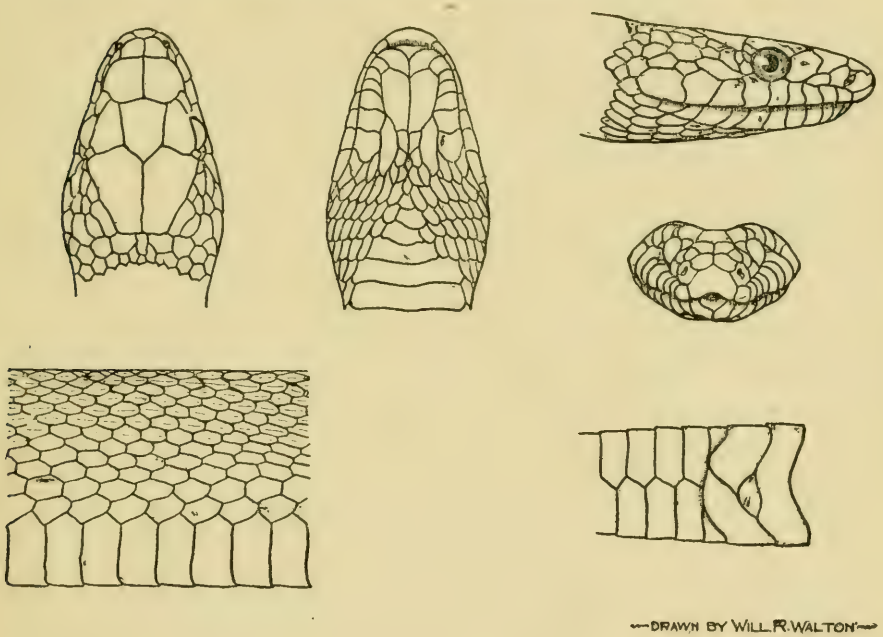


Fig. 11.—Structural characters of Pilot Snake.

This is the species that should properly be called the Pilot Snake, although the name "Pilot" has been given to two or three other species, especially to the Hog-nosed Adder (No. 21) and the Copperhead (No. 22). This confusion of common names has lead to the erroneous popular belief that this snake is poisonous. We occasionally see articles in the papers, especially from the eastern part of the State, stating that persons have been bitten by Pilot Snakes. Upon investigation we have learned that the Copperhead was the one that was meant, and in the region from which the report was circulated it is wrongly called the "Pilot."

This is one of the two large dark-colored snakes commonly called Blacksnakes (Schwartze Schlange, Pennsylvania German), and is distinguished at once from the other species of Blacksnake (No.

16) by the absence of the white chin and throat, and presence of white margins to the scales and irregular blotches on ventral surface.

Coluber is a synonym for *Callopeltis*, and in many publications the scientific name of this snake is given *Coluber obsoletus*. Confusion is avoided by remembering that the two scientific names are synonyms or refer to the same species.

In Pennsylvania we have two species (Nos. 12 and 13) of snakes belonging to the genus *Callopeltis*,—Pilot Snake and Fox Snake, the former of which is very common and the latter is rare. The genus is to be distinguished by the bifid anal plate, by the keeled dorsal scales, which are in either twenty-five or twenty-seven rows, the snout without a keel or plate at the tip, and the ventral plates over two hundred in number. The Pilot Snake differs from its relative, the Fox Snake (No. 13), not only in its darker color but also in having twenty-seven rows of scales instead of twenty-five, as found in that species, and the ventral plates about two hundred and thirty-five instead of not more than two hundred as found in No. 13.

The adult of the Pilot Snake is described as follows: Lustrous black, some of the scales white-edged; under parts slightly black, scales on the middle of back slightly keeled but rest smooth; scales in twenty-seven rows; ventral plates number about two hundred and thirty-five, and length about fifty to seventy-five inches. This snake is entirely harmless, has no poison fangs and carries no venom whatever. It is found from Massachusetts to Illinois and Texas and doubtless occurs in every county in Pennsylvania. We have received it from thirty-six counties, scattered fairly over the State, showing its distribution is general, as follows:

Adams County,	Heintzelman, W. E.,	Ortanna.
Allegheny County,	Couch, Merle,	Carnegie.
	Johnson, Stewart,	Pittsburg.
Armstrong County,	Woods, H. L.,	Apollo.
Bedford County,	Williams, S. W.,	Everett.
Berks County,	Grimm, W. H.,	Hamburg.
Blair County,	Tipton, J. H.,	Tyrone.
Cambria County,	Uncapher, D. H.,	Ebensburg.
Carbon County,	Murphy, A. and E.,	Summit Hill.
Columbia County,	Baldy, S.,	Catawissa.
Cumberland County,	Garber, S. R.,	Entlersville.
	Hess, I. C.,	Shiremanstown.
Elk County,	Schreiber, A.,	Dagus Mines.
Erie County,	McCord, W. F.,	Northeast.
	Lyon, G. A.,	Miles Grove.
Fayette County,	Lyons, W. T.,	Cheat Haven.
Fulton County,	Houck, R. C.,	McConnellsburg.
Greene County,	Bucher, Prof. J. G.,	Waynesburg.

Huntingdon County,	Elias, M. J.,	Cole's Summit.
	Swoope, J. P.,	Huntingdon.
	Leffard, J. H.,	Huntingdon.
Indiana County,	Yukenberger, H.,	Indiana.
	Wehrle, R. W.,	Indiana.
Juniata County,	June, Jas.,	McCoysville.
	Yoder, C.,	Pleasant View.
Lawrence County,	Hawthorne, L. H.,	New Castle.
Lebanon County,	Bohn, J. G.,	Onset.
Luzerne County,	Fink, J. B.,	Shickshinny.
Lycoming County,	Drill, J. H.,	Cogan House.
Mifflin County,	Harshberger, J. F.,	Strode's Mills.
	Rogers, L. B.,	Newton Hamilton.
Monroe County,	Allegar, I. L.,	Shawnee.
Montour County,	West, G. P., Mrs.,	Gates.
Northumberland County,	Swank, B. F.,	Crowl.
Perry County,	Brightbill, H. A.,	Marsh Run.
	Hooke, B. P., Jr.,	Landisburg.
	Brightbill, M. C., Mrs.,	Marsh Run.
	Wagoner, J. C.,	Landisburg.
Snyder County,	Keller, W. I.,	Beaver Springs.
Washington County,	Couch, Jos.,	Hickory.
	Stewart, R. A.,	Independence.
Westmoreland County,	Wagner, W. J.,	New Florence.
Wyoming County,	Knuppenberg, D. A.,	Lake Carey.
	Baldwin, F. M.,	Skinner's Eddy.
	McMickens, N. C.,	Meshoppen.
	Cartwright, W. M.,	Meshoppen.
York County,	Johnson, J. Q.,	Slab.

The Pilot is one of the largest Blacksnakes, and often climbs trees or runs over bushes. It takes advantage of its tree-climbing ability to reach the nests of birds and take therefrom the eggs or young as well as enter the holes of squirrels for the young, upon which they feed. It often lies for hours basking in the sun, and at times when disturbed may take advantage of the fright of its fleeing pursuer to chase after him. We have experimented with this and the Blue Racer (No. 16), running from them to see them follow us, but when we turned upon them and became their pursuers they would not venture to attack, but turned and fled. This is also a harmless snake, and the stories of its attempting to choke or strangle men, women and children are no doubt in all cases without proof or truth.

The Pilot Snake is oviparous or lays eggs, and our dissections show that its eggs commence to develop during the month of June. These become about one and three-fourth inches in length, and are covered with a thin, smooth, leathery shell and are laid during the latter part of August or early part of September. From one to two dozen of them are laid in loose earth or damp sawdust, where the heat of the sun will hatch them. We have had them hatch

during the first and second weeks of September. The young snakes commence to strike and fight and defend themselves before they are out of the shell. At the time it leaves the shell it is nearly one foot in length, and so spotted in color that it is thought by most persons to be a Spotted Adder, or House Snake or almost any other kind of spotted snake excepting the Pilot or Smooth Black Snake.

The food of the Pilot Snake has been reported by writers to be as follows: Birds' eggs (Maximilian, Cope and Garman); rats, rabbits and small animals (Cope, E. D.); mammals, birds and batrachians when in captivity (Atkinson). Prof. Cope definitely records that he found it eating wild mice. Our investigations show definitely a much more extended list of the elements of food substances, as given in the following table:

No. Specimens:	Food Materials:
4	Undet. Insect fragments.
1	Undet. Larvæ.
4	Insects, with Bird remains.
1	Undet. Species Orthoptera.
2	Acrididæ (Grasshoppers).
1	Woods Frog.
11	Undet. Birds.
1	Undet. Eggs.
1	Chicken Eggs.
1	Robin Eggs.
1	Red-winged Blackbird.
1	Sparrow.
1	Robin.
4	Undet. Mammals.
2	Common Opposum.
3	Undet. Mice.
3	Meadow Mouse. M. pennsylvanicus.
1	Microtus sp. (Uncertain species.)
2	House Mouse.
1	Undet. Squirrels.
4	Red Squirrels.
1	Chipmunk.
1	Undet. Shrew.
2	Weasles.

From the above list of food, it will be seen that the Pilot feeds upon birds of various kinds and also on their eggs. These are generally species that nest in bushes or near the ground. The eggs of chickens and robins have been definitely determined in their stomachs, while we have found also red-winged Blackbirds, Sparrows and Crow-blackbirds eaten by them. Among the mammals are the opossum and the very destructive meadow mouse and house mouse, as well as squirrels, chipmunks, shrews and weasels. The insects eaten are also to be considered, as these are species that are obnoxious to the interests of man.

PLATE XXVII.—Black Snake (*Bascanion constrictor*).
Photographed in Nature by Mr. Wm. H. Fisher, Baltimore.

PLATE XXVIII.—Black Snake (*Bascanion constrictor*), one-fourth Natural Size.

Photographed in the Office of the State Zoologist of Pa.

PLATE XXIX.—Young Black Snake (*B. constrictor*).
Photographed in Nature by Mr. Wm. H. Fisher.

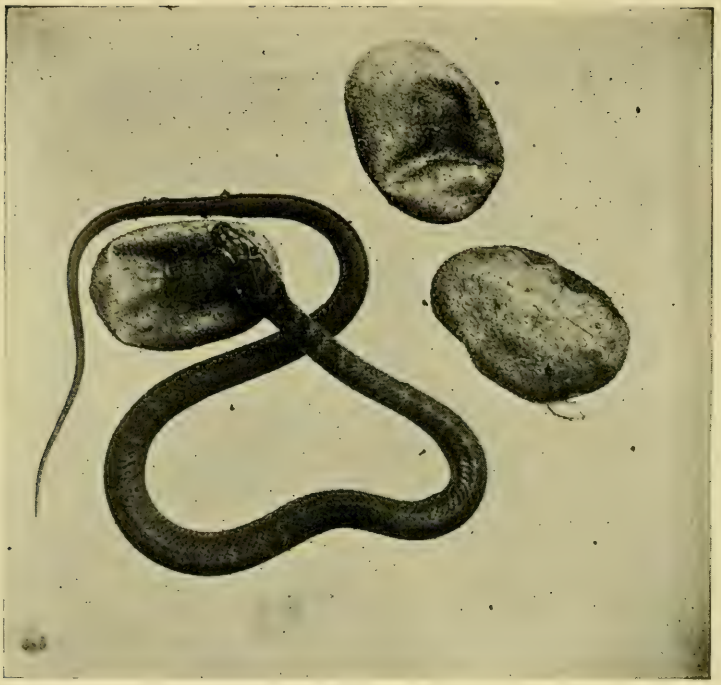


PLATE XXX.—Fig. a. Newly hatched Young and Eggs of Black Snake (*B. constrictor*), about half natural size.

Hatched and Photographed alive in the Office of the State Zoologist of Pa.

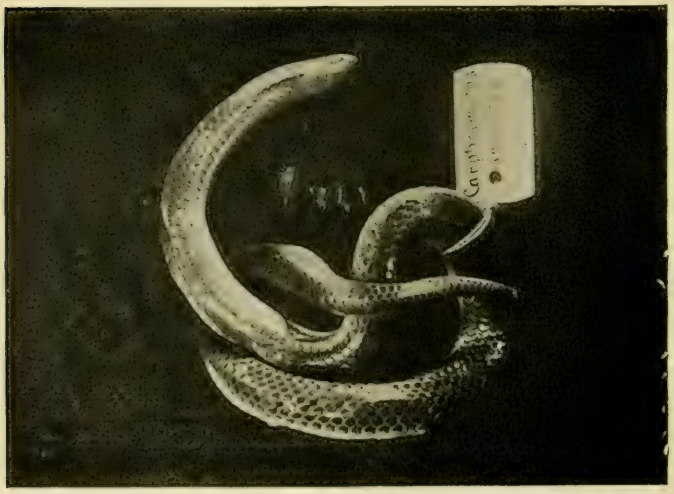


PLATE XXX.—Fig. b. Ground Snake (*Carphophiops amœnus*).

Photograph of a Pennsylvania Specimen in the Office of the Economic Zoologist of Pa.

In making a study of the food of the Pilot in relation to the time of year in which it was taken, we observe that during the early part of the summer the predominating feature consists of eggs or young birds, and thus at this time of year it is economically objectionable; (see Food Chart 12 B) while during the latter part of the summer it consists to a great extent of mice and other obnoxious mammals, (see Food Chart 12 C) and from the economic standpoint at this time

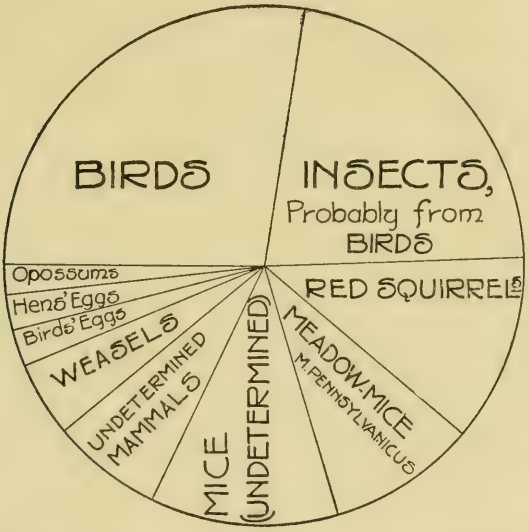


Fig 12a.—Diagram showing the percentages of Food Items of Pilot Snake (*Callopeltis obsoletus*): 11½ per cent. Red Squirrels; 2 per cent. Oppossum; 28 per cent. Birds; 2 per cent. Birds' Eggs (Undetermined); 4½ per cent. Weasels; 10 per cent. Meadow Mice (Microtus pennsylvanicus); 2 per cent. Hens' Eggs; 21 per cent. Insects (Probably from Birds); 7 per cent. Undetermined Mammals; 12 per cent. Mice (Undetermined).

of year it is to be considered as beneficial. It is impossible to strike a balance and say that this creature is so objectionable from an economic standpoint as to deserve destruction, nor so beneficial at all times as to justify preservation. We can only indicate what we have found and say that further studies are necessary before final conclusions are to be reached.

No. 13. *Callopeltis vulpinus* (B. & G.) **Fox Snake.**

The Fox Snake is so called because of its light brown color, and while it is more or less common and in some of the northern states, it is not a common species in Pennsylvania. It is given as a Pennsylvanian species upon the authority of *Jordan*, and is recorded as occurring from Massachusetts to Kansas and northward. Thus

it is a northern species and more liable to be found in the northern section of this State than in the southern. While it has the characters of the genus *Callopeltis*, as given above, it differs from the Pilot Snake in the color being light brown with four-sided chocolate-colored blotches, scales in twenty-five rows and the ventral plates not over two hundred and ten. We respectfully invite correspondence upon this species and desire specimens of the same.

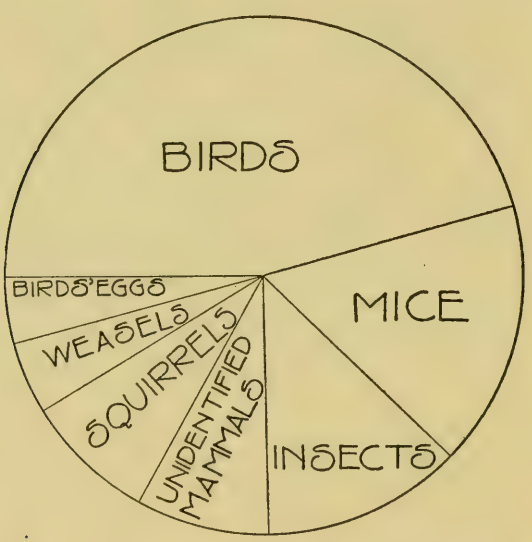


Fig. 12b.—Diagram showing the percentages of Food Items of Pilot Snake (*Callopeltis obsoletus*) found during the months of June and July only; 46 per cent. Birds; 16½ per cent. Mice; 12½ per cent. Insects; 8½ per cent. Unidentified Mammals; 4 per cent. Weasels; 4 per cent. Birds' Eggs.

Very little is known or published concerning the food of the Fox Snake. Prof. Cope has published that it feeds on "vermin of various kinds," and also that he found it eating a rabbit. It is probable that to a great extent its food consists of mice, rats, rabbits, frogs, toads and such birds as it can capture.

No. 14. *Opheodrys æstivus* (L.) Green Snake. Plate XXVI.

In the State of Pennsylvania there are two species of snakes green in color. One of these (No. 14) is known as the Green Snake, and the other as the Grass Snake. The former is rare in this State and the latter rather common. While both are small, harmless, uniformly green above and yellowish beneath, they differ considerably in certain structural characters. This species can be called the 'Keeled Green Snake," because all the scales have keels on them or are roughened. The Grass Snake (No. 15) can be called

the "Smooth Green Snake," because the scales are not keeled. In both, the anal plate is divided or bifid. The Green Snake has about one hundred and fifty-five ventral plates, while the Grass Snake has only about one hundred and forty. With the former the tail is more than one-third the length of the entire body, and with the latter the tail is less than one-third its entire length. The Green Snake is described as having a conical head; neck very small; color bright clear green, yellowish below; scales in seventeen rows; ventral plates one hundred and fifty to one hundred and sixty-five; tail more than one-third of the body, and the length reaching thirty inches.

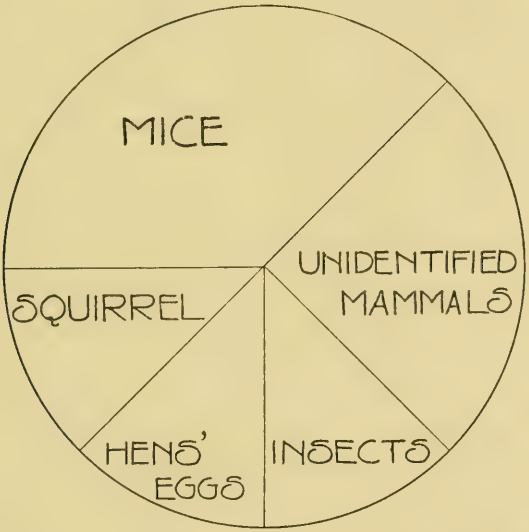


Fig. 12c.—Diagram showing the percentages of Food Items of Pilot Snake (*Callopeltis obsoletus*) found during August and September only: 37½ per cent Mice; 25 per cent. Unidentified Mammals; 12½ per cent. Insects; 12½ per cent. Hens' Eggs; 12½ per cent. Squirrels.

This snake is found from southern New Jersey to Indiana and southward, and is abundant in the southern part of the country. It is a beautiful little snake, living on bushes and trees, as well as among grass, and is shown by our Plate No. XXVI to be quite at home in a tree. It feeds more upon insects than upon other creatures, and as it is entirely harmless should be protected rather than destroyed. We regret that we have been able to study only two specimens of this species from this State. One is from Lancaster county and the other from Dauphin county, Pa. There are a few from Pennsylvania in other collections. We respectfully request readers to send us specimens of the green colored snakes which they may meet in their rambles. They are absolutely harmless.

The Green Snake is certainly one of our most beneficial reptiles as an insectivorous creature, and the few authors who have published notes on it are doubtless correct as follows:

Shaw, in his "General Zoology," says it feeds on flies and other insects, and Holbrook and Garman each report it as eating insects. These are the only published statements which we find referring to its food.

No. 15. *Liopeltis vernalis* (DeKay). **Grass Snake.**

The Grass Snake is not especially rare in the State of Pennsylvania, although it is not often observed, owing to the fact that it lives in the grass and among the foliage where its green color renders it inconspicuous. We have received twenty-nine specimens from counties listed below:

Adams County,	Myers, D. W.,	Gettysburg.
	Oslan, C. L.,	Aspers.
Allegheny County,	McCutchens, J. C.,	Pittsburg.
Beaver County,	Walls, R. B.,	Saxton.
Berks County,	Kline, R. H.,	Berneville.
Cambria County,	Dishart, H.,	Patton.
Centre County,	Benner, C. A.,	Powelton.
	Kennedy, Prof. J.,	Powelton.
Erie County,	Baron, E. A.,	McKean.
Fayette County,	Lange, W. H.,	Belle Vernon.
Franklin County,	Miller, J. B.,	Chambersburg.
	De Long, A. C.,	Mont Alto.
	Atkinson, Mr.,	Mont Alto.
Fulton County,	Hess, J.,	Dublin Mills.
Indiana County,	Wehrle, R. W.,	Indiana.
Juniata County,	Jameson, T.,	Swales.
Luzerne County,	Angus, W.,	Stoddartsville.
Lycoming County,	Nelson, Foster,	New Berry.
Monroe County,	Burdsall, F. H.,	Effort.
	Coggler, B. G.,	Tobyhanna.
Perry County,	Brightbill, H. M.,	Marsh Run.
Somerset County,	Suhrie, J. E.,	Crumb.
Sullivan County,	Wieland, W. S.,	Nordmont.
Union County,	Benner, W. E.,	Vicksburg.
Washington County,	Couch, Jos.,	Canonsburg.

As these are fairly well scattered over the State it shows that its distribution is no doubt general. It is to be recognized by its green color and smooth glossy scales without keels. It is described as having head elongate; neck slender; eyes generally large; uniform deep green (turning bluish in spirits), yellowish below; tail not quite one-third the length; scales fifteen; ventral plates one hundred and twenty-five to one hundred and forty, and length twenty-five inches or less.

This most beautiful and harmless little snake is found throughout the eastern United States and differs from the preceding in

being more common northward than southward. It lives where vegetation is abundant and is no doubt to a considerable extent nocturnal. It lays eggs, as is shown by the fact that we have received snake eggs and upon opening them found well developed little embryos representing this species of serpent.

The eggs, according to our dissections, commence to develop in June and reach the full length (1½ in.), by the middle of August, about which time they are laid. The egg shell is translucent, thin, and parchment-like, and the little embryo within the egg is about an inch long at the time it is laid. The laying may occur from the 12th of August to the 15th of September. The eggs probably hatch within three weeks after the time of laying. They are deposited in loose earth, decaying wood, or sawdust, and the young soon find protection in concealment in the grass or green foliage.

The Grass Snake has been reported as feeding on insects (DeKay and Morse) and "crickets and grasshoppers" (Holbrook). Dr. Atkinson has published that he found three grasshoppers in one specimen of this serpent.

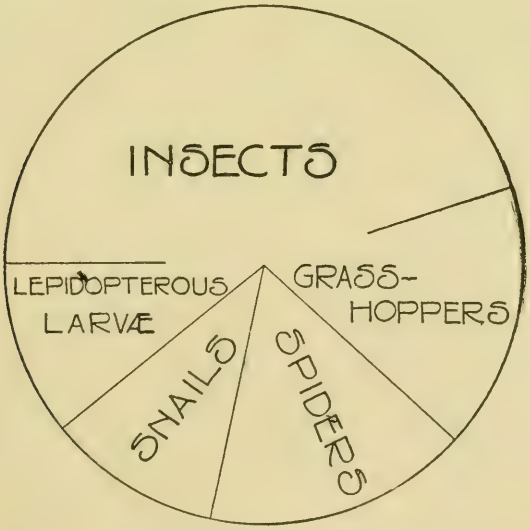


Fig. 13.—Diagram showing the percentages of Food Items of Grass Snake (*Liopeltis vernalis*): 45 per cent. Insects; 16 per cent. Spiders; 17 per cent. Grasshoppers; 11 per cent. Lepidopterous Larvæ; 11 per cent. Snails.

From our actual studies of the food contents of 22 specimens we have ascertained the following:

No. Specimens:	Food Materials:
1	Helix hirsuta (Snail).
1	Slug.
1	Snails. Undet.

3	Spiders.
2	Undet. Insect fragments.
2	Undet. Larvæ.
1	Undet. Species Orthoptera.
2	Acrididæ (Grasshoppers).
2	Common crickets.
2	Striped Brown Crickets.
2	Undet. Lepidoptera.
1	Measuring Worms.
1	Ground Beetles (Harpalus sp.)
1	Red Ants.
1	Striped Salamander.

In the above table we find that most of the food materials mentioned are obnoxious to the interests and property of mankind, excepting the ground beetles and the striped salamander, which are insectivorous. Consequently we must say emphatically that an animal with such a menu must be very valuable to mankind in destroying the obnoxious insects and other pests around him. The absence of toads and fragments of toads from this list shows they do not feed on these useful batrachians, and also that the insects found in their stomachs were taken by them primarily as their own food, rather than secondarily as the food of the toads which were swallowed, as is evidently the case with the Garter Snake and the Hog-nosed Adder or Blowing Viper.

The above table proves conclusively that the Grass Snake is beneficial, as it feeds upon small snails, slugs, spiders, grasshoppers, crickets, measuring worms and other objectionable insect larvæ, and red ants, with an occasional salamander for variation, yet very few amphibians are taken as its food. Were it not for the two eating ground beetles and one specimen of salamander included in the above list, we could say that all these individuals showed absolutely beneficial characters in their feeding habits. As an animal that needs preservation in order to help suppress the increasing numbers of insect pests, the harmless and beautiful little Grass Snake is to be recommended. Let its utility be taught in the home and school and these useful creatures preserved.

No. 16. *Bascanion constrictor* (L.) **Black Snake. Plates XXVII, XXVIII, XXIX, XXX Fig. a.**

The Black Snake is also called the "Blue Racer" from the fact that it has a bluish lustre and runs rapidly, especially over vines and thickly growing bushes. It differs conspicuously from the other species of Black Snake (No. 12), called the Pilot Snake, by the presence of the white on throat and chin only, also in having all the scales smooth instead of keeled. The genus Bascanion, of which we have but one species in this State, does not have the dorsal scales keeled; the anal plate is bifid; the scales are generally in seventeen

rows, and the ventral plates are one hundred and eighty-five in number. The *B. constrictor*, which is commonly known as Black Snake or Blue Racer (Schwartze Schlange, in Pennsylvania German), is to be known by its lustrous pitch black color, which is bluish or greenish below, and the white throat and chin, very large eyes, scales generally seventeen, ventral plates one hundred and seventy to one hundred and ninety, and length five feet or less. It may at times be found larger.

It is not generally known that the young are a grayish olive color, spotted with rhomboid black botches or spots, and few persons recognize young Black Snakes because they expect to see them black, rather than spotted. Most persons take them to be the young of the House Snake (No. 20), Water Snake (No. 11), or the Copperhead (No. 22). The Black Snake or Blue Racer is entirely harmless and does not voluntarily attack any person, although it is true that when angered it may pursue its tormentor if the latter should turn and flee. This snake is found in the eastern United States and is very common eastward and southward. We have received it from thirty counties and it is beyond any doubt to be found in the other counties of this State. It is among the more common species of larger snakes, in more or less wooded regions and along hillsides and among bushes.

The following is our Pennsylvanian record:

Adams County,	Bream, T. F.,	Gettysburg.
Beaver County,	Elder, T. S.,	Darlington.
Berks County,	Gruber, Prof. C. L.,	Kutztown.
Blair County,	Marder, G. A.,	Altoona.
Bradford County,	Robinson, J. S.,	Milan.
Bucks County,	Atkinson, J. W.,	Buckingham.
	Cox, E. C.,	Buckingham.
	Fosbeiner, J.,	Richland Centre.
	Bewley, Miss Anna K.,	Forest Grove.
Centre County,	Harpster, J. S.,	Port Matilda.
Clinton County,	Moran, E.,	Lock Haven.
Crawford County,	Coon, O. O.,	Saegertown.
Dauphin County,	Whitauer, C. B.,	Steelton.
Fulton County,	Millott, P. C.,	Andover.
	Palmer, A. C.,	Warfordsburg.
	Schenck, J. M.,	Enid.
Erie County,	Mixer, E. W.,	Waterford.
Huntingdon County,	Swoope, J. P.,	Huntingdon.
Indiana County,	Wehrle, R. W.,	Indiana.
Lebanon County,	Bohn, J. G.,	Onset.
	Peiffer, L. S.,	Fredericksburg.
	Bohn, J.,	Lickdale.
Lehigh County,	Dickenshied, F. S.,	Hosensack.
Luzerne County,	Patterson, J. E.,	Wilkes-Barre.
	Shovlin, H. A.,	Freeland.

Lycoming County,	Shafer, W. H.,	Cogen House.
	Drill, H.,	Cogen House.
	Sarson, W.,	Okome.
Monroe County,	Allegar, I. L.,	Shawnee.
Perry County,	Brightbill, H. A.,	Marsh Run.
	Brightbill, H. M.,	Marsh Run.
Schuylkill County,	Moyer, M.,	Schuylkill Haven.
Somerset County,	Suhrie, J. E.,	Crumb.
Venango County,	Bean, Lauella,	Emlenton.
Washington County,	Couch, Jos.,	Hickory.
	Couch, Merle,	Canonsburg.
Wayne County,	Bullock, W. H.,	Honesdale.
Wyoming County,	Sharpe, A. B.,	Jenningsville.
York County,	Johnson, J.,	Woodbine.

Both species of Black Snakes are reputed enemies of Copperheads and Rattlers, and the effectiveness of Black Snakes in destroying these two venomous species is so generally believed and reported to us we must believe that there is enough truth in it to warrant the belief in the common assertions that the Black Snakes attack, kill and eat Copperheads and Rattlers. However, we have not been able to find specimens of this venomous species of reptile in the stomachs of Black Snakes, although we have found them eating Garter Snakes, Water Snakes and Grass Snakes. Prof. Verrill, of Yale, found a Copperhead in the stomach of one of this species. It is remarkable how the snakes of this species can climb trees and walls and how rapidly they can run over bushes and through branches. We remember chasing one nearly one hundred yards as it ran over bushes and vines four or five feet above the ground, while the writer was running the same distance on practically open sod ground.

The Black Snake or Racer multiplies by laying eggs, which are one and one-half to one and five-eighths inches in length, oval in shape and twenty to forty in number, deposited two or three inches below the surface of loose soil into which the reptile bores, or in piles of sawdust, hollow logs or trees or decaying wood. The embryonic snake at the time of hatching is nearly one foot in length and is of such a light color and so spotted that it is seldom believed to be a Black Snake.

The eggs are laid during the latter part of June or early part of July, and the last of the latter month the embryo shows typical color markings. They generally hatch during the latter part of August or early part of September. We have collected them (our specimen No. 1636) hatching as late as October. We have evidence from correspondence which will be published later, that the young may remain in the egg during the entire winter and not hatch nor become active until the following spring. The shell is generally white

and elongate, with rough points, and the young fight, strike and defend themselves as soon as their heads are out of the shell. They cut their way through by means of an egg-tooth projecting from the middle of the upper snout, having for its function the slitting of the leathery shell through which the animal crawls, after which the egg-tooth is shed.

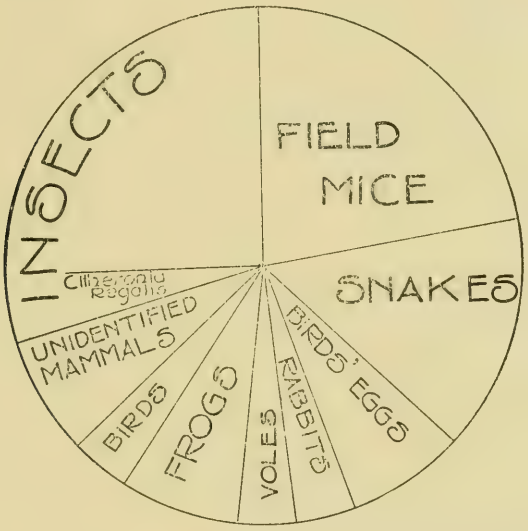


Fig. 14.—Diagram showing the percentages of Food Items of Black Snake (*Bascanion constrictor*): 25 per cent. Insects; 15 per cent. Snakes; 22 per cent. Field Mice; 8 per cent. Birds' Eggs; 4 per cent. Rabbits; 4 per cent. Voles; 7½ per cent. Frogs; 4 per cent. Birds; 7 per cent. Mammals (unidentified); 3½ per cent (*Citheronia regalis*). Larvæ of Royal Moth.

Writers have reported the Black Snake as feeding upon a great variety of substances as follows: Small mammals (Atkinson), mice and rats (Shaw and Cuvier), field mice (Garman and Smith), squirrels and opossums (Cuvier), small quadrupeds (DeKay), milk, in pans (Shaw), birds (DeKay, Garman, Smith, Cuvier, Atkinson and Harlan), eggs (Shaw, DeKay, Morse and Harlan), lizards (Cuvier), rattle snakes (Shaw), batrachians (Atkinson), toads (DeKay), frogs (DeKay, Garman, Smith and Cuvier), and insects (Morse). Very few persons have published anything definite as to the species of these various animals upon which they feed. Dr. Atkinson, of Carnegie Museum, has taken weasels and voles from their stomachs, but as a rule specific statements of their food have not been given by other writers. Our investigations show the following list of food for different individuals of this species:

No. Specimens:	Food Materials:
3	Undet. Insect fragments.
1	Insects, with Frog remains.
1	Acrididæ (Grasshoppers).
2	Cave Crickets.
2	Undet. Lepidoptera.
1	Cecropia Moth.
2	Imperial Moths.
2	Regal Moths.
1	Common Cutworms.
2	Undet. Beetles.
1	Undet. Ground Beetles.
1	Long-Horned Leaf Beetles.
2	Clover Leaf Beetles (P. punctatus).
1	Undet. Saw Fly.
1	Currant Worms.
1	Ichneumonidæ.
1	Woods Frog.
1	Green Frog.
2	Garter Snake.
1	Water Snake.
1	Grass Snake.
1	Undet. Bird.
2	Robins' eggs.
3	Undet. Mammals.
1	Rabbit.
1	Undet. Mice.
4	Meadow Mice (M. pennsylvanicus).
2	Microtus sp. (uncertain species).
1	Vole. (Evotomys sp.)

In the above extensive list of food materials we find that the Black Snakes have eaten meadow mice (*Microtus pennsylvanicus*) more than any other one material found in their stomachs. Among the economically objectionable food materials which they had taken are grasshoppers, cave crickets, moths and cutworms of different species, leaf beetles, especially clover-leaf beetles, saw flies, currant worms and meadow mice and voles. The list of beneficial food materials are frogs, ichneumon flies, grass snake, bird, robbins' eggs and rabbit. An important feature of this table is that it shows that the Black Snake eats other snakes, such as Garter Snakes and Grass Snakes, and there is no doubt in our mind of the truth of the generally accepted statement that it is an enemy of the Rattler and Copperhead.

In striking the balance in the food of the Black Snake it can not now be decided in favor of this reptile, as the above list shows that it is more obnoxious than beneficial. It is true that an individual serpent may form the habit of frequenting the hen house or chickens' nests to seek and eat their eggs, and the proper thing to do in such a case as this is to meet the trouble by killing the

molester. From individual stomach records we learn certain facts that are not to be obtained from the general list, such as that given above in the form of a food chart of this serpent. One of the very significant points is that a bird, snake or frog was present in almost every stomach which contained insects, unless that were large larvæ. It is very evident that the Black Snake does not eat any but the largest insects, such as the larvæ of the Royal Moth and of the Sphinx moths, but it does feed upon insectivorous creatures to a great extent and the latter furnished the smaller insects and fragments which were found within those that were studied. Thus, it appears to be more destructive than beneficial, as the present evidences appear to be against it. More studies are needed for our final verdict, which must be reserved until more complete and satisfactory evidences are obtained.

No. 17. *Pituophis melanoleucus* (Daudin). **Pine or Bull Snake.**

The Pine Snake is one of the species of serpents that probably occurs in Pennsylvania, although we have not yet been fortunate enough to secure specimens and find no definite record of it having been collected in this State. It is also called the Bull Snake, and lives in pine woods, from which it takes its common name. Its general ground color is whitish, with chestnut brown blotches, which are margined with black, and three series of blotches on the sides. This is one of the two genera with the dorsal scales keeled and the anal plate entire. The scales are in twenty-nine rows, the ventral plates about two hundred and twenty-five in number, and the greatest length about six feet. It is recorded as feeding upon rabbits, squirrels, birds, etc., and we desire specimens in order to make more definite studies.

No. 18. *Diadophis punctatus* (L.) **Ring-necked Snake.**

The little Ring-necked Snake is commonly seen in the early spring in most parts of this State, on dry paths, sunning itself. It is a beautiful, interesting and harmless species, which never attains a size of more than one and one-half feet in length, and is to be recognized by its smooth scales, the bifid anal plate, scales in fifteen rows, ventral plates about one hundred and forty or more in number, and bluish black in color, with a yellow collar or ring about the neck. This ring is about two scales wide and is quite conspicuous. Beneath, the color is orange yellow, becoming bluish in spirits. Each plate of the under side usually has a black spot on it at each side, and some times one in the middle.

This harmless little snake is recorded as being a western species, occurring eastward to Ohio, yet our investigations must extend its

range, as we have collected or received it from the counties listed in a following table:

Adams County,	Hartman, E. W.,	Cashtown.
Beaver County,	Mansfield, I. F.,	Beaver.
Bedford County,	Beemiller, Frank,	Bedford.
Berks County,	Dengler, J. E.,	Tulpehocken.
Blair County,	Riddle, Miss Bertha,	Bushman.
Bradford County,	Seward, F. H.,	Wyalusing.
Cambria County,	Uncapher, D. H.,	Ebensburg.
Chester County,	Mast, A. H.,	Elverson.
Clearfield County,	Care, J. G.,	Irvona.
Columbia County,	Stahl, H. R.,	Light Street.
Franklin County,	De Long, C. A.,	Mont Alto.
Huntingdon,	Mierley, K. W.,	Mapleton Depot.
	Fouse, C. S.,	Aitch.
Indiana County,	Wehrle, R. W.,	Indiana.
Jefferson County,	Brian, Chas.,	Brockwayville.
Lackawanna County,	Croasdale, W. D.,	Chinchilla.
Lawrence County,	Hawthorne, L. H.,	New Castle.
Lehigh County,	Kocher, J. F.,	Walberts.
Lycoming County,	Van Housen, Bruce,	Williamsport.
	Spencer, Douglas,	Williamsport.
Perry County,	Brightbill, H. A.,	Marsh Run.
	Callender, G. S.,	Duncannon.
Snyder County,	Keller, W. J.,	Beaver Springs.
Somerset County,	Suhrie, J. E.,	Crumb.
Sullivan County,	Wieland, W. S.,	Nordmont.
Washington County,	Couch, Merle,	Canonsburg.

It is no doubt to be found in almost every county in the State, as it is to be seen that the list given above represents nearly all parts of Pennsylvania. It is to a considerable extent nocturnal in habits, and during the day time is often found beneath stones, logs or bark. Its dark color renders it nearly the color of the damp soil where it lives. It depends upon its protective coloration for concealment. The largest specimen which we have received is seventeen and one-half inches in length. This is from Cannonsburg, Washington county.

There has been almost nothing published about the reproductive methods of the Ring-necked Snake, but we are prepared to state here positively that it is oviparous, or lays eggs. The latent gonads or undeveloped eggs are one-fourth inch in length and commence to develop in May, when they reach a length of one-half inch, and by the middle of June they are practically developed, or over one inch long. They are laid from the middle of June to July or August and each is covered with a thin opaque shell, white and leathery, and very irregular in shape and size. They hatch in September and October, and the young are about four inches in length at the time of hatching.

As far as we can learn, this is the only definite statement that has ever been published about the reproduction of the Ring-necked Snake, excepting a statement by Dr. Atkinson to the effect that he had found ten eggs in a specimen taken by him July 9th, and that from the thickness of the shell enveloping them there were indications that the species is oviparous. When we receive enough specimens we shall try to work out the full life history of this valuable little serpent.

Authors have published various reports about the food of this little Ring-necked Snake. It is said to feed upon reptiles (Cope); batrachians (Cope); toads (Morse); insects (Holbrook, Cope, Morse and Atkinson); and worms (DeKay and Atkinson). Atkinson found beetles and earthworms in one.

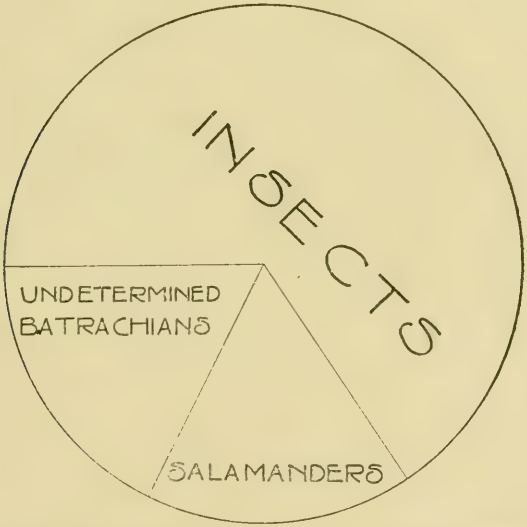


Fig. 15.—Diagram showing the percentages of Food Items of Ring-necked Snake (*Diadophis punctatus*): 66 per cent. Insects; 16 per cent. Undetermined Batrachians; 17 per cent. Salamanders.

Of the twenty specimens which we have examined, sixteen contained no food, two contained undetermined insect fragments, one contained undetermined beetles and Ground Beetles; in another we found an undetermined salamander, and in another a Striped Salamander (*Plethodon cinereus*). This indicates its beneficial feeding habits, as it appears its chief food consists of earthworms and insects, rather than batrachians (excepting salamanders) and reptiles, as some have reported. With this, as with other species, more specimens are needed for further investigations and final conclusions.

No. 19. *Lampropeltis getulus* (L.) *Var. sayi* (Holb.). **Chain or Thunder Snake, King Snake.**

The Chain Snake is so named from the coloration or color pattern, which gives the appearance of chains extending along the body. It is also called the Thunder Snake, and one variety is known as the King Snake. The genus *Lampropeltis* is to be recognized by the absence of keels from the scales; the anal plate entire; ventral plates one hundred and eighty in number; scales in twenty-one to twenty-five rows. *L. getulus* is described as black with narrow yellowish lines forking on the sides, each fork embracing a large black spot; color chiefly black; belly checkered; scales in twenty-one rows; ventral plates two hundred and ten to two hundred and forty; length fifty inches or less. While this is commonly found from Virginia to Louisiana, mostly east of the mountains, the Yellow-spotted Black Snake or King Snake, which is another variety, is found from the Alleghenies to the Rocky Mountains, we have not collected nor received specimens in the State of Pennsylvania and insert it here on the authority of Dr. Jordan, in his Manual of Vertebrates, who gives it from "the Allegheny to the Rocky Mountains." We find no author who has made definite observations upon its food, but it is reported commonly by writers that it feeds upon batrachians, such as salamanders and toads, and reptiles, such as rattle snakes, moccasins and lizards, and also on birds and moles. This reptile is so well marked that it should be recognized, even by one who is not an expert, and as we are anxious to receive specimens of it we invite readers to help us procure it.

No. 20. *Lampropeltis doliatus* (L.) *triangulus* (Boie.) **Milk Snake or House Snake. Plate XXXI.**

The House Snake or Milk Snake is among the most numerous of the snakes of Pennsylvania, and is known by a greater variety of names than is any other one species. It is variously known as the House Snake, Milk Snake, Chicken Snake, Thunder and Lightning Snake, Red Snake, Horn Snake, Chequered Snake, Milk Adder, Spotted Adder and "Blotshich Schlange" in Pennsylvania German. The latter is one of the most common names in some places. It is known by its grayish color, with three series of brown rounded blotches bordered with black; about twenty-five in the dorsal row. It has an arrow-shaped blotch or spot on the top of its head, with the point of the arrow extending toward the tail, and the under side is light, with a great many square or rectagular black blotches. These small square black marks on the under side at once distinguish it from all other species of reptiles found in his State. While the

tail is short, it is not as stumpy nor as heavy as the tails of the two venomous species of serpents which we have. The largest specimen which we have collected is forty inches, and the smallest specimen is nine inches long.

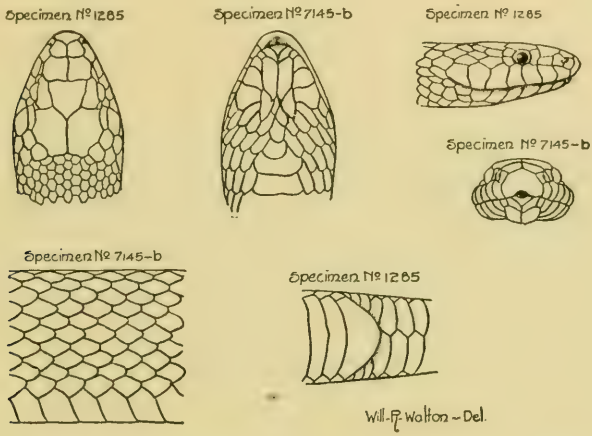


Fig. 16.—Structural Characters of House Snake (*Lampropeltis doliatus triangulus*).

Natural Size. Drawn under Supervision of H. A. Surface, Economic Zoologist.

The House or Milk Snake, or Spotted Adder, is found from Virginia to Iowa and northward and occurs throughout Pennsylvania as the most common snake in the State, excepting the Garter Snake. We have received it from the following forty-eight out of sixty-seven counties in this Commonwealth, and it, of course, is found in the other counties:

Adams County,	Sprenkel, E. A.,	Fairfield.
Allegheny County,	Johnson, Stewart,	Pittsburg.
	Brumbaugh, C. L.,	Wilkinsburg.
	Walker, R. L.,	Carnegie.
	Couch, W.,	Carnegie.
	Reed, C. G.,	Bridgeville.
	Cruikshank, Dr. O. T.,	Swissvale.
Beaver County,	Walls, R. B.,	Saxton.
	Doughty, G.,	Smiths Ferry.
Bedford County,	Williams, L. S.,	Everett.
Berks County,	Neithamer, E. F.,	Reading.
	Becker, W. D.,	Fleetwood.
	Grimm, W. H.,	Hamburg.
	Dengler, J. E.,	Tulpehocken.
Bradford County,	Huffman, J. L.,	New Albany.
Bucks County,	Oppenlander, E.,	Passer.
	Godshalk, S. Y.,	Perkasie.
Cambria County,	Dishart,	Patton.

Carbon County,	Salt, H. E.,	Weissport.
	Murphy, J. H.,	Summithill.
	Davis, Russel,	Lansford.
Centre County,	Kuhn, C. T.,	State College.
Chester County,	Baldwin, O. H.,	Parkersburg.
	Keim, J. H.,	St. Peters.
Clarion County,	Cyphert, P.,	Crates.
	Arnold, F. M.,	Clarion.
Clearfield County,	Hund, W. E.,	La Jose.
	Green, J. W.,	McCartney.
Clinton County,	Williams, J. M.,	Floral.
	Caprio, S.,	Lock Haven.
Columbia County,	Kuhler, K. L.,	Benton.
Crawford County,	Gilmore, L. B.,	Saegerstown.
	Hanks, A. J.,	Wilson Mills.
	Miller, W. H.,	Guy's Mills.
	Martin, J. T.,	Meadville.
	McFate, D.,	Meadville.
Cumberland County,	Hull, R. J.,	Lisburn.
	Grosz, F.,	Balfour.
	Ritchey, Mrs. G. F.,	New Kingstown.
	Garber, S. P.,	Entlerville.
	Cressler, G. E.,	Shippensburg.
	Creamer, J. E.,	Shippensburg.
Dauphin County,	Sober, Miss Martha G.,	Dauphin.
	Meredith, H. C.,	Harrisburg.
	Logan, R. F.,	Steelton.
	Ruof, F.,	Hummelstown.
	Backenstoe, D. C.,	Fort Hunter.
Delaware County,	Hoopes, P. R.,	Wayne.
Erie County,	Shaffer, Ora,	Union City.
	Mixer, W. E.,	Waterford.
	Laurie, C. F.,	Erie.
	Clark, C. W.,	Corry.
Fayette County,	Lange, W. H.,	Belle Vernon.
Franklin County,	Dixon, W. D.,	St. Thomas.
	Rinick, Garnet A.,	Chambersburg.
	De Long, C. A.,	Mont Alto.
	Beatty, T. B.,	Quincy.
Fulton County,	Jackson, R. L.,	McConnellsburg.
	Covalt, Ira,	Covalt.
Hutingdon County,	Lefford, W. C.,	Huntingdon.
Indiana County,	Wehrle, R. W.,	Indiana.
Jefferson County,	Brian, Chas.,	Brockwayville.
	Swab, C. U.,	Brookville.
Juniata County,	Haldman, C. G.,	Thompsontown.
Lancaster County,	Mayer, Dr. I. H.,	Willow St.
	Wister, J. J.,	Columbia.
Lebanon County,	Bohn, J. G.,	Onset.
	Derickson, S. H.,	Annville.
	Strauss, C.,	Fredericksburg.
	Ulrich, A. S.,	Lebanon.
	Mell, J., Jr,	Richland.
Lehigh County,	Kocher, Dr. J. F.,	Walberts.

PLATE XXXI.—Milk Snake or House Snake (*Lampropeltis doliatus triangulus*).
Photo in Nature by Mr. Wm. H. Fisher.

PLATE XXXII.—Spreading Adder or Blowing Viper (*Heterodon platirhinos*).
Photographed in Nature by Mr. Wm. H. Fisher.

PLATE XXXIII.—Colored Boy Handling Spreading Adder and Black Snake, showing neither Species is Venomous.
Photographed by the State Zoologist.

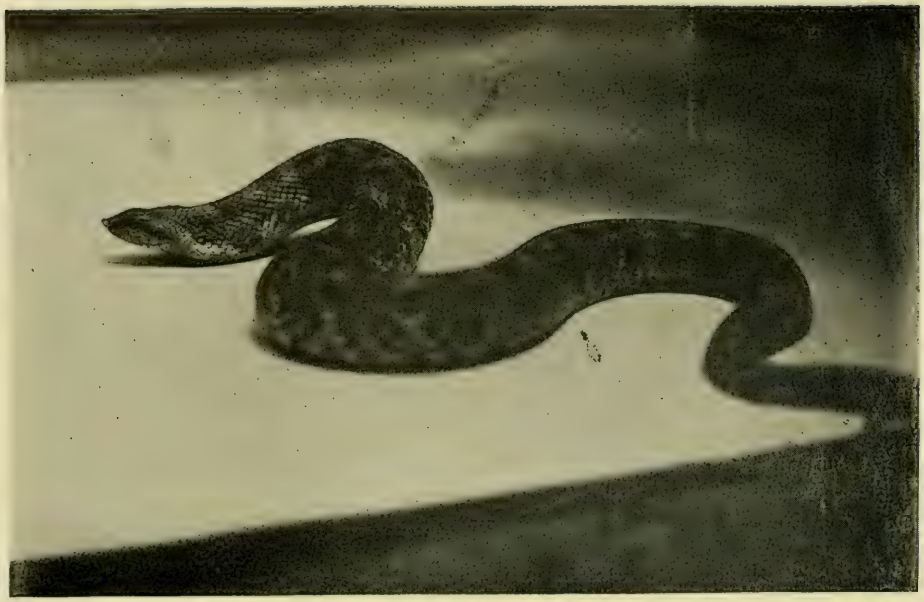


PLATE XXXIV.—Blowing Viper, Spreading Adder or Hog-nosed Adder (*Heterodon platirhinos*).

Photographed while alive and moving, in the Office of the State Zoologist of Pa. Specimen No. 7313.

PLATE XXXV.—Fig. b. Embryos of Hog-nosed Adder or Blowing Viper, just before birth, showing this species is Ovoviviparous. Natural size. Photograph of Pennsylvania Material (No. 3376) in the Office of the State Zoologist.

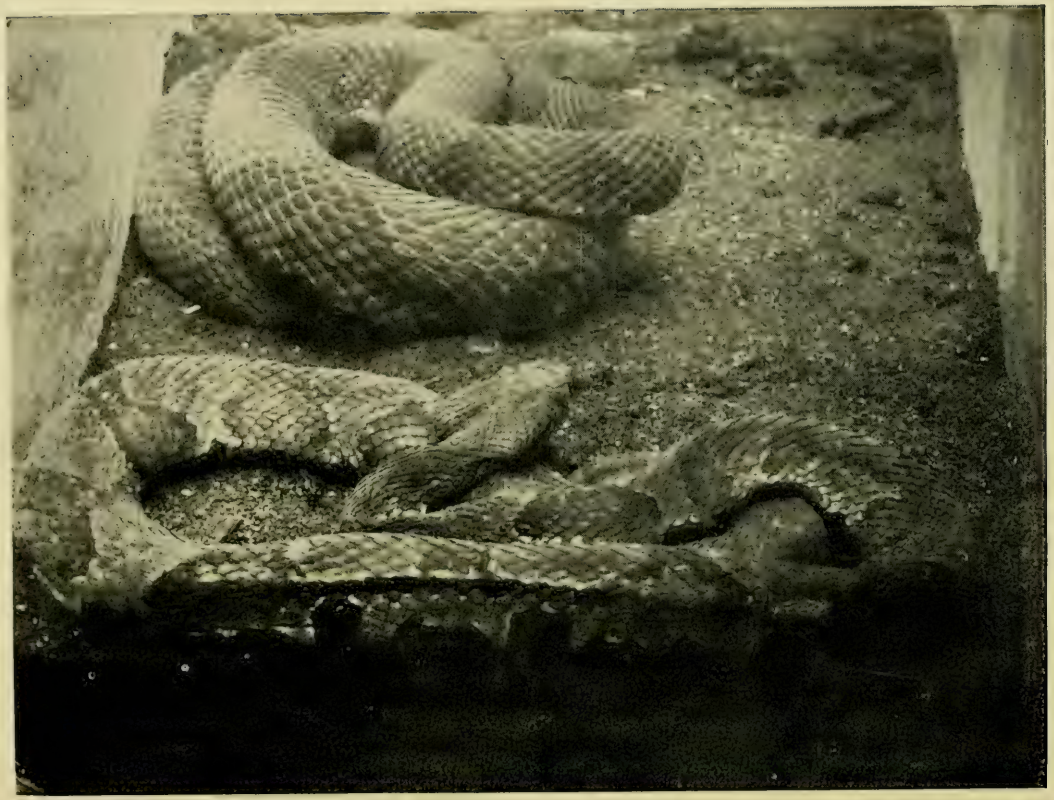


PLATE XXXVI.—Two Copperhead Snakes (*Agkistrodon contortrix*), in striking position.
Photograph of Living Specimens in the Office of the State Zoologist of Pa.

PLATE XXXVII.—Copperhead Snake opened and photographed to show its Stomach filled with Seventeen-year Locusts. Specimen No. 6541b in our Collection, sent by Mr. A. P. White.

PLATE XXXVIII.—Embryos of Copperhead Snakes, before birth, showing that this Species produces living young instead of eggs. Specimen No. 3850a, sent by J. P. Swoope.

Photographed in the Office of the State Zoologist of Pa.

Luzerne County,	Funk, J. B.,	Shickshinny.
	Angus, Wm.,	Stoddartsville.
Lycoming County,	Geddes, J. M.,	Williamsport.
	Shafer, W. E.,	Cogan Station.
Monroe County,	Allegar, I. L.,	Shawnee.
Montgomery County,	Benner, W. M.,	Telford.
	Wagner, Harold,	Pottstown.
Montour County,	Wertman, Mrs. E. G.,	Danville.
Northampton County,	Narne, Dr. F. H.,	Bethlehem.
	Jefferson, J. A.,	Easton.
	Seip, G. W.,	Easton.
Perry County,	Brightbill, Nellie,	Marsh Run.
	Showalter, C. E.,	Landisburg.
Potter County,	Gorham, W. H.,	Coudersport.
	Lehman, J. P.,	Coudersport.
Schuylkill County,	Filbert, B. A.,	Schuylkill.
Snyder County,	Roush, M. L.,	Freeburg.
	Bordner, Dr. H. H.,	Shamokin Dam.
Somerset County,	Suhrie, J. E.,	New Baltimore.
Sullivan County,	Wieland, W. S.,	Nordmont.
Susquehanna County,	Mosher, J. M.,	New Milford.
Tioga County,	Andrews, S. F.,	Wellsboro.
	Mulford, E. R.,	Wellsboro.
	King, K. L.,	Westfield.
	Olver, W.,	Mansfield.
Warren County,	Weld, R. J.,	Sugar Grove.
	Wright, B. G.,	Sugar Grove.
Venango County,	Witherop, C. N.,	Emlenton.
Washington County,	Couch, Jos.,	Canonsburg.
	Couch, Merle,	Canonsburg.
	McCreary,	Crothers.
Wayne County,	Bullock, W. H.,	Honesdale.
Westmoreland County,	Lakin, H.,	Mt. Pleasant.
York County,	Frey, H. S.,	Hellam.
	Hoover, T. B.,	Wellsville.
	May, W. H.,	Wellsville.
	Krone, B. P.,	Lewisberry.

It lives in cultivated districts, and although harmless and entirely innocent, there seems to be much superstitious fear and many ridiculous stories concerning it. The name "House Snake" is given to it because it may be found about the abode of man, which it at times enters. This is mostly caused by cold weather of fall or the lower outside temperature of evening or night cause it to seek a place where the atmosphere is warmer, and thus it may enter the dwelling, but no harm can come from its presence. Most ridiculous stories have been told concerning its milking cows, and it should be enough to say that this is entirely impossible and such stories are without foundation. It is often seen in or near milk houses, and is reported as drinking milk from pans. This may be true, because it is known that many snakes feed upon milk and eggs when they have the opportunity.

The House Snake lays eggs, which vary from seven to twenty in number. These eggs are deposited in loose soil, decaying wood or sawdust. The young are brightly colored and active, and from evidences at hand, this snake is not as strictly nocturnal as are some other species which we have discussed.

Dr. O. P. Hay, in a "Report of the Reptiles and Batrachians of Indiana," published in 1892, said: "According to Dr. Goode's investigations, this snake is oviparous and guards its nest. Whenever danger threatens her young the mother finds an asylum for them down her capacious throat. (See 'American Association for the Advancement of Science,' 1872.) I have taken eggs of this species in Illinois that were buried in a pile of manure and more or less glued together. The egg is two inches long and little less than one and one-fourth inches in diameter. The covering is parchment-like. It contains a young snake ten inches long." We prefer to describe the covering of the egg of the House Snake as leathery, white and opaque, to distinguish it from the thinner parchment-like covering of the egg of the Grass Snake.

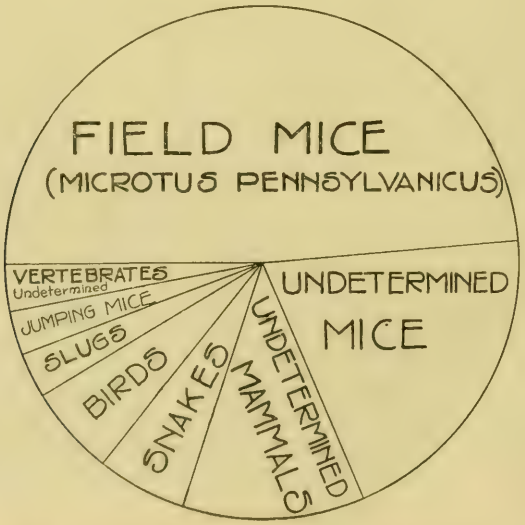


Fig. 17.—Diagram showing the percentages of specimens of Food Items of Milk or House Snake (*Lampropeltis doliatus triangulus*): 48½ per cent. Field Mice (*Microtus pennsylvanicus*); 20 per cent. undetermined Mice; 11 per cent. Unidentified Mammals; 6 per cent. Snakes; 5½ per cent. Birds; 3 per cent. Slugs; 3 per cent. Jumping Mice; 3 per cent. Undetermined Vertebrates.

Our investigations show that the ova commence to develop about the middle of May and become fully developed and are laid about the 10th of August. Our specimen No. 1382 b, collected on that

date, had laid its eggs for the summer. The largest eggs that we found were one and three-fourths inches long and three-fourths in diameter. We have collected them as late as the 25th of October and have evidences that they hatch during that month and September. The young are nearly nine inches long at the time of hatching.

There is very little reported by writers upon the food of this serpent, although Dr. Atkinson has found in its stomach DeKay's Snake, and also the Queen Snake or Striped Water Snake. Cope has also found it feeding upon the Pennsylvania meadow mouse, and Dr. Merriam in "Science News" has reported its eating the Garter Snake.

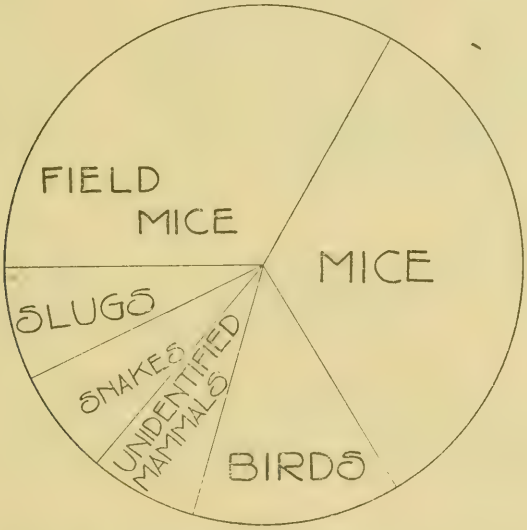


Fig. 17a.—Diagram showing the percentages of Food Items of House Snake (*Lampropeltis doliatus triangulus*) found during July and August only: 33½ per cent. Field Mice; 33½ per cent. Mice; 13 per cent. Birds; 7 per cent. Unidentified Mammals; 7 per cent. Snakes; 6 per cent. Slugs.

In our dissections of ninety specimens we found forty-eight with empty stomachs, and of those which contained food the following table gives the different kinds of animals eaten and the number of specimens of this species feeding upon each kind of material:

No. Specimens:	Food Materials:
1	Slugs.
2	Undet. Vertebrates.
1	Red-bellied Snake.
1	Rock Snake.
1	Undet. Bird.
1	Robin's Eggs.

2	Undet. Mammals.
1	Jumping Mouse.
3	Undet. Mice.
9	Meadow Mice (M. pennsylvanicus).
6	Microtus sp. Mice (uncertain species).
1	White-footed mouse.
1	House mouse.

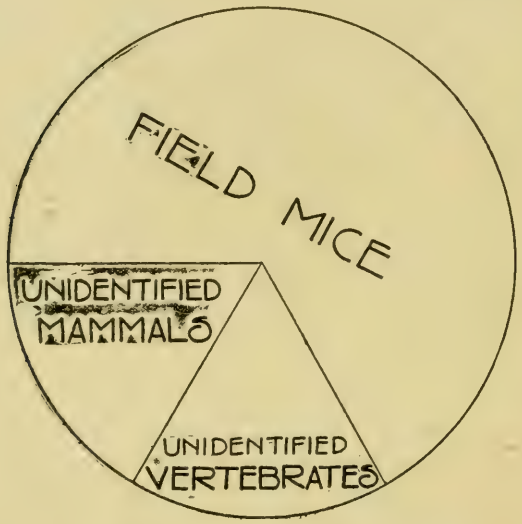


Fig. 17b.—Diagram showing the percentages of Food Items of House Snake (*Lampropeltis doliatus triangulus*) found during September and October only: 67 per cent. Field Mice; 16½ per cent. Unidentified Vertebrates; 16½ per cent. Unidentified Mammals.

When we consider that the above table shows positively that more than half of those individuals which contained food had recently been eating mice of some kind, and that these same mice are among the most destructive creatures of the house, barn, storeroom and farm, we can see sufficient justification for preserving the House Snake or Milk Snake, notwithstanding the unjust superstition, ignorance and fear with which it is regarded.

No. 21. *Heterodon platirhinos* (Latr). **Spreading Adder or Blowing Viper. Plates XXXII, XXXIV, XXXV.**

This snake is another species of reptile with a great variety of common names. It is variously known as the Spreading Adder, Hissing Viper, Blowing Viper, Blow Viper, Hog-nosed Snake, Blowing Adder, Hissing Adder, Spreading Viper, Hog-nosed Viper, Pilot, Bastard Rattle Snake or Rossel Boshtard and Blaser, and other common names. Most of these names refer to its habit of spreading

its head quite flat when angered and hissing in a threatening manner. There is no more striking example of pure bluff than that which is exhibited by this entirely harmless snake. Not one man in a thousand has the courage to pick up this snake while it is spreading, blowing and striking, but we have seen this done by inexperienced and uninformed persons. We photographed a boy in the act of handling one of these serpents while it was enlarging

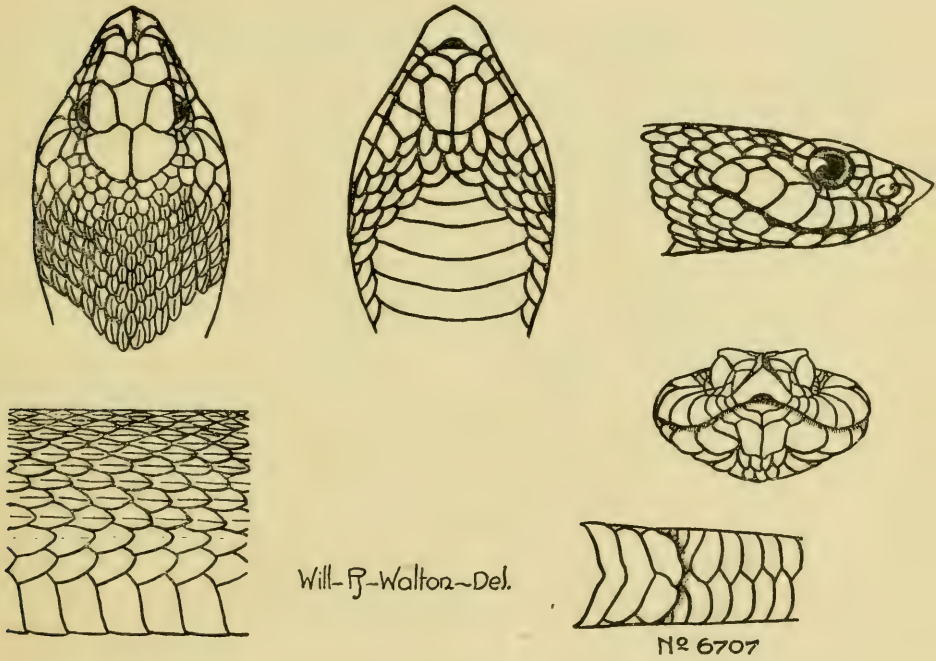


Fig. 18.—Structural Characters of Spreading Adder (*Heterodon platirhinos*). All Natural Size excepting lower right hand figure which is ½ Natural Size. Drawn under supervision of the Economic Zoologist.

and flattening its head. This is shown in Plate XXXIII. The fact that the fear of serpents is not natural but acquired from older persons is shown by the attitude of this little colored boy, James Dean, of Harrisburg, Pa., who at the age of five years came into our office and was very much interested in playing with the living snakes. One day he asked if he could have one, and upon being questioned as to what he would do with it, replied, "I want to take it home." When asked "For what purpose?" he replied, "To get Mam to cook it!"

A very valued and intelligent correspondent in the southeastern part of Pennsylvania wrote to us, endeavoring to call our attention in a kindly manner to a mistake which he thought we had made in

saying that "The Copperhead and Rattler are the only poisonous species of reptiles found in this State." He said, "Surely you have forgotten the Spreading Adder." Nevertheless, we here again repeat the statement that this most threatening snake is entirely harmless, although one of the greatest "bluffers" known in Nature. It must be remembered that it is not unusual for harmless creatures to simulate by color or actions those which have decided means of defense.

The name "Hognosed Adder" is given from the flattened upturned snout or nose, and the specific name *platirhinos* means "flat-nose." This is doubtless used by the serpent in boring into the ground to find a suitable place for bringing forth its young, or passing a dry or cold season. One of the justifications that some people find in considering this species of serpent poisonous is that they say it will strike itself after being teased for some time and fall over dead. Fortunately, we had an opportunity to test the truth of this report. We found one that was molting or casting its outer skin, and the skin over the eyes had loosened enough to make it temporarily blind. After it had been teased for a short time and had thrown itself into a frenzy by spreading, hissing and striking in various directions it struck backwards toward its body but did not hit itself by three or four inches, and at once fell over apparently lifeless. Its mouth was open and dirt could be poked into it without any evidence of sensation on the part of the snake, but one trick showed that it was aware of what was being done to it. It persisted in lying apparently limp and lifeless but upside-down. Every time we would turn it right side up, even though it was simulating death, it would time after time gradually turn back until its back rested upon the ground and the ventral side was up. Perhaps this was an effort on its part to aid its appearance of being dead, and thus induce its tormentor to pass it by as a creature that was *hors de combat*, as do the opossum, curculio, and other forms of animal life practice the same deception. It is needless to say that it had not injured itself and was in its normal condition in less than half an hour.

The genus *Heterodon*, to which belongs the Hog-nosed Snakes, is distinguished by keeled dorsal scales; in twenty-three to twenty-five rows; anal plate bifid and snout recurved and keeled. In fact, the last named feature is enough to distinguish the two species of this genus immediately from all other serpents. The Spreading Adder, which is the one species of the genus found in this State, is described as brownish or reddish, with about twenty-eight dark dorsal blotches besides spots on the sides and half rings on the tail. There is one form (var. *niger*) which is uniformly black, and of

which we collected one specimen in Centre county, Pa., in September, 1900. The length is about thirty inches or less, and the tail is short and thick. In this regard it closely resembles the venomous serpents.

This reptile is found in the eastern part of the United States rather abundantly and no doubt occurs in every county in the State of Pennsylvania. We have received it from the counties named in the list, which is not yet sufficiently complete to justify us in concluding that it does not occur in the northern district, from which we do not have specimens.

Bedford County,	Walls, R. B.,	Saxton.
Berks County,	Leibelsperger, I. H.,	Fleetwood.
Blair County,	Way, A. P.,	Altoona.
Carbon County,	Murphy, H. J.,	Summitt Hill.
Chester County,	Climenson, W. W.,	Honey Brook.
	Gilliford, R. W.,	Spring City.
Cumberland County,	Garver, P. S.,	Entlersville.
Franklin County,	Hoffman, E. D.,	Mercersburg.
	De Long, C. A.,	Mont Alto.
	Myers, J. G.,	Fayetteville.
Huntingdon County,	Black, Joel,	Huntingdon.
	Swoope, J. P.,	Huntingdon.
Luzerne County,	Campbell, E. W.,	Wilkes-Barre.
	Angus, Wm.,	Stoddartsville.
	Truax, S. T.,	Glen Summit Sp'gs.
	Anthony, W. R.,	Glen Lyon.
Monroe County,	Allegar, I. L.,	Shawnee.
	Percho, J.,	E. Stroudsburg.
	Blakeslee, Josephine,	Blakeslee.
	Gould, Mrs. E. V.,	Effort.
Montour County,	West, Mrs. G. P.,	Danville.
Northampton County,	Oxford, T., Jr.,	N. Bangor.
Northumberland County,	Allison, Dr. C. E.,	Elysburg.
Perry County,	Brightbill, H. A.,	Marsh Run.
	Heckendorn, D. K.,	New Bloomfield.
	Couch, F. G.,	Andersonburg.
	Bower, M. R.,	Landisburg.
	Brightbill, H. M.,	Marsh Run.
Union County,	Spigelmeyer, Wm.,	Millmont.
York County,	May, Henry,	Dillsburg.

It lives in dry woods and sandy hillsides, and is often found under bushes by berry pickers, who take unnecessary fright upon seeing it, especially if it is so disturbed as to commence its contortions and hissing.

The Hog-nosed Adder, or Blowing Viper, has been said by many writers to be oviparous or egg-laying, but our specimens do not give us facts to agree with such statements. Our specimen No. 3336, collected August 5th, contained young embryos six and one-half inches in length, each in a very delicate transparent membrane.

These are photographed and reproduced in a plate in this Bulletin, showing decidedly that this reptile is, or at least at times may be ovoviviparous, or bearing living young. The young are borne during the latter part of August or September. During the first week of September we found specimens ten inches in length, which showed the same characters of striking, spreading, blowing, simulating death as have been described in this Bulletin for the adult.

The food of the Hog-nosed Adder reported in literature is as follows: Mice (Morse); birds' eggs (International Encyclopedia); toads and frogs (Morse), and insects (Holbrook). No one has definitely published a statement of their own observations upon the food of this serpent, and consequently little is known about it with certainty.

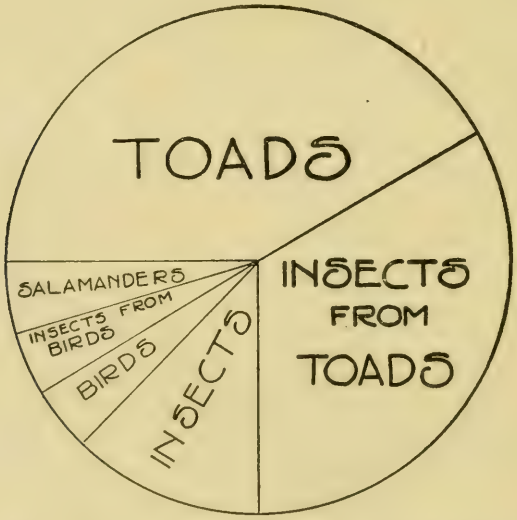


Fig. 19.—Diagram showing the percentages of Food Items of Spreading Adder or Blowing Viper (*Heterodon platirhinos*): 41½ per cent. Toads; 12½ per cent. Insects; 4 per cent. Birds; 33 per cent. Insects from Toads; 4 per cent. Insects from Birds; 4 per cent. Salamanders.

Of the twenty-seven specimens which we have examined we found the following number of individuals with each of the food materials contained in the table below:

No. Specimens:	Food Materials:
6	Undet. Insect fragments.
4	Insects with Toad remains.
1	Insects with Bird remains.
1	Acrididæ (Grasshoppers).
1	Stink-bug.
1	17-year Cicada.
2	Undet. Lepidoptera.

1	Undet. Species Bees.
1	Granite Salamander.
1	Tadpole.
10	Toads.
1	Undet. Bird.

By a study of the above table it will be seen that only one was known to feed upon a bird; none were found with eggs or shells, and none with frogs, although we have several containing insects, one having filled itself with 17-year locusts, and two had eaten caterpillars. However, the most striking fact to be learned by a study of the above table is that the chief element of food of the Spreading Adder is the Common Toad, of which ten specimens had been eaten. This is very unfortunate, because in the wholesale destruction of the toad is found the most serious feature of the life or habits of the Spreading Adder. We fear that the destruction of a few varieties of insects by the Hog-nosed Adder can not atone for the loss of so many toads, and from the economic standpoint this serpent must be considered objectionable because it feeds upon toads, which are known to be decidedly beneficial.

Family 2. *Crotalidæ.* The Rattlesnakes and Copperheads.

The serpents belonging to the Family Crotalidæ are to be recognized by the presence of large poison fangs in the front of the upper jaw and the deep pit on the side of the head, plainly visible between the eye and the nostril. The poison fangs are erectile or so constructed that they lie down when not in use and rise and stand forward when the serpents prepare to strike. No other reptiles have the pit here mentioned and illustrated in Fig. 22. The body is uniformly stout, head flat and triangular, and neck slender. The pupil of the eye is elliptical in shape and stands vertical, as does the pupil of a cat's eye. It dilates or contracts immediately with a decrease or increase of light, respectively. The tail is short and small; the scales are keeled in the Pennsylvanian, the anal plate is entire, and the plates beneath the tail are not divided. This is a family of American reptiles, containing about sixty species, all of which are notorious as being venomous and consequently objectionable. All are ovoviviparous or bring forth living young, and do not kill their prey by constricting it or squeezing it, but by the use of the mouth only.

However, there are only a few in each brood and in this State but one brood per year. There are two species found commonly in this State and a third which is reported from the western part of the State.

The different species of this fortunately small family of venomous serpents may be distinguished at once by the following key:

The Analytic Key to the Family Crotalidæ.

A. With no rattles at end of tail. No. 22. Agkistrodon contortrix (L.). Copperhead Snake. Page 186.

AA. With rattles at end of tail. No. 26.

B. Blotches on back in seven series; rattles small. No. 23. Sistrurus catenatus (Rafin). Prairie Rattle Snake. Page 190.

BB. Blotches on back in three rows, forming zigzag cross-blotches; rattles large. No. 24. Crotalus horridus (L). Common Rattle Snake. Page 191.

No. 22. *Agkistrodon contortrix* (L.). Copperhead Snake. Plates XXXVI, XXXVII, XXXVIII.

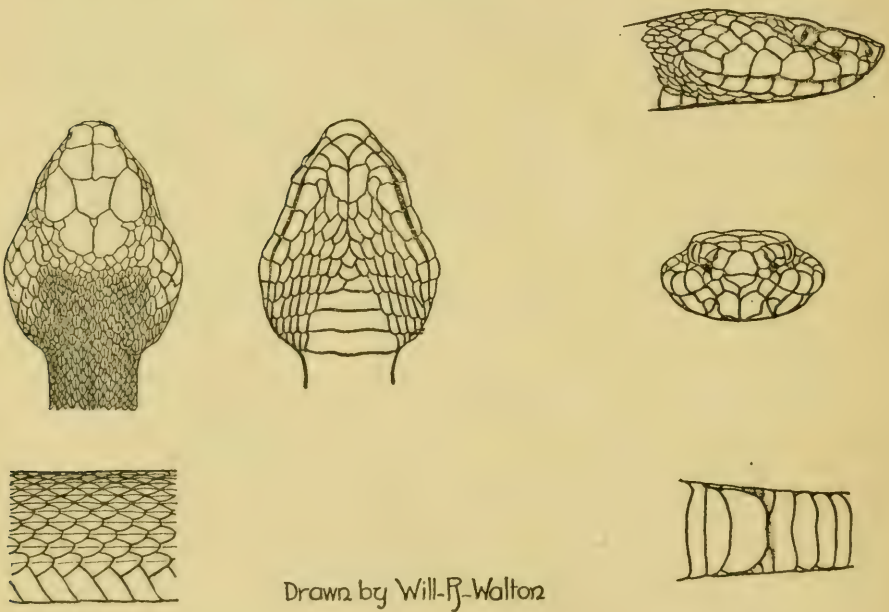


Fig. 20.—Structural Characters of Copperhead Snake (*Agkistrodon contortrix*). Slightly less than Natural Size.

Drawn by the Artist of the Zoologist's Office, under Supervision of H. A. Surface.

The Copperhead Snake has a great variety of common names among which are Cotton-mouth, Hazel-head, Red Viper, Copperbelly, Red Adder, Deaf Adder, Pilot Snake and "Kupper Schlange," in Pennsylvania German. The word "Pilot" should never be applied to this snake, but it is impossible for writers to change a custom that has been so generally established as that of applying this term to the Copperhead Snake in the eastern part of our State, instead of to that form of Black Snake to which it properly belongs.

There is no creature more treacherous, despicable nor dangerous in this State than the Copperhead Snake. It lurks in bushes or grass or among stones, and strikes without warning and often

without provocation. Compared with it, the Rattler is a creature of honor, as the latter strikes only for food or in self defense and it almost always sounds a warning before striking. This gives an opportunity for persons who are on the alert to avoid its venomous attack.

The Copperhead Snake is described as being hazel brown, touched with coppery red; back with a series of fifteen to twenty-five V-shaped blotches; pale yellow, with thirty-five to forty-five dark spots on each side, and the scales arranged in twenty-three rows. The length is about forty inches, or very rarely more.

This dangerous reptile is found from the northeastern part of the United States to Wisconsin and southward, mostly in damp places, although not confined to such localities. Fortunately, it is extinct in most of the cultivated districts of this State which have been long settled, and while it is not decreasing rapidly in the wild mountainous parts of the Commonwealth, its numbers are being reduced until it is not to be found in some counties. We have received it from the counties in Pennsylvania listed below:

Adams County,	Heintzelman, W. E.,	Orrtanna.
Allegheny County,	Johnson, S.,	Pittsburg.
Armstrong County,	Nill, T. W.,	Dayton.
	Allshouse, A. J.,	Leechburg.
Beaver County,	Wright, F. R.,	Smith's Ferry.
	Reed, G. S.,	Baden.
Bedford County,	Kams, Rev. W. E.,	Hopewell.
Berks County,	Griesmer, G. B.,	Spangsville.
Blair County,	Waring, F. R.,	Tyrone.
Carbon County,	Salt, N. E.,	Weissport.
Centre County,	Williams, G. W. R.,	Lemont.
Chester County,	Laurence, Jno.,	Coatesville.
Clarion County,	Kaufman, M. M.,	Clarion.
	Arnold, F. M., Jr.,	Clarion.
Clinton County,	White, A. P.,	Lock Haven.
Cumberland County,	Garber, S. P.,	Carlisle.
Dauphin County,	Haas, R. V.,	Lykens.
	Backenstoe, C.,	Fort Hunter.
Fayette County,	Lange, W. H.,	Belle Vernon.
Franklin County,	Dixon, W. D.,	St. Thomas.
	Hopkins, E. D.,	Mercersburg.
	De Long, C. A.,	Mont Alto.
Fulton County,	Palmer, A. C.,	Warfordsburg.
Huntingdon County,	Gibbs, E. E. C.,	Huntingdon.
	Robb, J. I.,	Alexandria.
	Moyer, S. F.,	Alexandria.
	Lefford, Wm.,	Huntingdon.
Indiana County,	Wehrle, R. W.,	Indiana.
Juniata County,	Yoder, P. C.,	Pleasant View.
	Hoyt, H. J.,	Mifflintown.
Lancaster County,	Penrose, L.,	Drumore.

Lebanon County,	Peiffer, L. S.,	Fredericksburg.
	Derickson, S. H.,	Annville.
Monroe County,	Allegar, I. L.,	N. Water Gap.
Northampton County,	Ashton, Walter,	Easton.
Montour County,	West, Mrs. G. P.,	Danville.
Perry County,	Brightbill, Mrs. Margaret,	Marsh Run.
Warren County,	Wells, R. J.,	Sugar Grove.
Washington County,	Hufford, J. F.,	Amity.
Westmoreland County,	Brinton, G. M.,	Irwin, R. F. D.
Wyoming County,	Smith, H. C.,	Vosburg.
	Welles, R. C.,	Meshoppen.
	Lowe, E.,	Meshoppen.
York County,	Baird, Jno.,	Delta.

Fortunately, it is not a reptile that wanders far from one fixed place of abode, and thus in regions where it does not frequently occur it is not often liable to be found at unexpected moments.

These reptiles often live together and hibernate in dens or retreats that are suitable to them. It is true that great numbers of them are taken at one time from hollow logs, caves or dens.

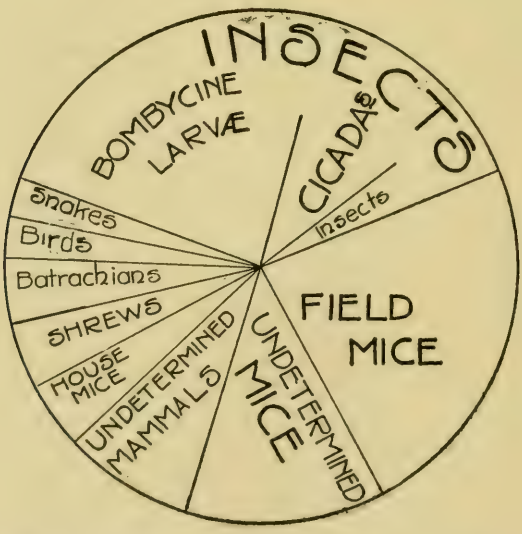


Fig. 21.—Diagram showing the percentages of Food Items of Copperhead Snake (*Agkistrodon contortrix*): 2 per cent. Snakes; 14 per cent. Insects; 8 per cent. Undetermined Mammals; 23 per cent. Bombycine Larvæ; 4½ per cent. Shrews; 4½ per cent. House Mice; 23½ per cent. Field Mice; 13 per cent. Undetermined Mice; 5 per cent. Batrachians; 2 per cent. Birds.

The Copperhead agrees with the other members of this family in being ovoviviparous, or bearing living young. It must be understood as explained in other pages of this bulletin that these are enclosed in a membranous shell but are retained until hatched.

Our dissection shows that in the early part of June these eggs are about one and one-half inch in length on a yolk, with covering, very closely resembling a true egg. Gradually the embryo develops and the yolk is absorbed, and the young is born from the latter part of August to the early part of October. Our specimen No. 2550, collected on the 18th of September, contained eggs one and three-fourths inches in length, with the development of the embryo nearly complete. These could not have been born until October. From six to ten are born at a time. Dr. Atkinson writes "A female kept in the laboratory of the Museum gave birth to six young on the 28th of August, 1900. The young are poisonous at an early age. One of these young eight days old bit the writer on the finger and caused a painful inflammation which continued four days."

This reptile is reported as feeding on frogs and disabled birds, and Dr. Atkinson has found in its stomach the larvæ of insects, cicadas, locusts and small birds. We have found it feeding on the following material:

No. Specimens:	Food Materials:
3	Undet. Insect fragments.
1	Undet. Larvæ.
6	17-year Cicada.
1	Undet. Lepidoptera.
2	Polyphemus moth (larvæ).
2	Io Moth (larvæ).
1	Imperial Moth (larvæ).
1	Regal Moth (larvae).
2	Oak Worms (Anisota sp.)
1	Undet. Vertebrate.
2	Granite Salamanders.
1	House Snake.
1	Sparrow.
3	Undet. Mammals.
3	Oppossums.
3	Undet. Mice.
8	Meadow Mice (M. pennsylvanicus).
5	Meadow Mice (Microtus sp.)
1	White-footed Mouse.
2	House Mice.
1	Undet Squirrels.
1	Undet. Shrews.
1	Mole Shrew (Blarina sp.)

From the above list it will be seen that the food of the Copperhead to a great extent consists of large insects, especially larvæ which fall to the ground from the leaves on which they were feeding, and also of mammals of various kinds, especially the most obnoxious species of mice. Note that six different individuals were found gorged with Seventeen-year Locusts or Cicadas.

From the economic standpoint of its feeding habits in relation to mankind, it is very beneficial, and if it were not for the careless use of a most dangerous weapon we should be justified in recommending its preservation.

No. 23. *Sistrurus catenatus* (Rafin.). **Prairie Rattlesnake. Plate XXXIX.**

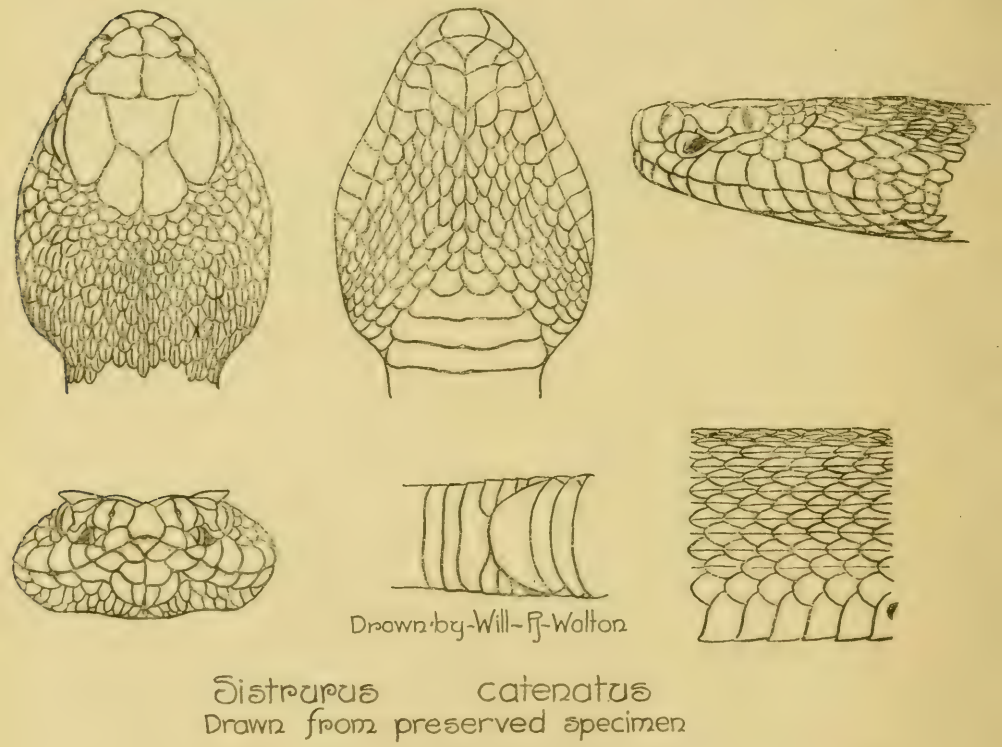


Fig. 22.—Structural Characters of the Prairie Rattlesnake (*Sistrurus catenatus*). Natural size. Drawn in the Office of the Economic Zoologist.

The Prairie Rattlesnake is often called the Massassauga, from the Indian name for this reptile. The name of the genus *Sistrurus*, is from two Greek words, meaning "Rattle-tail;" and the name of the species *catenatus*, is from the Latin, "chained," or "forming a chain," and refers to the color pattern.

It is not usually known that two species of Rattlesnakes are to be found in the State of Pennsylvania, and also that they are described as belonging to different Genera or major groups, although they are of the same family. The Common Rattle Snake, which is generally found in rocky places through the State, belongs to the genus *Crotalus*. The difference between the genera *Sistrurus* (which is the Prairie Rattle Snake) and *Crotalus* (which in-

cludes our Common Rattler) is that the former has the top of the head with about eight plates arranged in a rosette, and the rattle is always very small, while the latter (or *Crotalus*) has the top of the head covered with small scales instead of plates, and the rattle is generally large.

The Prairie Rattler is brown or black, with about seven rows of deep blotches, about thirty-four such blotches in each row, and each blotch with a yellow edge and a blackish shade toward the outside and edged with yellow. From the pit to the neck there is a yellow streak. Occasional specimens may be found which are all black (melanic), as with the Hog-nosed Adder. The ventral plates number one hundred and thirty-five to one hundred and fifty, and the length rarely exceeds thirty inches.

This species of reptile is the one found mostly on the prairies from Ohio to Minnesota and southward, and lives mostly in grassy fields. It is rare in Pennsylvania, being found only in the western part of the State. We have not collected nor seen a specimen from Pennsylvania, although Dr. Atkinson, of the Carnegie Museum, Pittsburg, Pa., published in his "Reptiles of Allegheny County," records of the occurrence of this species. Thus it occurs only in the extreme western part of the State, according to our present knowledge of its distribution in this Commonwealth. There are no published observations on its food or feeding habits, although Dr. Stejneger, in his "Report on the Poisonous Snakes of North America," quotes Dr. Taylor as saying that it feeds on mice and other rodents. No doubt in grassy regions it takes the place of the Common Rattle Snake and its food must be very similar, with due variations for the difference in haunts, as this species lives mostly in grassy fields, while the next is to be found mostly in rocky places. Consequently a variation in food should be expected, with more insects, particularly grasshoppers, taken by this species.

No. 24. *Crotalus horridus* (L.). **Common Rattlesnake. Plates XL, XLI.**

There is no mistaking the Rattle Snakes, as they are the only serpents with horny beads or rattlers on their tails. The noise which they produce is also characteristic, and every person who once hears it will never forget it. It sounds very much like escaping steam or like a mingling of steam escaping and the shrill song of certain species of crickets or locusts. The noise is no doubt made to frighten away intruders and thus preserve the store of venom which may be necessary for saving the life of the serpent on another occasion or for taking its food. This venom is secreted slowly, and after the snake strikes two or three times there is generally not enough left to produce very serious results. Thus it

might be unable to continue to defend itself or capture its prey if it should be so prodigal as to waste its venom. Mankind and nearly all forms of animal life know the sound as well as the odor of this reptile, and have learned to avoid it. It might be asked why the Rattle Snake is blessed with a rattle as a means of protection, while its cousin, the Copperhead, is doomed to go through the world without sounding a similar alarm for driving away intruders, and thus preserving its venom for future needs. This may be explained by observing the difference in the habits of the two species. The Rattle Snake lies quiet, coiled upon a stone, log, rock or hummock, and is often inconspicuous and entirely unseen by the person or creature which it drives away by its sound. It does not generally attempt to flee or crawl from an intruder. The Copperhead remains inactive or attempts to shrink away to a place of safety, until it finds it is discovered, when it will put itself on the defensive. Vigilance and its tendency to retire from danger take the place of the warning rattles. It should be added that in taking their prey the Rattle Snakes do not use their rattles nor fangs, and where the prey is small enough to be captured and eaten without injecting venom into it, they reserve their secretion.

The Common Rattle Snake can be known by its yellowish brown to dark colors of various shades, with three rows of irregular brown spots running together more or less and forming zigzag cross blotches; the tail is black, while the body may vary from almost black to light yellow with spots or blotches. There is a pale line from the mouth to the eye with a very dark patch below it. The ventral plates are one hundred and sixty-five to one hundred and seventy-five in number, and the total length rarely exceeds sixty inches. The largest that we have received or collected is fifty inches long. There is a popular belief in this State that the yellow individuals are females and the black ones are males, but our dissections of all the specimens that we could procure have proven that this is not the truth, but rather that the color is lightest immediately after moulting, and darkest just before moulting, although it appears the yellow is the predominating color of the females and the darker shade prevails among the males.

There is also a popular belief that the age of the snake is to be recognized by the number of rattles and the "button," or small rattle at the tip. Most persons think a rattle is formed each year and consequently a serpent with fourteen rattles and a button should be fifteen years of age. However, this is not true, as we have seen them shed or lose two or three of their rattles at one time in their cages in zoological gardens. Also, we have kept a careful account of the number of rattles in regard to length or

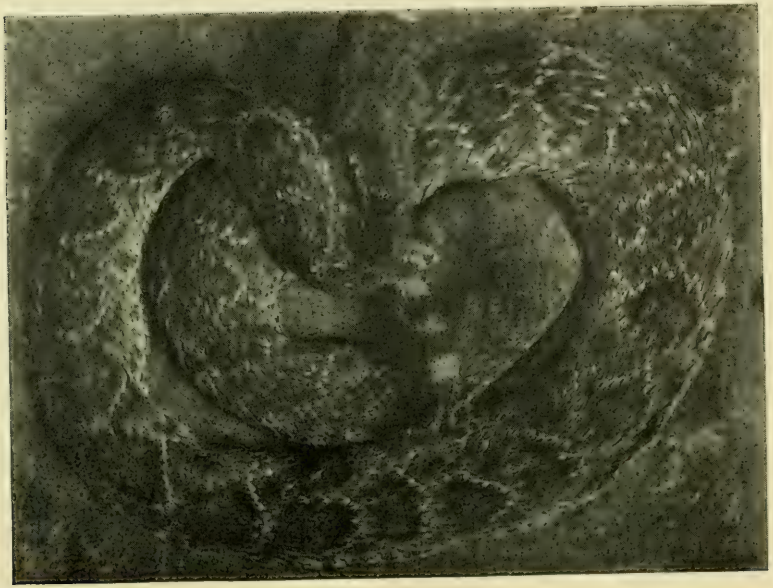


PLATE XXXIX.—Prairie Rattlesnake (*Sistrurus catenatus*).
Photographed by the State Zoologist.

PLATE XL.—Common Rattlesnake (*Crotalus horridus*), dissected and photographed to show a Common Rat (*Mus decumanus*) in its stomach. Specimen No. 3211, sent by John M. Schenck.

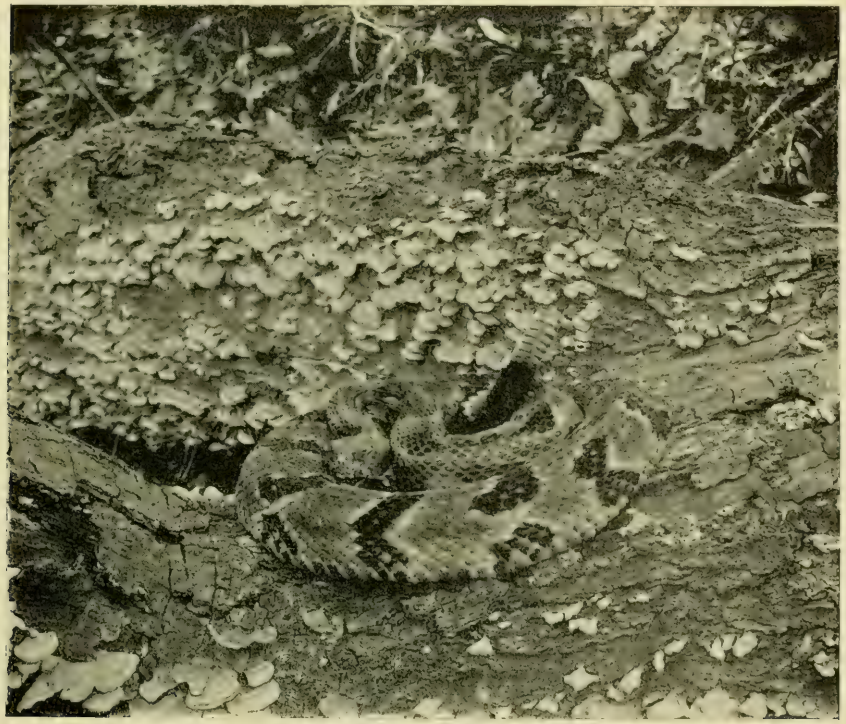


PLATE XLI.—Common Rattlesnake (*Crotallus horridus*).
Photographed in Nature by Mr. Wm. H. Fisher.

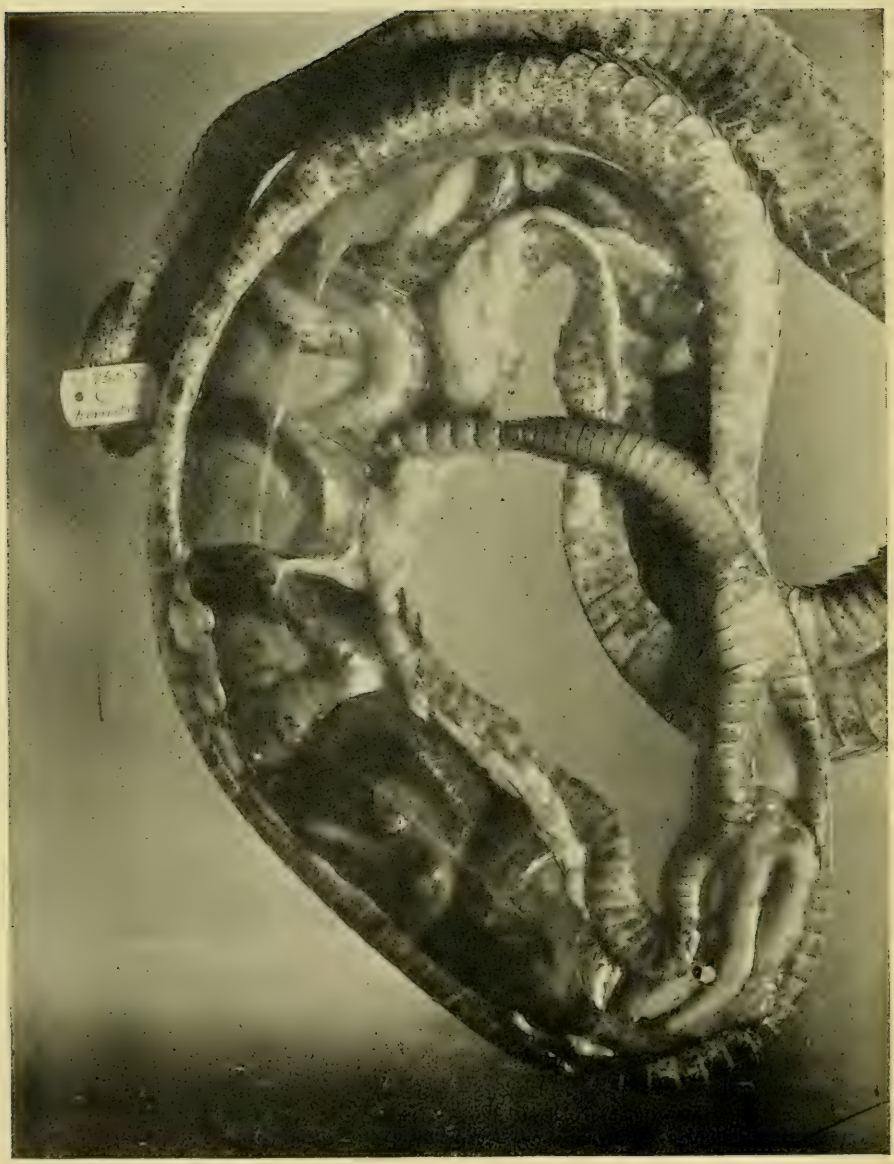


PLATE XLII.—Common Rattlesnake (*Crotalus horridus*), dissected and photographed to show embryonic young. Showing this Species bears living young instead of laying eggs. Specimen No. 7558, sent by J. C. Williams.

size of the serpent, and find that there is no definite relationship whatever. The rattle itself is only a horny outer-growth of the epidermis or outer skin, and portions of it may be broken off or lost at any time. The vigor with which it is used by its owner is liable to result in its being broken as it hits against some hard object, and although it is true that others are formed from time to time there is no truth in the statement that they are retained by the reptile in such a manner as to definitely indicate age. Of course, an unusually long rattle will be found only on an old individual, but on others of the same age it might be very short. The size of a snake is the most certain indication of its age, although this also varies with the amount of food that it has been able to obtain. As a rule, female snakes are larger than males. This is in accordance with the observed conditions of most species of cold blooded vertebrates.

There is also a popular belief that the Rattle Snake coils itself around regularly, like a rope, and strikes from this coil. This is impossible. Let a person coil a rope and then attempt to uncoil it in the same manner that would be necessary for the snake to follow to strike from such a position, and he will see that it must turn over and over in the uncoiling. While snakes of all kinds do often coil, it shows they never strike from a coil, nor from a stretched out position. In striking they curve the front portion of the body (horizontally n t vertically) somewhat like the letter "S," and their reach in striking is about the distance that this zigzag curve permits them to extend themselves when all the "slack" is played out. There is a popular belief that snakes jump at persons, even for considerable distances. This also is entirely fallacious. No snake is able to strike more than two-thirds or three-fourths of the length of its body. It is impossible for a snake to stand or run on its tail only, and even in its most vigorous attacks the tail is not raised from the ground. The stories of snakes of any kind standing on their tails and chasing men, women and children are untrue, although it must be remembered that, as already said on a previous page of this Bulletin, the Black Snakes will on rare occasions pursue individuals who show their timidity by running from them, and since these snakes are very long they are able to raise their heads, neck and front part of the body from the ground, and by this means can look over the top of the grass through which they are running.

The Common Rattle Snake is found from New England to the Rocky Mountains mostly in rocky places. Its coloration is such that it is generally protected as it lies in the sunshine on the rocks and logs. However common it may be in some portions of this

State it has been so reduced in numbers in our civilized districts as to be practically extinct in some regions. We have received specimens from the counties listed below:

Adams County,	Momson, C. S.,	Bendersville.
	Hoffman, E. H.,	Aspers.
Carbon County,	Salt, N. E.,	Weissport.
Butler County,	McKinley, J. H.,	Harrisville.
Centre County,	Musser, Geo.,	Roland.
Clearfield County,	Brown, G. W.,	Sabula.
Clinton County,	Harvey, O. A.,	Flemington.
Franklin County,	De Long, C. A.,	Mont Alto.
	Shearer, D. M.,	Fayetteville.
Fulton County,	Hess, Jno.,	Dublin Mills.
	Schenck, J. M.,	Enid.
	Jackson, Miss Mabel,	McConnellsburg.
	Millist, A. N.,	Sipes Mills.
Huntingdon County,	Runk, A. J.,	Mt. Union.
Indiana County,	Wehrle, R. W.,	Indiana.
Luzerne County,	Angus, Wm.,	Stoddartsville.
	James, W. T.,	Wilkes-Barre.
Lycoming County,	Shafer, W. F.,	Cogan Station.
	Drill, J. H.,	Cogan Station.
	Dennison, C. E.,	Okome.
	Drill, H.,	Cogan Station.
Monroe County,	Allegar, I. L.,	N. Water Gap.
Northumberland County,	Leitzell, E. A.,	Northumberland.
Perry County,	Brightbill, H. A.,	Marsh Run.
Susquehanna County,	Quinn, J. C.,	Susquehanna.
Tioga County,	Andrews, S. F.,	Wellsboro.
	King, L. K.,	Westfield.
	Howland, Jno.,	Westfield.
Warren County,	Hook, D. B.,	Corydon.
Washington County,	Couch, Jos.,	Hickory.

There are no doubt other counties in which it occurs, and we hope to have specimens from these in time. We should receive more specimens were it not that in some places the oil, skin and hearts are used as quack medicines. There is absolutely no virtue in such a disgusting prescription as a fresh Rattle Snake's heart to be swallowed entire for consumption. It is true that one or two persons have been reported as having been cured by such treatment, but there is no evidence to show that this was the cause of improved health. The skins of Rattle Snakes are sometimes worn by superstitious or credulous persons with an erroneous belief that they cure rheumatism. This useless practice is also adopted with the skin of the eel. The custom no doubt comes from the old idea of *Similia similibus curantur* or "like cures like." The flexibility of the eel's or rattler's skin is no doubt supposed to impart its virtues

to limbs stiffened with rheumatism, even though but a piece of the skin of the eel or Rattle Snake be applied thereto.

The oil of the Rattle Snake finds ready sale among the less settled districts of this State as a sovereign remedy for deafness and various ills of mankind. It is sold at a very high price and may even have a local value of four dollars per pound. However, it is decidedly a "quack" remedy notwithstanding the faith given it by mountaineers and woodmen who when they can not produce it for their own use order it at local drug stores, but in educated communities it finds no sale as it is not used. Reputable physicians never prescribe it any more than they use the skin of the Rattle Snake or eel for rheumatism. There may be some virtue in the penetrating and softening oil for deafness, especially in some cases which are caused by a dryness of the interior of the ear or the hardening of the secretions, but other kinds of oil, such as sweet oil, would serve the same purpose fully as effectually. The use of Rattle Snake oil for deafness again may come from the old theory of like producing like, as the Rattle Snake is supposed to have a keenly developed sense of hearing, the virtues of which are transmitted in the oil. If such doctrines were true we should eat the flesh of ducks if we would swim, the flesh of rabbits if we would run, and of birds if we would fly!

There have been most remarkable stories published concerning the dens of Rattle Snakes and some other species, and while a great many persons have doubted these, we must acknowledge that investigations give facts proving they are true. Rattle Snakes and Copperheads do often live in local spots, such as rocky sides or peaks of mountains, in very great numbers where they continue to congregate and mutiply. At times they will be found in such dens by hundreds, but do not appear to leave them for any great distance, as they generally have holes under the rocks into which they retire at night and for winter hibernation.

Dr. J. T. Rothrock, former State Forestry Commissioner, has just reported to us that Mr. Christian Wagaman, of Fayetteville, Franklin county, Pa., on August 1, 1906, found a den of Rattle Snakes within five miles of Mont Alto, Franklin county, Pa., where he killed one hundred and forty individuals in one day, and the person to whom he related the occurrence went there two days afterward and killed forty, and within a few days Mr. W. returned and killed seventy more. In the northwestern part of Centre county is a similar den, which at this writing is undisturbed. Another den is also reported to us as being situated in Huntingdon county, on the southern peak of the second or third mountain south of Spring Grove Mills (Centre county). We have records of other

snake dens in this State. No doubt readers know of many, and we shall be glad to correspond with them upon the subject.

While most reports record the Rattle Snakes and Copperheads as being nocturnal in their habits, we must regard them more as also diurnal or moving about and feeding in the day time rather than at night. Their food as shown in the table following would likewise indicate this. When it comes time for winter hibernation they go into holes in the ground, crevices in caves or hollow logs and become dormant as do other serpents. Both species of the Rattle Snake and also the Copperhead are ovoviviparous or bring forth living young and bear only a few in a brood, and but one brood per year. There are from nine to twelve in each brood and are generally born in the early part of September. Early in the season the eggs are plainly visible in the female when she is cut open and this gives foundation to the report that the Rattle Snakes lay eggs. It should be remembered that in these eggs are the developing embryo which continue developing until the yolk is absorbed and the very thin membrane which can not be called an egg shell, contains the embryonic Rattler plainly seen within. See Plate XLI.

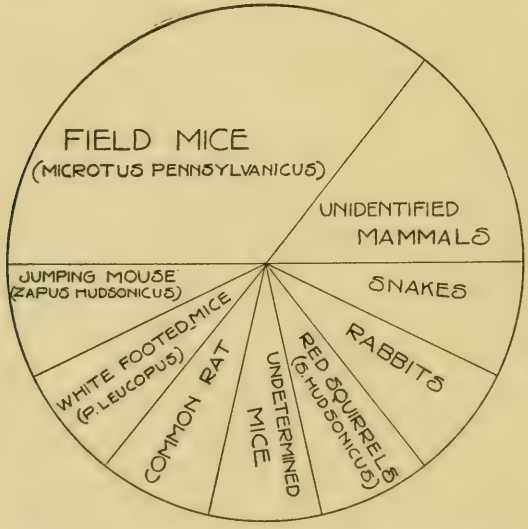


Fig. 23.—Diagram showing the percentages of Food Items of Rattle Snake (*Crotalus horridus*): 37½ per cent. Field Mice; 18½ per cent. Undetermined Mammals; 6 per cent. Snakes; 6 per cent. Rabbits; 6 per cent. Red Squirrels; 6 per cent. Mice; 6 per cent. Common Rats; 7 per cent. Undetermined Mice; 7 per cent. Jumping Mice.

In literature the Rattle Snakes are reported as feeding on rats, mice and rabbits (Holbrook, Morse and Stejneger), and squirrels

and other Batrachians by various authors. Dr. Atkinson has taken a young rabbit from the stomach of one of these serpents.

The following table shows the variety of food of this peculiarly American reptile:

No. Specimens:	Food Materials:
1	Undet. Vertebrate.
3	Undet. Mammals.
1	Rabbit.
1	Jumping Mouse.
6	Meadow Mice.
1	White-footed Mouse.
1	Common Rat.
1	Small Red Squirrel.
1	Undet. Shrew.
1	Common Shrew.

The above table shows that it feeds almost wholly upon mammals or the hairy quadrupeds. As most of these are very obnoxious in their economic relations to mankind, the Rattle Snake, from its feeding habits alone, must be considered one of our important and valuable creatures, as it aids in holding in check the mice and rats that are so destructive to crops of various kinds.

STOMACH CONTENTS OF PENNSYLVANIA SNAKES.

(Report of Specimens Examined on or before June 16, 1906.)

Kind of Species Number.†	4	5	7	8	10	11	12	15	16	18	20	21	22	24
Total No. Examined,	16	21	10	186	11	70	54	22	44	20	90	27	56	30
No. with recognizable food,	5	4	4	72	5	22	29	10	19	6	32	14	41	15
Invertebrata found eaten.														
Branch Annulata.														
Undetermined worms,				1										
Lumbricus sp. (Earth worms),		1		22										
Branch Mollusca.														
Class Gastropoda. (Univalves) Snails and Slugs.														
Stenotrema sp (Snail),				1										
Helix hirsuta. (Snail),								1						
Slugs,	5	3						1			1			
Snails, undetermined,		2		2				1						
Branch Arthropoda (A*).														
Class Crustacea, Cambarus (Crayfish),					4									
Class Arachnida (Spiders),				1				3						
Class Myriapoda (Millipedes),				1										
Class Insecta or Hexapoda (B*).														
Fragments undetermined,			1	8			4	2	3	2		6	3	
Larvæ undetermined,		2					1	2					1	
With Salamander remains,			2											
With Toad remains,				7		2						4		
With Toad remains (probably),				7								2		
With Frog remains,			1						1					
With Bird remains,							4					1		
Order Orthoptera IX (C*).														
Undetermined species,				2		1	1	1						
Fam. 4. Acrididæ. (The Short-horned Grasshoppers),														
Melanoplus femur-rubrum (Red-legged Grasshoppers),				2			2	2	1			1		
Melanoplus bivittatus (Two-striped Grasshoppers),						2								
Fam. 5. Locustidæ (Long-horned Grasshoppers),				1										
Ceuthophilus sp. (Cave Cricket),									2					
Fam. 6. Gryllidæ. Crickets.														
Gryllus pennsylvanicus (Common Cricket),				1				2						
Nemobius fasciatus (Striped Brown Cricket),						1		2						
Order X. Hemiptera (D*).														
Fam. 23. Pentatomidæ (Stink-Bug Family),												1		
Fam. Cicadidæ (Cicadas).														
Tibicen septendecim. (Seventeen year Cicada),												1	6	
Ord. XV. Lepidoptera (Moths and Butterflies).														
Undt. Lepidoptera,				1				2	2			2	1	

Fam. Saturnidæ (Giant Silkworms),									1					
Samia cecropia (Cecropia Moth),													2	
Telea polyphemus (Polyphemus Moth),													2	
Hyperchiria io (Io Moth),														
Fam. Ceratocampidæ.														
Eacles imperialis (Imperial Moth),									2				1	
Citheronia regalis (The Regal Moth),									2				2	
Anisota (Oak Worm),									1					
Fam. Noctuidæ. (The Cutworms),														
Fam. Geometridæ. (Measuring Worms),								1						
Ord. XVI. Diptera. Flies.														
Undt. Fly Larvæ,				2										
Ord. XVIII. Coleoptera. Beetles.														
Undt. Beetles,			2	7					2	1				
Fam. Carabidæ. Ground Beetles.														
Undt. Ground Beetles,				3		1			1	1				
Calosoma scrutator (Searcher),				1										
Harpalus. Black Ground Bettle,				1				1						
Fam. Staphylinidæ. Rove Bettles,				1										
Fam. Coccinellidæ. Lady Birds,..				1										
Fam. Lampyridæ. Fire Flies,				2										
Fam. Scarabæidæ,				1										
Euphoria inda. Bumble Flower-Beetle,				1										
Fam. Chrysomelidæ. Leaf-Beetles.														
Donacia sp. Long-horned Leaf Beetles,									1					
Doryphora decemlineata. Colorado Potato Beetle,				3										
Fam. Curculionidæ. Weevils,				1										
Phytonomus punctatus. Clover Leaf Beetle,									2					
Fam. Calandridæ. Bill-Bugs.														
Rhynchophorus sp. Snout Beetles,				1										
Ord. XIX Hymenoptera Wasps, Ants, Bees, etc.														
Undt. sp.,				1										
Fam. Tenthredinidæ. Saw Fly														
Undt. Saw Flies,									1					
Nematus ribesii (?) Currant (?) Worms,									1					
Fam. Ichneumonidæ,									1					
Fam. Formicidæ.														
Black Ants,			2	4										
Red Ants,			1	1				1						
Fam. Apidæ. Bees.														
Undt. sp.,												1		
Vertebrates found Eaten.														
Undt. Vertebrates,				5		2					2		1	1
Class. Pisces. Fishes.														
Undt. Fishes,						6								
Fam. Siluridæ. Catfishes.														
Ameiurus sp. Catfish,						2								
Fam. Catostomidæ. Suckers.														
Catostomus teres. White Sucker,						1								

*A. B. C. D. See The Monthly Bulletin of the Division of Zoology, Vol. 3, No. 9, January 1, 1906, pages, 274, et sep.—H. A. S.
†For names of kinds of serpents indicated by numbers in this chart see lists in previous pages of this Bulletin.

STOMACH CONTENTS OF PENNSYLVANIA SNAKES—Concluded.

Kind of Species Number.†	4	5	7	8	10	11	12	15	16	18	20	21	22	24
Fam. Cottidæ. Star-Gazers.														
Cottus richardsoni. Miller's Thumb,						1								
Cottus ictalops. Stone-roller,						1								
Class. Batrachia. Batrachians.														
Undt. Batrachians,				1										
Ord. Urodela. Salamanders.														
Undt. Salamanders,			1			1				1				
Fam. Plethodontidæ. Small-tongued Salamanders,														
Plethodon cinereus. Striped Salamander,			2	1		1		1		1				
Plethodon glutinosus. Granite Salamander,				4								1	2	
Spelerpes bilineatus. Two-striped Salamander,			1											
Fam. Pleurodelidæ.														
Diemyctylus viridescens. Newt. Eft,												1		
Ord. Salientia. Jumping. Batrachians.														
Tadpoles,						1								
Bufonidæ. The Toads,														
Bufo lentiginosus americana. Toad,				17	1	4						10		
Fam. Hylidæ. Tree Toads.														
Hyla versicolor. Great Tree Toad,			1											
Hyla pickeringii. Small Tree Toad,				2										
Fam. Ranidæ. Frogs, Undt. Frogs,				1										
Rana pipiens. Leopard Frogs,				2										
Rana sylvatica. Wood Frog,				2			1		1					
Rana clamitans. Green Frog,				1		2			1					
Class. Reptilia. Reptiles.														
Ord. Ophidia. Serpents.														
Fam. Colubridæ. The Constricting Serpents,														
Storeria occiptomaculata. Red-bellied snake,											1			
Storeria dekayi. Rock Snake,											1			
Thamnophis sirtalis. Garter Snake,									2					
Natrix sipedon. Water Snake,									1					
Liopeltis vernalis. Grass Snake,									1					
Lampropeltis doliatus triangulus. House Snake,													1	
Class. Aves. Birds.														
Undt. Birds,							11		1		1	1		
Undt. Eggs,							1							
Chicken Eggs,							1							
Robin Eggs,							1		2					
Fam. Icteridæ. Orioles, etc.														
Agelaius phœniceus. Red-winged Blackbird,							1							

Fam. Fringillidæ. The Sparrows.													
Sparrow sp.,				1			1					1	
Fam. Mniotiltidæ. The Warblers.													
Seiurus aurocapillus. Oven Bird,													1
Fam. Turdidæ. Thrushes.													
Merula migratoria. Robin,							1						
Class. Mammalia. The Mammals.													
Undt. Mammals,						1	4		3		2	3	3
Fam. Didelphididæ. Opossums.													
Didelphis virginiana. Common Opossum,							2						
Fam. Leporidæ. The Rabbits.													
Lepus nuttalli mallurus. Rabbit,									1				1
Fam. Dipodidæ. Jumping Mice.													
Zapus hudsonius, Jumping Mouse,											1		1
Fam. Muridæ. The Mice.													
Undt. Mice,							3		1		3	3	
Microtus pennsylvanicus. Meadow Mouse,						1	3		4		9	8	6
Microtus pennsylvanicus (?) (uncertain sp.),							1		2		6	5	
Peromyscus leucopus. White footed Mouse,											1	1	1
Evotomys, sp. Vole,									1				
Mus musculus. House Mouse,							2				1	2	
Mus decumanus. Common Rat,													1
Fam. Sciuridæ. Squirrels.													
Undt. Squirrels,							1					1	
Sciurus hudsonicus. Small Red Squirrel,							4						1
Tamias striatus. Chipmunk,							1						
Fam. Soricidæ. Shrews.													
Undt. Shrews,							1					1	1
Sorex personatus. Common shrew,						1							1
Blarina sp., Mole Shrew,												1	
Fam. Mustelidæ. The Weasles, etc.													
Putorius sp. Weasles,							2						

Definitions of Terms Used.

Anal, Belonging to the anus or vent.

Anal Plate, The plate just in front of and covering the vent or anus.

Dorsal, Belonging to the Back.

Food Material, Substance intentionally taken as food.

Gonad, Immature reproductive element. In this Bulletin, used to designate the undeveloped young, whether egg or embryo.

Gastrostege, Plates beneath body in front of tail.

Lateral, Belonging to the side.

Ovum, An egg.

Ova, Eggs.

Oviparous, Producing eggs or ova, that mature and are hatched outside the body of the parent.

Ovoviviparous, Bearing living young, which were nourished by a substance like a yolk within a membrane.

Plate, A large, hard, variously-shaped portion of the epidermis which lies against the edge of its neighbor rather than overlapping.

Poison, A substance producing a noxious effect upon the system, but not an animal secretion.

Scale, The smaller pointed portion of the epidermis which overlaps its neighbors and is partially covered by another.

Stomach Contents, Referring in this Bulletin to any contents of the digestive tract.

Urostege, A plate beneath the tail.

Venom, A noxious secretion from poison glands of animals.

Ventral, Belonging to the lower or ventral side, or beneath.

Viviparous, Bearing living young, which were nourished by direct connection with the circulatory system of the parent.

SPECIMENS RECEIVED DURING JUNE, 1906.

We are indebted to contributors named below for the following list of specimens received during the month of June, which does not include the collections made by the employes of this office:

Number.	Specimen—Insects.	Date—June, 1906.	Name and Address.
6416	Beetles,	1	H. J. O'Conner, Harrisburg.
6417	Luna Moth,	2	J. H. L. Rowley, Emlenton.
6422	Butterfly (L. arthemis),	4	H. J. Smith, Fryburg.
6423	Eyed Elater,	4	H. A. Rice, Landisburg.
6424	Long-horned Beetle,	4	Mrs. J. Pophan, Ringtown.
6425	Moth Larva,	4	E. E. Erdman, Shamokin.
6428	Work of Plum Curculio,	4	D. M. Wertz, Quincy.
6429	(a) San José Scale, (b) Surfy Scale,	4	C. M. Brodhead, Old Forge.
6431	Plant Lice,	4	E. B. Callaway, Honesdale.
6432	Cecidomyia Galls,	4	G. Hiester, Harrisburg.
6433	(a) Plant Lice,	4	J. F. Warg, Hawley.
6435	Caddis Flies,	4	W. H. Wolff, State College.
6437	Butterfly,	4	I. Bolinger, Dublin Mills.
6438	Oyster-shell Scale,	4	L. Walter, Klahr.
6447	Giant Water Bug (B. griseus),	4	J. N. McIntire, Sandy Lake.
6449	17-year Cicada,	5	W. R. Gorman, Hartley Hall.
6450	17-year Cicada,	5	W. F. Meredith, Stouchsburg.
6451	(a) Thalessa atra. (b) Thalessa nortonii. (c) Hymenoptera,	5	W. F. Fink, Osceola Mills.
6453	Vanessa Larvæ,	5	R. M. Blatt, Huntingdon.
6454	(a) Lecanium on Maple, (b) Oyster-shell Scale,	5	Dr. W. S. Ruthrauff, Mountaindale.
6455	(a) Syrphid Pupa, (b) Cynip Gall,	5	Miss C. Ott, Buckingham.
6456	(a) Tiger Beetle (C. 6-guttatus), (b) June Beetle, (c) Horned Passalus,	5	M. S. Rhodes, Newtonburg.
6460	(a) Plant Lice, (b) Jassids,	5	J. A. Farrabaugh, Bradley Junction.
6461	Long-horn Beetle,	5	D. L. Keister, Harrisburg.
6462	Cottony Maple Scale,	5	H. M. Morris, Homestead.
6465	Plant Lice,	5	A. H. Sinsabaugh, Wyalusing.
6466	Plant Lice,	5	C. W. Leitzell, Northumberland.
6469	Oyster-shell Scale,	5	G. L. Taylor, Perulack.
6470	Cloak Knotty Horn,	5	J. Meloney, Imperial.
6472	Flat-head Apple Borer,	5	J. C. Stratton, Strattonville.
6478	(a) Plant Lice, (b) Grasshoppers, (d) Wire Worm, (e) Arctiid (H. tessellaris),	6	W. H. Bullock, Honesdale.
6479	Bee,	6	G. M. Gates, Girard, Ill.
6480	(a) Plant Lice, (b) Moth Eggs, (c) Work of Jassids,	6	G. H. B. Terry, Wyalusing.
6481	Plant Lice,	6	J. W. Hampton, Charmian.
6482	(a) Plant Lice, (b) Lightning Beetles,	6	A. B. Callihan, Helen Furnace.
6484	Leaf Beetles,	6	D. Keirn, Hastings.
6486	Insects,	6	H. Schick, Harrisburg.
6487	Locust-boring Moth,	6	C. Anderson, Harrisburg.
6490	Oyster-shell Scale,	6	Mr. Willis, Harrisburg.
6492	Plant Lice,	6	F. S. Snayberger, Molino.
6494	Plant Lice,	7	W. E. Musser, New Bethlehem.
6495	(a) Eyed Elater, (b) Cecropria,	7	J. G. Care, Irvona.
6497	(a) Ground Beetle (C. Scrutator), (b) Warble Fly Larva,	7	Miss E. C. Cox, Buckingham.
6498	Plant Lice,	7	Mrs. M. Davis, Norristown.

Specimens Received During June—Continued.

Number.	Specimen—Insects.	Date—June, 1906.	Name and Address.
6501	(a) Oyster-shell Scale,	7	M. L. Line, Wilkes-Barre.
	(b) San José Scale,		
	(c) Leaf Beetle (G. rufosanguinea),		
6502	Rose Chafer,	7	E. S. Rhinehart, Mercersburg.
6503	Vonessa Larvæ,	7	Mrs. J. W. Atkinson, Buckingham.
6507	Lecanium,	8	A. H. Clark, Muncy.
6511	Tree Cricket, Egg punctures,	8	F. A. Moore, Reynoldsville.
6512	Bag Worms,	8	H. H. Grimm, Middleburg.
6513	Dermestid Larvæ,	8	S. R. Nissley, Manheim.
6514	Rose Chafers,	8	J. S. Keipp, W. Alexander.
6515	Burying Beetle,	8	H. Erway, Wellsboro.
6516	Diptera Larvæ,	8	F. Segling, Eldred.
6519	(a) Lecanium,	8	S. L. Brinton, W. Chester.
	(b) Aphids,		
6521	Dragon Fly (E. heros),	8	G. Plummer, Harrisburg.
6528	Tortoise Beetle,	9	Mrs. E. Robinson, Phila.
6532	(a) Apple Tent-caterpillars,	9	J. R. McMillan, Gettysburg.
	(b) Misc. Insects,		
6535	(a) Aphids,	11	I. T. Hann, W. Middlesex.
	(b) Syrphid Larvæ,		
6536	Chalcid Pupæ,	11	A. B. Gensler, Allen.
6537	(a) Beetle (M. heros),	11	D. W. Navle, Wellsboro.
6538	Cloaked Knotty Horn,	11	H. S. Webb, Scranton.
6539	(a) Lecanium,	11	E. R. Musser, Grant.
	(b) Mealy Bug,		
6542	(a) Cecropia,	11	J. C. Franke, Coudersport.
	(b) Luna,		
6543	(a) Lightning Beetle,	11	J. S. Wanick, Montrose.
	(b) Plant Lice,		
6544	Rose Chafers,	11	J. Schall, Spring City.
6545	Seventeen Year Cicada,	11	U. R. McCartney, Altoona.
6547	Larder Beetles (B. lardarius),	11	A. B. Grubb, Annville.
6548	Sialidæ,	11	L. M. Raver, Fleetville.
6551	Seventeen-year Cicadas,	11	J. E. Patterson, Glen Summit Spring.
6552	Moth Larvæ,	11	E. E. Erdman, Shamokin.
6553	Cottony Maple Scale,	11	N. McClintock, Pittsburg.
6555	(a) Thalessa atra,	11	R. Kisner, Danville.
	(b) Thalessa lunator,		
	(c) Bark showng punctures,		
6556	Elm Coxcomb Galls,	11	J. G. Krichbaum, Chambersburg.
6557	(a) Plant Lice,	11	W. Codney, Wellsboro.
	(b) Vanessa larvæ,		
6558	Bean Weevil (B. obtectus),	11	J. D. Gill, Sr., Philipsburg.
6559	Lemon Lecanium,	11	E. E. Beck, Huntingdon.
6561	Insects,	11	C. Anderson, Harrisburg.
6565	Rose Chafers,	12	R. S. Rebert, Hanover.
6566	Plant Lice,	12	W. Batty, Lenni Mills.
6567	Thalessa lunator,	12	J. T. Blake, Fox Chase.
6568	(a) Morning Cloak Larvæ,	12	W. H. Bullock, Honesdale.
	(b) Arclaid (H. caryæ),		
6571	(a) Scurfy Scale,	12	J. M. McEwen, Mercer.
	(b) Pentatomid Eggs,		
6573	Cecropia Moth,	12	A. L. McHenry, Harrisburg.
6580	(a) Giant Water Bug (B. amer.),	13	F. S. Andrews, Wellsboro.
	(b) Dragon Fly (E. heros),		
	(c) Swallow-tail (P. turnus),		
	(d) Io Moth,		
6581	Thalessa atra,	13	L. D. Goodspeed, Wellsboro.
6582	Lecanium on Peach,	13	J. K. Bomberger, Bismarck.
6583	Ground Beetle (C. scrutator),	13	H. J. L. Rowley, Emlenton.
6584	Rose Chafers,	13	S. Schlegel, E. Salem.
6585	Carpet Beetles,	13	J. H. Cogswell, Titusville.
6586	Luna Moth,	13	Mrs. C. J. Barney, Warren.
6588	Leaf Beetle (G. rufosanguinea),	13	J. Fielding, Scranton.
6589	Rose Chafer,	13	H. K. Miller, Huntsdale.
6590	Rose Chafers,	13	K. Kelly, Dillinger.
6591	Long-horned Beetle Larvæ,	13	G. T. Satterthwait, Ercildoun.
6594	(a) Caddis Fly,	13	H. J. O'Conner, Harrisburg.
	(b) Sphinx (P. Pandora),		
6595	(b) Yellow Swallow-tail	13	Mrs. M. C. Brightbill, Marsh Run
	(c) Black Swallow-tail,		
	(d) Luna Moth,		
	(e) Butterfly (A. cybele),		
6600	Rose Chafers,	14	S. S. Kane, Alinda.
6601	Oyster-shell Scale,	14	J. F. Conrad, Lindsay.
6602	(a) Morning Cloak Butterfly,	14	D. Spencer, Williamsport.
	(b) Larvæ Cloak Butterfly,		
	(c) Lecanium,		

Specimens Received During June—Continued.

Number.	Specimen—Insects.	Date—June, 1906.	Name and Address.
6603	Ground Beetle (C. scrutator),	14	J. J. Hoffman, Reynoldsville.
6604	Luna Moth,	14	Mrs. C. J. Barney, Warren.
6605	Corn Root Webworm,	14	B. A. McQueen, Millers Station.
6606	Gortyna Larva,	14	D. W. Bowman, Montoursville.
6607	(a) Morning Cloak Larva, (b) Leaf Beetles (L. scripta),	14	Dr. S. Wood, McDonald.
6608	(a) Io Moth, (b) Long-horn Beetle (S. vestita), (c) Undt. Beetle,	14	E. Blinzler, Emporium.
6610	Beetle Larva,	14	H. C. Heilman, Montgomery.
6612	(a) Dragon Fly (E. heros), (b) Misc. Insects,	14	J. S. Kelly, Highspire.
6613	Psocids,	14	Mrs. S. S. Hostetter, Lancaster.
6614	Rose Chafers,	15	D. M. Wertz, Quincy.
6615	Wooly Aphis,	15	J. J. Black, Gettysburg.
6616	Rose Chafer,	15	M. M. Plank, Joanna.
6617	Spittle Insects,	15	W. H. Moon Co., Morrisville.
6620	Underwing Larva (Catocala),	15	H. S. Buck, Clearfield.
6622	Rose Chafers,	15	H. C. Myers, Jersey Shore.
6623	Gortyna Larva,	15	F. Anderson, Geneva.
6624	San José Scale,	15	P. M. Stiely, Rough-and-Ready.
6625	Rose Chafers,	15	B. F. Reider, Kutztown.
6632	Stone Fly,	15	J. M. Crull, Landisburg.
6633	(a) Thalessa atra, (b) Ichneumon,	16	W. S. Fink, Osceola Mills.
6634	(a) Cottony Maple Scale, (b) Plant Lice, (c) Mourning Cloak Larvæ, (d) Silk Moth Larvæ,	16	W. H. Bullock, Honesdale.
6635	(a) San José Scale, (b) Scurfy Scale,	16	W. K. Warden, Oxford.
6637	Pentatomid Eggs,	16	D. K. Sterrett, Oakville.
6639	Gortyna Larvæ (P. nitela),	16	J. M. March, Spring City.
6640	Long Horned Beetles,	16	R. J. Weld, Sugar Grove.
6641	Rose Chafers,	16	P. S. Fenstermaker, Allentown.
6642	Leaf-cutting Bee Larvæ,	16	R. G. Brooke, Schwenksville.
6643	Lecanium,	16	Mrs. W. George, Warren.
6644	Dragon Flies,	16	C. Anderson, Harrisburg.
6668	San José Scale,	16	B. O. Smith, Burlington.
6648	Leaf Beetle (G. rufosanguinea),	18	H. A. Brinkman, Lehighton.
6649	Five-spotted Sphinx,	18	M. M. Kendall, McConnellsburg.
6651	(a) Luna Moth, (b) Rose Chafers, (c) Flower Beetle, (d) Caddis Fly Case,	18	Mrs. G. P. West, Danville.
6655	Plant Louse Galls,	18	H. A. Smith, Sunbury.
6656	Oyster-shell Scale,	18	W. H. Hickok, Troy.
6658	(a) Cottony Maple Scale, (b) Chalcid,	18	A. Koenig, Harrisburg.
6659	Insects,	18	H. J. O'Conner, Harrisburg.
6660	Beetles,	18	M. Jacobs, Harrisburg.
6664	(a) Luna Moth,	20	J. E. Patterson, Glen Summit Springs
6665	Cottony Maple Scale,	20	Warren J. Ellis, Phila.
6666	Cottony Maple Scale,	20	S. J. Barnett, Delta.
6668	San José Scale,	20	M. O. Reagle, Mount Bethel.
6669	Seventeen-year Cicadas,	20	W. Jones, Old Forge.
6670	Rose Chafers,	20	J. Willebran, Cresson.
6671	Corn Root Webworm,	20	L. D. Sanders, Centerville.
6672	San José Scale,	20	F. Keith, Eagle Foundry.
6673	Buprestid Beetle,	20	A. W. Young, Manheim.
6674	Maple Phylloxera,	20	O. L. Benton, Titusville.
6675	Oyster-shell Scale,	20	Miss L. Moore, Edgeworth.
6678	Rose Chafers,	21	S. M. Robinson, McConnellsburg.
6679	Mourning Cloak Larvæ,	21	W. H. Bullock, Honesdale.
6680	San José Scale,	21	T. P. Meyer, Lock Haven.
6682	(b) Capsid Plant Bug,	21	Mrs. J. W. Atkinson, Buckingham.
6683	Rose Chafers,	21	W. S. Huey, Allensville.
6684	(a) Wolly Aphis, (b) Lecanium,	21	J. Vallerchamp, Jr., Halifax.
6685	Helgamite Dobson Fly,	21	A. W. Clancy, Glenwood.
6687	Milk Weed Butterfly Pupa,	21	H. Illig, Richland.
6688	Corn Root Webworm,	21	H. S. Lauback, Springtown.
6689	Larva of Papaipema nitela,	21	H. Compton, McClane.
6690	Anthrenus Larvæ,	21	A. D. Wentz, Spring Forge.
6691	(d) Seventeen-year Cicada,	21	C. Casner, Williamsport.
6693	(a) Oyster-shell Scale, (b) Lecanium,	21	J. O. Brookbank, Driftwood.
6694	Oyster-shell Scale,	21	Brookbank Mercantile Co., Driftwood.

Specimens Received During June—Continued.

Number.	Specimen—Insects.	Date—June, 1906.	Name and Address.
6700	Cottony Maple Scale,	22	J. M. Witman, St. Mary's.
6702	Lecanium,	22	A. McCall, Union Church.
6706	Rose Chafers,	22	Geo. L. Enhart, St. Thomas.
6710	Dragon Flies,	22	Chas. Anderson, Harrisburg.
6713	Tree Hopper,	23	J. A. Fackler, Linglestown.
6715	Larvæ of P. nitela,	23	J. W. Gihnor, Enon Valley.
6716	Corn. Silvanus (S. surinamensis),	23	J. H. Christy, Penfield.
6720	Seventeen-year Cicada,	25	C. Cassner, Williamsport.
6722	Eyed Elater,	25	W. H. Taplin, Holmesburg.
6726	Work of Papaipema,	25	E. S. Bayard, Pittsburg.
6727	Cherry Leaf Folder (C. cerasivorana	25	W. H. Bullock, Honesdale.
6729	Diptera Larva,	25	J. Swift, Philipsburg.
6731	(b) Wooly Aphis,		
	(c) Ants,	25	H. A. Brightbill, Marsh Run.
6732	Cecidomyia (?) Galls,	25	C. P. Dadant, Hamilton, Ill.
6733	Work of Plum Curculio,	25	D. M. Wertz, Quincy.
6737	(a) Io Moth,		
	(b) Beetles,	25	H. Schick, Harrisburg.
	(c) Diptera,		
6738	Insects,	25	H. J. O'Conner, Harrisburg.
6740	Parasitized Plant Lice,	25	Holmes Seed Co., Harrisburg.
6742	Maple Pseudococcus,	25	B. F. Barr, Lancaster.
6743	(a) Bumble Flower Beetle (E. fulgida,		
	(b) Long-horned Beetle,	25	S. Still, Fisher's Ferry.
	(c) Buprestid Beetle,		
	(d) Pentatomid,		
6744	Catocola Larva,	25	F. C. Byers, Richland Furnace.
6745	(a) Beet (?) Leaf Miner,	25	J. E. Bird, Dushore.
6748	Seventeen-year Cicadas,	26	F. R. Waring, Tyrone.
6749	Long-horned Beetles,	26	R. J. Weld, Sugar Grove.
6754	Cherry Leaf Miners,	26	H. C. McKenrick, Clearfield.
6757	Eyed Elater,	27	C. J. Stratton, Erie.
6760	(a) Lecanium,	27	L. Moore, Brownsville.
6761	Gossyparia spuria,	27	J. C. Withrow, Vanport.
6764	(a) Gossyparia spuria,		
	(b) Cicada Punctures,		
	(c) San José Scale,	28	J. Fielding, Scranton.
	(d) Oyster-shell Scale,		
6768	Wooly Aphis,	28	J. R. Rodgers, Carlisle.
6769	Aphis Galls,	28	C. Yoder, Pleasant View.
6770	Rose Chafers,	28	J. J. Bauman, Bradley Junction.
6772	(a) Maple Borer (P. speciosus),		
	(b) Leaf Chafer (A. lucicola),	28	Mr. Myers, Hughesville.
6773	Syrphid Fly,	28	Mrs. H. A. Surface, Camp Hill.
6776	Giant Water Bug (B. griseus),	28	H. Barrington, Harrisburg.
6778	Maple Phylloxera,	28	J. F. Lewis, Phila.
6780	Plant Lice,	28	Rummel, Himes & Co., Shippensburg.
6781	Cabbage Moth Larvæ (M. picta),	28	A. B. Moore, Reynoldsville.
6782	P. nitela,	28	F. E. Talley, Brandywine Summit.
6784	San José Scale,	28	H. Harris, Aldan.
6785	San José Scale,	29	E. Newhart, Stroudsburg.
6789	Fly Larva,	29	J. Swift, Philipsburg.
6791	(d) Grasshoppers,		
	(e) Butterfly arthemis,	29	W. H. Bullock, Honesdale.
6792	Aphis Galls,	29	G. M. Brinton, Irwin.
6795	Morning Cloak Larvæ,	29	C. L. Peck, Coudersport.
6796	(a) Scurfy Scale,		
	(b) Cicada Wing,	29	G. A. Stanton, Hollisterville.
6797	Cecidomyia Galls,	29	H. Schick, Harrisburg.
6804	(b) Oyster-shell Scale,	30	G. A. Rice, Coryville.
6806	Parasitized Lecanium,	30	A. McCall, Union Church.
6807	(a) Elm Coxcomb Galls,	30	R. W. Wehrle, Indiana.
6808	(a) Powder Post Beetle,		
	(b) Clerid Beetle,		
	(c) Long-horned Beetle,	30	Hickock Mfg. Co., Harrisburg.
	(d) Braconidæ,		
6809	(a) Wooly Aphis,	30	Geo. R. Ross, Lebanon.
	(b) Moth,		
	Invertebrates, not Insects.		
6433	Red Mites,	4	F. J. F. Ward, Hawley.
6441	Slugs,	4	Minnie L. Benton, Titusville.
6456	(d) Black Spider,	5	M. S. Rhodes, Newtonburg.
6478	(c) Centipedes,	6	W. H. Bullock, Honesdale.
6537	(b) Millipede,	11	D. W. Navle, Wellsboro.
6579	Spider,	13	W. J. Burns, Reedsville.
6664	(b) Centipede,	20	J. E. Patterson, Glen Summit Springs.

Specimens Received During June—Continued.

Number.	Specimen—Insects.	Date—June, 1906.	Name and Address.
6680	(b) Mites,	21	T. P. Meyer, Lock Haven.
6717	Nematodes,	23	Mrs. J. Spencer, Towanda.
6745	(b) Red Mites,	25	J. E. Bird, Dushore.
	Reptiles and Batrachians.		
6427	Ring-necked Snake (D. punctatus),	4	L. H. Hawthorne, New Castle.
6436	Pilot Snake (C. obseletus),	4	R. A. Stewart, Independence.
6442	Common Water Snake (N. sipedon),	4	J. B. Gill, Berwyn.
6443	House Snake. (L. d. triangulus),	4	G. E. Showalter, Landisburg.
6448	Granite Salamander (P. glutinosus),	5	H. T. VanOstrand, Grafton.
6459	House Snake. (L. d. triangulus),	5	C. N. Witherup, Emlenton.
6463	Common Tree Toad (H. versicolor),	5	F. Oberly, Easton.
6464	(a) Granite Salamander, (b) 3 Brown Salamanders (D fusca), (c) 3 Two-lined Salamanders (S. bilineatus), (d) 7 Striped Salamander (P. Cinereus), (e) 2 Immature Salamanders,	5	W. L. King, Bethlehem.
6474	Copperhead (A. contortrix),	5	S. Johnson, Pittsburg.
6477	Pilot Snake,	6	S. Johnson, Pittsburg.
6493	Granite Salamander,	7	I. F. Mansfield, Beaver.
6500	Red-bellied Snake (S. occip.),	7	E. A. Wilcox, Sugar Run.
6504	Blue Racer (B. constrictor),	8	J. Johnson, Woodbine.
6505	(a) 4 Rock Snake (S. dekayi), (b) Red-bellied Snake (S. occi.),	8	C. F. Laurie, Erie.
6506	(a) Sculptured Tortoise (C. insculptus), (b) Newt (D. viridescens),	8	J. P. Swoope, Huntingdon.
6508	(a) Copperhead Snake, (b) House Snake,	8	W. G. Lefford, Huntingdon.
6522	Blue Racer,	8	A. B. Sharpe, Jenningsville.
6524	Pilot Snake,	8	W. F. McCord, North East.
6525	Common Garter Snake (T. sirtalis),	9	E. E. C. Gibbs, Huntingdon.
6526	House Snake,	9	Dr. I. H. Mayer, Willow Street.
6530	Map Turtle (G. geographicus),	9	A. G. Riggle, Cochrans Mills.
6531	(a) Red-bellied Snake, (b) Hoptoad (B. L. americanus),	9	A. B. Miller, Barnesville.
6534	Grass Snake (L. vernalis),	11	J. E. Miller, Chambersburg.
6541	(a) Common Garter Snake, (b) Copperhead,	11	A. P. White, Lock Haven.
6550	Copperhead Snake,	11	C. Backenstoe, Fort Hunter.
6568	(c) House Snake, (d) Brown Salamander, (e) 2 Striped Salamanders,	12	W. H. Bullock, Honesdale.
6569	Common Garter Snake,	12	A. P. White, Lock Haven.
6570	House Snake,	12	T. B. Hoover, Wellsville.
6577	Common Garter Snake,	12	J. R. Davis, Meadowbrook.
6578	(a) House Snake, (b) Pilot Snake,	12	W. H. Grimm, Hamburg.
6592	(a) Leather Snake (R. leberis), (b) House Snake, (c) Box Tortoise (P. carolina),	13	W. M. Benner, Telford.
6593	(a) Common Garter Snake, (b) Spotted Mud Turtle or Pond Turtle (C. guttatus), (c) Sculptured Turtle,	13	G. H. Bedford, Nazareth.
6595	(a) Copperhead,	13	Mrs. M. C. Brightbill, Marsh Run.
6598	2 Swift or Common Lizard (S. undulatus),	13	W. I. Keller, Beaver Springs.
6609	Common Garter Snake,	14	S. Johnson, Pittsburg.
6618	(a) 2 Red-bellied Snakes, (b) 5 Rock Snakes,	15	C. F. Laurie, Erie.
6621	Common Garter Snake,	15	W. E. Peddrick, Bellevue, Del.
6629	Sculptured Tortoise,	15	R. W. Wehrle, Indiana.
6631	Snapping Turtle (C. serpentina),	16	J. P. Lehman, Port Allegany.
6645	Common Garter Snake,	16	F. Ruof, Hummelstown.
6650	(a) 4 Common Water Snakes, (b) Common Garter Snake, (c) House Snake,	18	J. Mell, Jr., Richland.
6652	Spotted Salamander (A. punctatus),	18	B. Fleming, Granville Summit.
6662	House Snake,	20	A. S. Ulrich, Lebanon.
6663	Leather Snake,	20	J. B. Gill, Berwyn.
6695	Common Garter Snake,	21	L. H. Hawthorne, New Castle.
6696	2 Copperheads,	21	W. E. Heintzelman, Ortanna.
6704	Purple Salamanders (G. porphyr.),	22	J. Rapp, Jr., Warren.
6705	House Snake,	22	J. W. Selp, Easton.
6707	Blowing Viper (H. platirhinos),	22	H. May, Dillsburg.

Specimens Received During June—Continued.

Number.	Specimen—Insects.	Date—June, 1906.	Name and Address.
6712	House Snake,	23	S. Johnson, Pittsburg.
6721	Spotted Salamander,	25	S. Y. Godshalk, Perkasie.
6724	Common Garter Snake,	25	H. Bordner, Shamokin Dam.
6725	Ring-necked Snake,	25	R. W. Wehrle, Indiana.
6731	(a) Common Water Snake,	25	H. A. Brightbill, Marsh Run.
6763	Snake Egg,	27	W. W. Climenson, Honeybrook.
6787	Common Water Snake,	28	Dorothea S. Oppenlander, Passer.
6791	(a) House Snake, (b) Blue Racer, (c) Sculptured Tortoise,	29	W. H. Bullock, Honesdale.
6799	Copperhead Snake,	30	G. S. Reed, Baden.
6804	Copperhead Snake,	30	E. E. C. Gibbs.
	Birds and Mammals.		
6439	Crested Flycatcher,	4	Mrs. J. W. Atkinson, Buckingham.
6452	Chimney Swift,	5	E. R. Mulford, Wellsboro.
6457	Red Squirrel,	5	J. P. Lehman, Coudersport.
6458	Cedar Waxwing,	5	Molly D. Brallier, Conemaugh.
6475	2 Young Owls,	6	R. W. Wehrle, Indiana.
6527	(a) Red-winged Blackbird, (b) Purple Grackle,	9	F. S. Andrews, Wellsboro.
6540	American Goldfinch,	11	C. L. Brumbaugh, Wilkinsburg.
6554	Deer Hair,	12	R. L. Jackson, McConnellsburg.
6572	Purple Grackle,	12	A. Grener, Scranton.
6587	Chipping Sparrow,	13	Miss A. K. Bewley, Forestgrove.
6676	Part of kitten (?) skeleton,	20	E. R. Mulford, Knoxville.
6682	(a) Twilight Bat (N. humeralis),	21	Mrs. J. W. Atkinson, Buckingham.
6686	Star-nosed Mole,	21	W. W. Climenson, Honeybrook.
6699	Two-spur Chicken leg,	21	Messrs. Andrews and Mulford, Wellsboro.
6711	Balto. Oriole,	22	Mrs. S. A. Craig, Brookville.
6719	Common Mole (S. aquaticus),	23	Clara E. Mattis, Lansdale.
6746	Crow,	26	E. R. Mulford, Wellsboro.
6758	Short-tailed Shrew (B. brevicauda),	27	Mrs. J. W. Atkinson, Buckingham.
6759	Robin,	27	W. H. Bullock, Honesdale.
6778	Chipping Sparrow,	28	E. R. Mulford, Wellsboro.
6789	(a) Black-billed Cuckoo,	29	L. Winship, Moscow.

Surface, H.A. The serpent
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