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FIELD BOOK
of
Illinois Land Snails

FRANK COLLINS BAKER



ILLINOIS
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MANUAL 2

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Illinois Land Snails

STATE OF ILLINOIS

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Fieldbook of
Illinois Land Snails

By

FRANK COLLINS BAKER



Printed by Authority of the State of Illinois

NATURAL HISTORY SURVEY DIVISION

THEODORE H. FRISON, *Chief*

MANUAL 2

Urbana

August 1939

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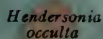
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*Polygyra
multilineata
rubra*



*Bulimulus
dealbatus*



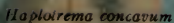
*Hendersonia
occulta*



*Haploirema
concavum*



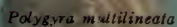
*Succinea
ovalis*



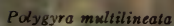
Haploirema concavum



*Polygyra
tridentata*



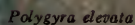
Polygyra multilineata



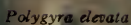
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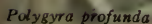
*Anguispira
alternata*



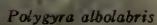
Polygyra elevata



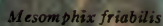
Polygyra elevata



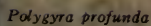
Polygyra profunda



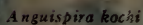
Polygyra albolabris



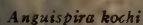
Mesomphix friabilis



Polygyra profunda



Anguispira kochi



Anguispira kochi

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FOREWORD

THIS fieldbook is intended primarily for the use of amateur students of nature who wish to learn the names and something of the habits of the snails found in Illinois. Its size and organization are such that it may conveniently be carried into the field by high school and college classes and other nature study groups.

Information contained in this fieldbook is based on a collection of more than 20,000 specimens of Illinois Mollusca, obtained principally by a detailed survey of the state. The financing of this survey was made possible by a small special appropriation to the Illinois Natural History Survey, available the biennium beginning July 1, 1931.

The Natural History Survey was fortunate to obtain the services of Mr. Frank Collins Baker, Curator of the Museum of Natural History of the University of Illinois and an authority on the classification of these invertebrates, to prepare the text and to direct the field collections necessary for a thorough distribution record of our native species within the state. Mr. Baker spent part of the summers of 1931 and 1932 in the field directing the collection of specimens and, since then, has spent much time in the identification of material and the preparation of the manuscript for this manual.

Dr. Thural Dale Foster, now deceased, at that time a graduate student in the Department of Zoology of the University of Illinois, was employed by the Survey as assistant to Mr. Baker on this project for three months in the summer of 1931 and two months in the summer of 1932 to collect land Mollusca in all parts of the state. The collections resulting from this special work are now deposited on loan with the Mollusca material belonging to the Natural History Museum of the University of Illinois.

Other collections deposited in the University's Natural History Museum, notably those of Ferriss, Nason and Hinkley, as well as many records published by other students of Illinois

fauna, have been drawn upon whenever necessary. This field-book, therefore, embodies all the present state of knowledge concerning the number of Illinois species of land snails and their distribution throughout the state.

The introductory chapter of this fieldbook contains interesting and useful information on the general characteristics of Illinois land snails—where they live, how they grow and how they may best be collected and studied.

In the descriptive section of the book, an attempt has been made to present a simple account of each species of land snail found within the state. Each species is illustrated by a figure or figures accurately drawn to show its characteristics.

Keys to families and genera have been included to aid in the identification of species. Students unfamiliar with keys should consult the paragraphs on their use in the introductory chapter.

The description of each species of snail has been made brief, and only the important features that distinguish one species from another have been mentioned. The habitat preferences of the species as they occur in Illinois are noted.

The drawings for the illustrations are the work of Dr. Carl O. Mohr, Associate Entomologist and artist with the Natural History Survey. It is felt that the inclusion of mostly new and original drawings, instead of copies of time-worn illustrations made many years ago, will be welcomed by all students of the Mollusca. Of the shell or animal figures, all but those at the top of pages 88 and 120 and on page 143 were drawn from specimens.

Adapting the manuscript to the same general format as the Illinois Natural History Survey Manual 1, *Fieldbook of Illinois Wild Flowers*, as well as its general styling and indexing, has been the work of Mr. James S. Ayars, editor for the Survey.

It is the hope of those engaged in the preparation of this fieldbook that its publication may stimulate the study of an interesting subject not only among young people in schools and colleges of the state but also among individuals of all ages who find pleasure in exploring the mysteries of the out of doors.

THEODORE H. FRISON
Chief

Urbana
January 16, 1939

A C K N O W L E D G M E N T S

ACKNOWLEDGMENT is made to Dr. Henry A. Pilsbry, Curator of the Department of Mollusca of the Academy of Natural Sciences of Philadelphia, for determination of and information concerning several species of the Pupillidae and other small snails. A student of Dr. Pilsbry in 1889, the author of this fieldbook has been inspired by this dean of American conchologists during a half century of scientific endeavor. It is fitting that appreciation of this guidance be made here.

Thanks are due to Dr. Harley J. Van Cleave, Professor of Zoology, University of Illinois, for advice and criticism during the preparation of this volume; and to Dr. Allen F. Archer, Museum of Zoology, University of Michigan, for information concerning the status of certain species of *Polygyra*.

The author is indebted to Dr. Van Cleave and to his son, Philip, for several collections made in the vicinity of Urbana and in other parts of Illinois; and to Dr. Alvin R. Cahn, formerly Assistant Professor of Zoology, University of Illinois, for material from a number of places in the state.

Grateful acknowledgment is made to the memory of Dr. Thural Dale Foster, companion and friend during the survey of the state which preceded preparation of this volume, for not a little of its value is due to his painstaking search for rare or new Illinois records.

The author acknowledges his indebtedness to the following colleagues: Dr. Carl O. Mohr, Associate Entomologist of the Illinois Natural History Survey, for his painstaking work on the excellent figures which illustrate this manual; Dr. B. D. Burks, Assistant Entomologist of the Survey, for assistance in preparing and checking keys; Mr. James S. Ayars, Survey Editor, for the careful revision of the manuscript and for many suggestions which have made the work of greater value.

The author wishes to express his deep appreciation to Dr. T. H. Frison, Chief of the Illinois Natural History Survey, through whose interest the molluscan survey of 1931-32 and the preparation of this fieldbook were made possible.

FRANK COLLINS BAKER

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Land Snails

What they are and where they live

LAND SNAILS

What they are and where they live

Among the beautiful pictures
That hang on Memory's wall,
Is one of a dim old forest
That seemeth best of all.

—ALICE CARY, *Pictures of Memory*

WHO does not enjoy a ramble through a deep old forest, with its majestic monarchs of the woodland, its climbing vines, trumpet creeper and wild grape, and its carpet of colorful flowers and soft mosses? Birds flit about in the sunlit glades, squirrels perch on the lower branches of trees, eying the intruder with apparent curiosity or fear. Butterflies float lazily through the air, and bees dart from flower to flower. A fat old woodchuck waddles peacefully along until he observes the intruder, when he makes a dash for his hole in the side of a hill. On the forest floor are many old logs, branches of trees and the litter and debris characteristic of an ancient woodland. Here lies hidden a wealth of animal life that escapes the attention of the casual observer.

Hunting for snails.—Let us turn over one of the old logs, not too large or heavy, and see what is concealed beneath. What a scampering at once takes place! Beetles, spiders, bugs, several salamanders, a few centipedes, all make a bee line for a place in which to hide. But there are a few animals beneath the log that do not run away. Among these are white or yellow larvae of certain beetles, as well as slugs and various land snails with spiral shells.

Snails with shells.—Let us look carefully at this land *snail*, fig. 1, now just emerging from its *shell* and beginning to crawl slowly over the upturned surface of the log. Its yellowish shell is about an inch in diameter—large for that of an Illinois land snail. This is placed on what may be called the *back* of the animal and is tilted somewhat to the left side.

At the head end of the animal are two pairs of *feelers*: a pair of short *tentacles* and, above them, a pair of long *eye peduncles*. At the tip of each of the latter is an *eye*. The feelers are constantly moving about, touching every obstacle in the path

of the snail. If a long eye peduncle is touched, the snail immediately withdraws it outside in, in such manner as one sometimes removes the finger of a glove.

The visible part of the snail's *body*, which ends in a slender, tapering *tail*, is long and narrow. Irregular granulations that cover the body give it a rough appearance. The underside of the body, known as the *foot*, is flat, and when the snail lifts its head from the log wavelike pulsations along this foot may be seen. Locomotion of the snail is accomplished not by a picking

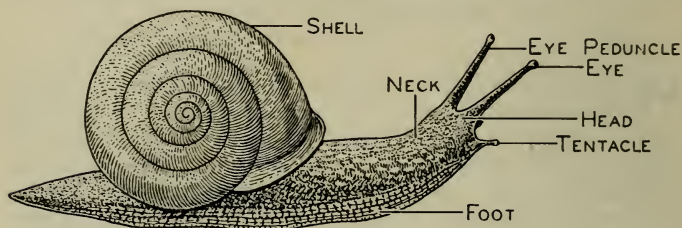


FIG. 1.—Animal of land snail, *Polygyra albolabris* (Say). Parts of the body are indicated.

up and setting down of the foot but by a sliding movement produced by a wave of muscular contractions along the foot.

The soft part of the animal containing most of the vital organs remains within the shell. It is covered by a tough skin called the *mantle*. The thickened portion of the mantle which borders the *aperture* or opening of the shell, and which is known as the *mantle collar*, secretes the material which adds new shell around the aperture, for only by the addition of new shell material around the edge of this opening does the snail shell increase in size.

Noticeable is the *mucus* which is exuded from a gland near the *mouth*. The mucus assists the snail in crawling by smoothing or lubricating the path over which it passes. On the right side of the body, just under the edge of the shell, may be seen the *breathing orifice* or lung opening through which the snail takes in air, for it is a lung breather just as we are. All of the Illinois land snails are lung breathers, and all species but one belong to the Pulmonata, an order which takes its name from a Latin word meaning lung.

Let us search the log still farther. We tear off a piece of the bark which is loose or started. On the inner side of this bark we

find snail shells of several different sizes. Some are globular like weed seed; others are elongated like the seed of grass. Some are brown or blackish; others, horn-colored or yellowish. Some are opaque; others, almost transparent, like paraffin. One has stripes; another, spots.

Slugs.—Not all snaillike animals have shells into which they can retire. Under our log we find one apparently without a shell. This is known as a *slug*, page 129. It is black in color, about an inch in length, and it has a peculiar shieldlike projection near the head. Under its shield we find a small, flat shell which acts as a protection to the breathing organ. Another slug, a different kind, is about 3 inches in length, of a whitish color covered with black spots, and has no shieldlike projection near the head. This slug is always covered with mucus and when handled exudes great quantities of this matter. Only five species of slugs are common in Illinois.

Food and Feeding Habits of Snails

If we place one of our Illinois woodland snails in a glass jar and permit it to crawl up the side, we may observe that it has on the under surface of the head a mouth, which repeatedly opens and closes. When we look closely we see a rough, tongue-like object which is pushed out of the mouth and pulled in somewhat like a cat's tongue in lapping milk from a saucer. This is the *radula* or tooth-bearer with which the snail obtains its food. When the snail is crawling up the side of a glass jar, we may observe this tongue licking up the particles of vegetable matter on the glass, or if we place a piece of lettuce in the jar we may see the animal biting off with its horny *jaw* small pieces of the lettuce which it then scrapes into smaller pieces with the *radula*.

The mouth parts.—If we cut a longitudinal section from the head of a dead, preserved snail, we may see the relationship of the *radula* to the other parts of the head and mouth. Such a section is shown in fig. 2. The ribbonlike *radula* of our woodland snail is drawn over a part of the mouth called the *cartilage*. Different muscles move the cartilage and the *radula* backward and forward, allowing the snail to rasp off particles of food brought down between the lips. The *radula* wears out at the anterior or front end, which is used more than any other part. To repair this wear, the whole *radula* grows forward from the core, much as our finger nails grow from their bases.

Made of a material called *chitin*, the radula is yellowish and transparent. In the mouth of the animal, it is partly coiled and saddle-shaped. If we remove the radula from a preserved snail, spread it on a glass slide and examine it with a microscope of rather high power, we see that its upper side is covered with many rows of little projections called *teeth*. Each row of teeth running crosswise of the radula has a central tooth which is symmetrical. On either side to right and left of this central tooth are many other teeth, which are not nearly so symmetrical. Two com-

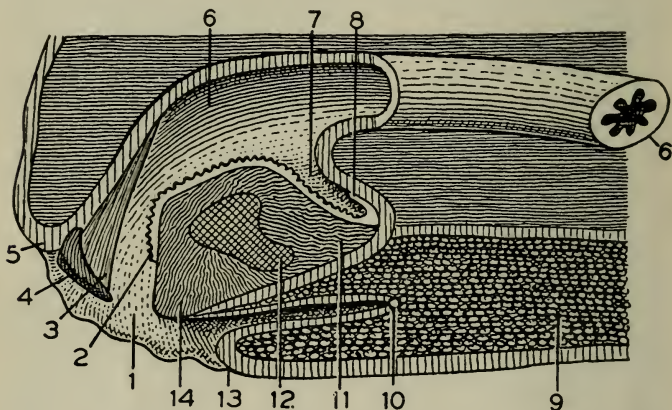


FIG. 2.—Cross section of head of a land snail: 1, mouth; 2, radula; 3, cartilage bearing jaw; 4, jaw; 5, upper lip; 6, esophagus; 7, core of radula; 8, new teeth forming; 9, mucus glands; 10, orifice of mucus glands; 11, posterior cartilage muscles; 12, cartilage; 13, lower lip; 14, anterior cartilage muscles.

plete half rows of the teeth on the radula of a snail are shown in fig. 3. These are, of course, greatly magnified. Some of the teeth, still more highly magnified, are shown in fig. 4. The manner in which the teeth lie upon the radula, with a portion bent over or reflexed, is shown in fig. 5.

The number of teeth on a radula is astonishingly large. Thus, the radula of *Polygyra albolabris*, the woodland snail we are studying, has 91 teeth in a single row and, as there are 120 rows, the total number of teeth is 10,920. Carnivorous snails do not have so many teeth, and these are differently shaped, being sharp and daggerlike, as those of the land snail *Haplotrema*

concovum, shown in fig. 6. This snail has but 51 teeth in a row and only 32 rows, 1,632 teeth in all.

Though the teeth of snails furnish evidence on which species may be separated, our purpose in this fieldbook is not



FIG. 3.—Two rows of teeth from the left side of a radula membrane of *Polygyra tridentata* (Say).

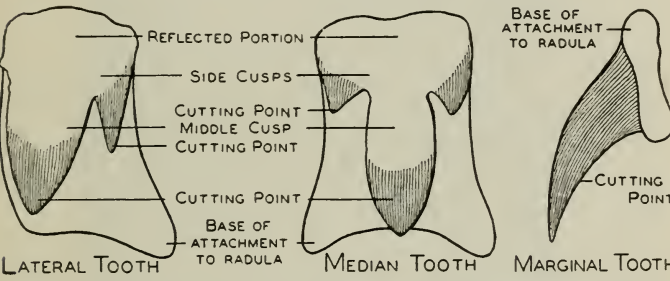


FIG. 4.—The three kinds of teeth, lateral, median and marginal, on the radula or lingual ribbon of a land snail, greatly magnified.



FIG. 5.—Longitudinal section of the radula of a land snail. The teeth lie on the radula membrane much as shingles lie on a roof.

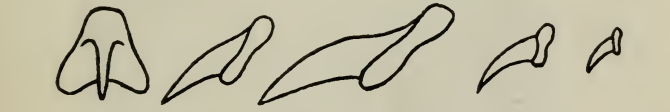
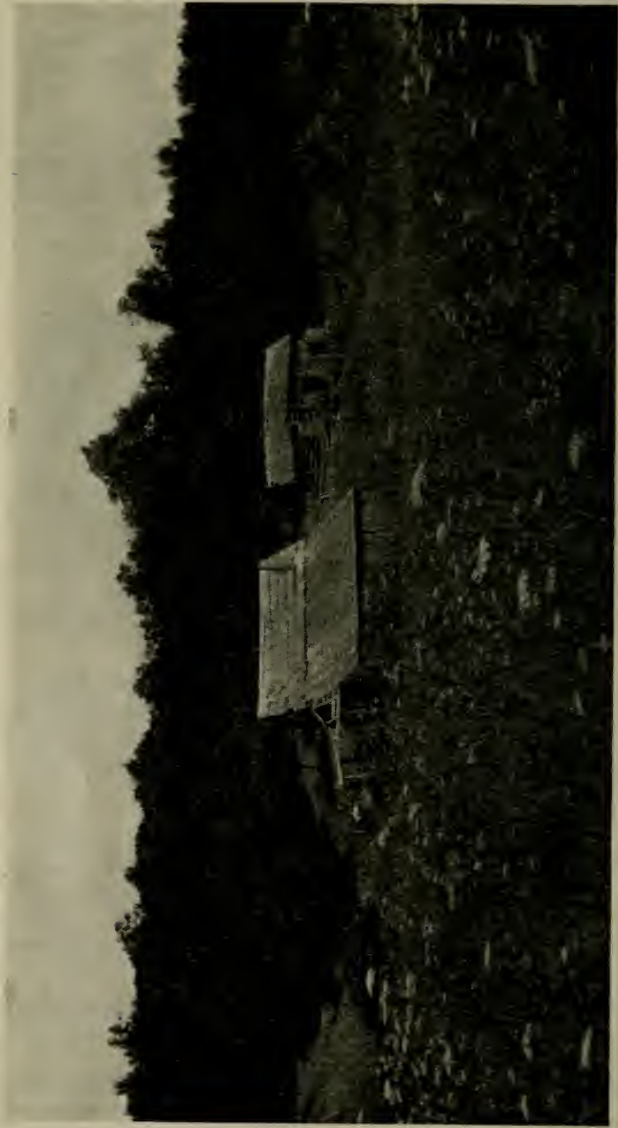


FIG. 6.—Teeth from the radula or lingual ribbon of the carnivorous snail *Haplotrema concavum* (Say).

to discuss the subject of finer anatomy. Instead, our object is to point out the readily observable means of recognizing the shells of Illinois land snails.

Food of snails.—The great majority of snails feed upon vegetable matter. Thistles, nettles, fungi, succulent leaves and



North of Alto Pass, Union County. Behind the buildings is a characteristic southern Illinois woodland habitat with rotting logs where zonitoids, pupoids and polygyras are abundant.

the fruit of the horsetail are often part of their diet. They will not eat pungent plants of any kind. Not all snails eat vegetable matter. A few are carnivorous and feed upon earthworms, leeches or other snails.

Because the body of the land snail is peculiarly shaped to fit into the coiled shell, the digestive, circulatory, locomotor, nervous and reproductive organs are not so easily recognized and studied as those of many other animals. But all of these systems are found in the land snail, and in the various species they often show individual patterns which add evidence to the differences based on form and size of shell.

How Snails Reproduce

In a small cavity in our old log, we note a mass of jellylike globules, *eggs* which have been laid by the white-lipped woodland snail, *Polygyra albolabris*. All Illinois land snails lay eggs, which vary in number from a few to 40 or more, in moist localities where they are protected from the sun's rays. The eggs may be found hidden under old logs, especially those on which the bark is loose, under chips, leaves, pieces of peeled-off bark and all sorts of debris. May and June are the usual periods during which land snails lay their eggs. Twenty or 30 days later, the young snails hatch and start on their life journey, reaching full maturity in about two years. Some land snails do not lay eggs but give birth to fully formed young. However, no species with this birth habit are found in Illinois.

Lung-breathing land snails, the only kind considered in this fieldbook, are hermaphroditic; that is, both sexes are in the same animal, the sexual organs being closely associated in the body, and the external openings of both sexes being merged in one opening. Study of the variation of the organs in the different species aids greatly in the classification of the land snails.

Where Land Snails Live

Land snails may be found almost everywhere, even in places where the dry nature of the habitat would seem to exclude life of any kind. Forested river valleys are perhaps the most favorable habitats for snails, especially those valleys having outcrops of limestone rock. The largest, most highly colored shells of the various species of land snails are found where lime is



Rocky cliff along the Ohio River near Golconda, Pope County. A good habitat for dentate *Polygyra*, as well as for *Mesomphix*, *Haplotrema* and other snails.

available in quantities; areas where granitic or volcanic rock abounds are usually poor places for snails. Often, isolated woodlands in the midst of cultivated areas afford favorable snail habitats.

Snails abound on some of the highest Illinois hills and in some of the deepest valleys; in comparatively dry places and in swamps and marshes. Curiously enough, the rights of way of railroads, especially embankments, afford good collecting localities, and a distinct fauna, evidently driven from the prairies by the advance of civilization, has taken refuge in this environment.

Most snails are associated with distinctive kinds of environment. Some are restricted to the heavy, virgin forests; others are limited to the more open woodlands which have been cut over. Many species are found in regions forested with oak, maple, willow and other deciduous trees; only a few are associated with coniferous trees. Some are found in abundance on and near limestone cliffs, whereas others are more or less restricted to the vicinity of bodies of water, or the bottom lands or floodplains of rivers and streams. Some, as the amber snails of the genus *Succinea*, live among cattails bordering ponds and streams and may be found even in the water; these snails are in a measure amphibious. A few snails are found on prairies in the grass, but the fauna of such places is not large. No pulmonate mollusk will live where sand, lime or ashes in a pure state are found. A few typical habitats are shown in the illustrations contained in this volume.

Collecting Land Snails

Perhaps the best place to find snails, especially the small species, is under loose or started bark of fallen tree trunks that have been lying on the forest floor so long that the wood has become somewhat rotten. Here both individuals and species of land snails are usually abundant. As many as 15 different kinds of snails have been found in one such favorable location. In the shelter of rocks or boulders may often be found a number of the smaller snails called pupoids. Under leaves, in old brush piles, under old boards near sawmills, and under and in the general debris of the forest floor these animals may usually be found. Sometimes the larger species may be seen either crawling upon or clinging to tree trunks, and many times in wet weather snails

may be found on the leaves of forest shrubs and other plants. In fact, almost any place may harbor one or more land snails. The admonition to be given the beginning conchologist is to look everywhere; he may be rewarded by finding species hitherto unknown in his vicinity.

The spring and summer months when moisture is abundant are best suited for the activity of snails. The most favorable time for collecting them is after a rainy period in summer. In late fall, and also in very dry periods, snails bury themselves in the ground or under debris of some sort and close the shell aperture with a secretion which forms a leathery flap called an *epiphragm*. They may thus be found in any of the winter months by a little patient digging about stumps, or under matted leaves and started bark.

Making the collection.—In collecting land snails, the conchologist should not confine his activities to living specimens. Even the empty, so-called “dead” shells should be picked up if they are not badly broken or bleached. Among these may be representatives of some species the living specimens of which are not easily found. The empty shells are just as useful for establishing a record of the presence of a particular species or variety as are the shells containing animals. When well cleaned, they make good cabinet specimens.

Often, close examination of the ground will reveal shells of many of the small species, the interesting pupoid snails. Washings from cliffs and debris along the shores of streams—known as stream drift—may contain shells of many species not commonly found alive.

Keeping records.—It is of great importance for the student to keep a record of his field observations in a book or on sheets of paper, which may be called *field data blanks*. This record should give the exact location of the place where each specimen is found, the nature of the habitat, the kinds of trees and other vegetation in the immediate vicinity, the condition of the ground where the collection is made, the nature of the weather at the time and the temperature of the air.

It may be possible for the amateur collector to supply very valuable information to science by keeping exact records of his collecting localities. A different number should be given to each collecting location even if two or more locations are in the same general region. For example, in one general region there may be an isolated woodland, a river valley and a railroad em-

bankment, all visited. Each should be given a number. Accurate records kept faithfully will reward the conchologist with a full account of his season's work.

Apparatus for the Collector

Apparatus for collecting land snails is very simple. A number of wide-mouthed bottles, two or three ounces in capacity, several homeopathic vials and a tin box that fits the pocket are all the containers necessary.

One or two small vials should be partly filled with alcohol for those specimens that are desired only for the shells. Alcohol will kill the snails and keep them from adhering to the side of the vial. It will also preserve the animals and prevent the ill-smelling odors that arise from decaying matter.

A pair of small forceps or tweezers is indispensable for picking up small specimens like the pupoids and also for sorting the collection at home. The points of the tweezers should meet exactly, and the spring should not be too rigid, or, in closing the points, the collector may apply too much pressure, breaking delicate shells like those of the zonitoids. It is a good plan to tie a string to the tweezers to prevent loss when they are laid aside in the collecting of larger snails. The string may be tied around the wrist or attached through a buttonhole to the jacket or shirt of the collector.

The large snails may be placed in the tin box or wide-mouthed bottles and killed after the collecting trip is over.

A stout knife is necessary for the purpose of tearing off small pieces of bark, turning over debris and digging snails out of their burrows in the ground. A trowel is often helpful for digging up the earth in favorable habitats.

A very convenient implement for the collector is the Ferriss hoe, made by filing an ordinary hoe blade into heart-shaped form. This may be used for protection against venomous snakes—rattlers, moccasins and copperheads—common in some parts of southern Illinois, and also for pulling over rock piles and digging up forest debris. To collectors who may be affected by poison ivy, this implement will be found of great value for pulling aside the vines when they cover the ground or old stumps and logs.

The snail collector should be careful to avoid ruthless destruction of the habitats where he is studying. He will notice



The author at the shell cabinets in the Museum of Natural History, University of Illinois. The drawers, trays, glass shell vials and labels may be seen here.

that very few animals of any sort are beneath recently fallen trees. Years are required for the ground underneath a fallen log to become fully suited as a dwelling place for snails, salamanders, spiders and the host of other animals which live between logs and the soil. When a decaying log is rolled from its established location, the conditions favorable for sheltering these animals are completely destroyed. For this reason, the snail collector who moves a log should, in the spirit of conservation, carefully roll it back into its place, securing as nearly as possible a perfect fit to the old spot where it lay.

Preserving Specimens

Preservation of the specimens gathered from a collecting trip is of the first importance. At the time the live specimens are collected, they may be covered with dirt and slime. These substances must be washed off in clear water. The "dead" shells may be washed clear of dirt in running water, the inside of each shell cleaned out at the aperture with wire or tweezers. They may then be dried by being laid on blotting paper or newspaper.

The living specimens may be dropped into boiling water, which will kill the animals and render easy the removal of the soft parts from the shells. For this latter purpose a bent wire sharpened at one end, or a fishhook fastened in a wooden handle, makes a good implement. If a wire or fishhook is inserted in the dead snail and the shell turned, the animal may be easily removed. The shell should be washed clean of mucus and then allowed to dry naturally. No artificial heat should be applied, as this will crack the shell.

The animal that is to be preserved by the collector may be killed by drowning. A small bottle should be filled to the very top with cold water from which dissolved air has been removed by boiling. The snail should then be dropped into the water and a small piece of glass placed over the mouth of the bottle. This will exclude all air. In about 12 hours the snail will have died with its body, tentacles and eye peduncles extended. It may be preserved in a 4 per cent solution of formalin; or it may be placed in a 50 per cent solution of alcohol for a few days and then transferred to a 75 per cent solution of alcohol.

Small specimens which have been collected in the homeopathic vials partly filled with alcohol may be taken out and dried on blotting paper.

Slugs may be drowned by the method described for land snails and may then be preserved in alcohol or formalin.

Labels and Cabinets

The labeling and preserving of a collection are of the first importance. The small, cleaned and dried shells may be kept in homeopathic vials, and the large specimens in cardboard trays or boxes. Each label should be prepared with great care, as upon accurate records depends much of the value of the collection.

<p>St. 11b MOLLUSCAN SURVEY OF ILLINOIS</p> <p>PUPOIDES MARGINATUS (Say)</p> <p>Illinois: Macon Co., 2 mi. S. of Decatur, Wabash RR. right of way.</p> <p>Deposited by Illinois Natural History Survey No. Z-3392/Det. by Baker Date, Summer, 1926</p> <p>MUSEUM OF NATURAL HISTORY, UNIVERSITY OF ILLINOIS</p>

FIG. 7.—Sample label for trays of shell cabinet.

Information on each label should include the scientific name of the specimen, the exact locality from which it came, the date of collecting and any note concerning the habitat that may be of interest and value. A sample label is shown in fig. 7.

The trays in which the collection is kept may be of several sizes but, for convenience in handling, a certain degree of uniformity should be maintained. If a size of 2 inches by 1 inch is decided upon for the smallest tray or basic unit, dimensions of the larger trays should be multiples of these measurements: 2 by 2, 2 by 4 or 4 by 4 inches. In the Museum of Natural History of the University of Illinois, the basic unit is 3 inches by 1 inch. Other trays are 3 by 1½, 3 by 2, 3 by 3 and 3 by 4 inches. Extra large size trays are 3 by 6 and 6 by 6 inches, but these are too large for most land snails. All the Museum trays are half an inch in depth. If the collector cannot afford to have trays made at a box factory, he may use spool boxes or other small cardboard containers.

Glass receptacles called shell vials are sold by laboratory supply houses and, as these have no flange at the mouth, they are more desirable for small specimens than are the homeopathic vials. The shell vials may be of a size just enough shorter

than the width of the tray to permit a short cork to be placed in the mouth. For a 2- by 1-inch tray, a bottle $1\frac{3}{4}$ inches in length is desirable. The larger shell specimens may lie loose in the tray.

It is well to index the collection either in a book or upon library catalog cards. Much of the valuable information previously recorded on the field data blanks may be entered under the name of each specimen.

Cabinets are necessary, but they need not be expensive. If available, a spool cabinet is very good. One of the best cabinets for keeping a collection of land snails in good order is a legal blank case, which is about 14 inches high, 10 inches wide and 15 inches deep. It has 10 drawers, each drawer slightly less than an inch deep and capable of holding several trays such as have been described. These drawers are admirable for the land snails found in Illinois. The case may be purchased from office supply companies for about \$6.

With the case, the trays and the vials, the collector has most of the equipment for beginning a valuable and interesting collection of land snails.

Classification of Land Snails

In the study of land snails, a system of naming is used by which they may be known to people interested in them. The shell itself has certain features which are given names. By a description of the form and position of these named parts of the shell almost anyone may know or identify a snail. In fig. 8, a shell of *Polygyra tridentata frisoni* is pictured with the parts indicated. The shell in nature is covered with a horny envelope called the *periostracum* or *epidermis*, which protects the limy part of the shell substance from destruction by the carbonic acid in the air or water. When the snail perishes and its shell dries, this epidermis usually peels off, exhibiting the chalky nature of the shell substance.

Form of shells.—The shells of Illinois land snails vary greatly in form. They are rounded, elongated, flattened and disc-like, or turreted. They range in size from that of one of the little pupoids, less than one-sixteenth inch in length, to that of the white-lipped snail, more than an inch in diameter.

The *aperture* in different species varies in form and may be modified by the presence of large or small projections known as

denticles, folds or lamellae, sometimes improperly called *teeth*.

The surface of the shell exhibits a feature called *sculpture*, represented by growth lines. These are made as the animal adds to the size of its shell by depositing a limy substance at the edge of the aperture from the little cells bordering its soft parts. The sculpture may be very fine, like thread wound tightly on a

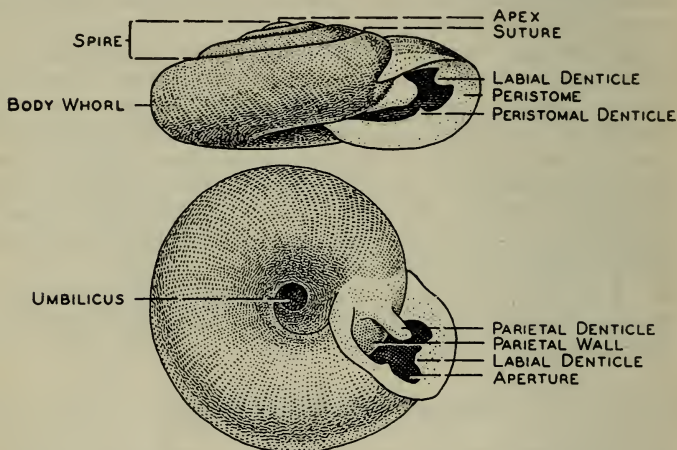


FIG. 8.—Named parts of shell of the snail *Polygyra tridentata frisoni*
F. C. Baker.

spool, or it may be so coarse that it forms elevations called *ribs*. Sometimes well-defined spiral marks or lines are added, forming in many cases a latticed pattern.

Color of shells.—Varying widely in color and pattern, the shells of the land snails of Illinois occur in many different shades of yellow, brown and gray. Some are of uniform color; others are marked by one or more spiral bands or a number of zig-zag spots and cloudings of darker color. Shells of many of the forms, for instance some of the pupoids, are translucent and like paraffin in appearance; other shells are opaque and of a dark brown or nearly black color. Certain species have a glassy or shiny shell of a brownish color.

All of the variations in size, form and color of shell enter into the naming of snails.

Naming snails.—Snails are known by their scientific names, which are always of Latin form and are often of Greek or Latin

origin. The white-lipped snail mentioned previously is known as *Polygyra albolabris* (Say). The first name, *Polygyra*, which happens to be of Greek origin, indicates the genus to which the snail belongs; the second, *albolabris*, which is of Latin origin, denotes the species. The word in parentheses is the last name of the man, Thomas Say, who first described this species. His name is in parentheses because this snail is no longer in the genus in which he placed it. Originally, Say gave this snail the name *albolabris* and placed it in the genus *Helix*. It was then known as *Helix albolabris* Say. Later, when other scientists decided that the species *albolabris* should be removed from the genus *Helix* and placed in the genus *Polygyra*, the name of the original describer was included in parentheses, and the snail then became known as it is today: *Polygyra albolabris* (Say).

Not all species of snails have names of Greek or Latin origin. *Vertigo morsei* Sterki was named for Edward S. Morse; *Polygyra fosteri* F. C. Baker, for Thural Dale Foster; *Gastrocopta holzingeri* (Sterki), for John M. Holzinger. It is not uncommon for conchologists wishing to honor fellow scientists or friends to give a Latinized form of their names to new species of snails.

Our system of classification is known as the binomial or two-name system and was first used definitely by the great Swedish naturalist Linné, or Linnaeus, in the year 1758. The system has been formally adopted, and no names published previous to this date are now used by students of the natural sciences.

Most present day workers in the Mollusca have extended the binomial system to include recognizable differences occurring within species. Subforms are designated by a third or variety name. The species *Polygyra albolabris* is divided into a number of forms or varieties. The typical form is known as *Polygyra albolabris albolabris*. Other Illinois forms of this species given distinguishing variety names are known as *Polygyra albolabris dentata* and *Polygyra albolabris allenii*.

Reasons for scientific names.—Many people ask why we do not use common English names for snails as we do for birds and mammals. We may answer that there are so many different species of snails which resemble each other closely that it would not be practical to give each a common name. Many scientific names are not more difficult to pronounce or understand than are some of the names in common use which have been taken from the Latin and Greek languages. For example, we speak

of a stadium, a rostrum, an auditorium. Scientific names become simple when we understand and use them frequently.

Another reason for using Latin and Greek for scientific names is that these languages are more nearly universal than any others. Use of them allows the form of the name to remain unchanged. The name *Polygyra albolabris* is clearly understood by conchologists of almost any nationality, while the name *many-whorled, white-lipped snail* might mean nothing to anyone except American or English students.

Pronunciation of scientific names.—Although scientific names are of Greek or Latin derivation or form, they are pronounced in the United States as if they were of English origin. Students who have learned the Latin pronunciation common today in public schools of the United States sometimes experience more difficulty in sounding scientific names than do those who have studied only English. Just as in English, the letter *g* is pronounced sometimes as in *green* and sometimes as in *gentle*; *c* sometimes as in *cat* and sometimes as in *cell*; *v* like the English *v* rather than the English *w*. Guides to pronunciation may be found in the introductory section of Webster's *New International Dictionary* under "Rules for the English Pronunciation of Latin."

Divisions of snails.—Snails, like all other groups of animal life, are separated into divisions according to different characteristics that several may have in common. These divisions are *class, order, family, genus* and *species*. Thus our white-lipped snail, the species *Polygyra albolabris* (Say), belongs to the class Gastropoda, or snails; the order Pulmonata, or snails that breathe air by means of a lung and that have certain characteristics of the internal organs in common; the family Polygyridae, or group containing all of the snails that have teeth, internal organs and shell more or less like our white-lipped snail; and the genus *Polygyra*, to which belong the snails more intimately related to our snail. The whole system of nomenclature is simple, and the amateur conchologist need have no fear concerning his ability to comprehend it.

How to Identify Land Shells

The young collector of Illinois land snails will naturally ask, "How am I going to find out what species I have collected? Must I run through the entire book to see if my specimen matches a certain description or figure?" Such a question is



Railroad habitat near Mayview, Champaign County. The railroad embankment is a good habitat for some small snails which live in very dry places.

pertinent, and we have provided devices known as *keys*, from which a species may be identified by certain characteristics combinations of characteristics that are peculiar to it.

Key to the families.—Suppose you have found a large snail with brown color bands encircling its coarsely ribbed, dome shaped shell. You first consult the key to families on page 3. Under 1 you find, "Animal having a well-developed spiral shell into which it can withdraw," and "Animal having only a rudimentary shell, or shell wanting entirely." The shell is spiral and well-developed; so you consult both parts of couplet as the key directs. If the shell has plaits or denticles extending far back into the whorl, the key identifies it as belonging to the family Strobilopsidae. But as this shell has no plaits, you next consult couplet 3. Because the shell is dome shaped, you move to couplet 4, and because it has a lip with a sharp edge you consult couplet 7. The coarse ribs of the shell identify the snail as belonging to the family Endodontidae.

Keys to the genera.—Turning to page 83, you find a key to the genera of the family Endodontidae. In the first couplet you read: "Shell $\frac{3}{4}$ to 1 inch in diameter and marked by brown spiral bands or scattered blotches of brown color," and "Shell $\frac{1}{4}$ inch or less in diameter and without contrasting markings even brown or horn in color." As your shell is nearly an inch in diameter, you know it belongs in the genus *Anguispira*. Turning to the key for this genus, page 84, you find: "Whorls with irregular vertical dashes and spots," and "Body whorl with two horizontal stripes." As your shell has a body whorl with two horizontal stripes, you decide that its name must be *Anguispira kochi*.

Using the keys.—The keys contained in this fieldbook are based on the most obvious characteristics of the shells of adult specimens found in Illinois. They will not aid in the identification of young or immature snails. For instance, shells of the immature specimens of *Polygyra* have a thin lip with sharp edge whereas shells of the adult snails of this genus are characterized by a reflected or turned-over lip. Young polygyras are likely to be confused with adult specimens belonging to the family Endodontidae or even with those of the large Zonitidae. *Polygyra* shells differ from those of the Endodontidae in usually being yellowish in color and from those of the Zonitidae in having a surface which is never smooth or polished. Young snails are usually found with adult specimens, and the genera

similarity between young and old helps to place the young with the adults of their species.

Careful attention to these keys should enable a student to identify adult specimens of any of the species of land snails found in Illinois. The keys are intended for aid in the identification of the snails of Illinois only and could not be used very successfully for land snails in general or for the land snails of any other one state. Although in adjoining states and in similar situations some of the same genera and species occur as in Illinois, the presence of other genera and species not found in this state would tend to make the keys inaccurate.

Economic Importance of Land Snails

Land snails are of varying importance economically. None of the Illinois land snails is so large as the European edible snail, *Helix pomatia*, and none is eaten now, although some species at one time furnished food for the American Indian.

As food for other animals, the Illinois land snails are of some value. Many birds are known to eat such small snails as the pupoids and zonitoids. Salamanders and newts eat the small slugs of the forest. Mice, moles, shrews and some squirrels eat the larger snails, and the broken shells are frequently found near a burrow or at the base of a tree where some animal has had a snail feast.

As garden pests, several species of snails and slugs are worthy of note. The little glassy zonitoid known as *Zonitoides arboreus* often occurs in such abundance in the garden patch as to do considerable damage. Slugs also live in the garden and eat the succulent vegetables which are grown for the table. These animals are nocturnal in habit and are seldom noticed. In the daytime they may often be found beneath boards in or near the garden. At least two species of large slugs, *Limax maximus* and *Limax flavus*, have been introduced into this country from Europe and are found more or less abundantly in some greenhouses, where they may seriously damage growing plants. In some cities the large *Limax maximus* has escaped from the greenhouses and has been found in yards and nearby fields. The best precaution against a visitation of these slugs is a quantity of fine ashes scattered over the soil. In an effort to become free from the irritating ashes, the slugs will soon exhaust themselves by secreting an abundance of mucus.



Hill region seven miles southwest of Anna, Union County. Many species of snails may be found in these hills, which are part of the Ozarkian Uplift.

One relationship between snails and other animals is commonly overlooked. In the bodies of many kinds of snails parasitic worms undergo a necessary part of their development. Fortunately, none of the Illinois land snails is known to harbor parasitic worms directly of importance to man. There are, however, many species of land snails whose bodies shelter parasites belonging to the flatworm group known as the flukes or Trematoda. These worms, growing inside the bodies of land snails, never reach maturity in the snails, which are called intermediate hosts. For full development the trematode must enter the body of some mammal, bird, amphibian or reptile. Relatively little is known of the life-history details of these parasitic worms carried by land snails in Illinois, though the larvae have been frequently observed.

Collectors of Illinois Land Snails

Many eminent students of science have contributed to our knowledge of the nature and extent of the land snail fauna of Illinois. Chief among these is Thomas Say, father of American conchology, who lived for a time at New Harmony, Indiana, and who studied and gave names to many species common in our state. Amos Binney and his son, William G. Binney, were the first to place the fauna on a scientific basis of classification, and not a few of our species have the names of these famous conchologists as their describers. The name of Thomas Bland, an intimate associate of William G. Binney, is indelibly connected with the study of land snails of Illinois and other parts of North America. Augustus A. Gould of Boston, Isaac Lea of Philadelphia and Bryant Walker of Detroit have contributed largely to the subject. Among living students of this branch of science who have studied the Illinois fauna is Henry A. Pilsbry of Philadelphia, who has placed the subject on a sound basis of classification and whose treatment has been followed in this fieldbook. H. B. Baker of Philadelphia and George H. Clapp of Pittsburgh, distinguished students of the land snails, have added much to our knowledge of some of the species of land snails that live in Illinois.

Many citizens of Illinois have studied and collected the land mollusks of the state and have left a large and interesting bibliography. Most of these are now dead, and few others have become interested enough to take their places.

Among the early Illinois naturalists who made extensive collections and added greatly to our knowledge of the Mollusca of this state may be mentioned Robert Kennicott, who was Director of the Chicago Academy of Sciences and who studied the zoology of Illinois (1845-1885)*, W. W. Calkins of Chicago (1870-1885), John Wolf of Canton (1865-1870) and H. A. Ulffers of southern Illinois (1850-55). Later, another group of men took up the study and greatly advanced our knowledge: W. A. Nason of Algonquin (1865-1910), J. H. Ferriss of Joliet (1890-1925), A. A. Hinkley of Rockford and Dubois (1895-1920), W. A. Marsh of Aledo (1880-1900) and W. S. Strode of Bernadotte (1890-1910).

Two men who wrote little but who made good collections of Illinois snails for others to study should also be mentioned: George T. Marston of Green Bay, Wisconsin, and C. S. Hodgson of Albion, Illinois.

The collections of some of these students have been deposited in the Natural History Museum of the University of Illinois, along with the loan collection from the Natural History Survey, and the material is available for scientific study. Among the collections are those of Nason, Ferriss, Strode, Hodgson and the author.

Physiography of Illinois

The state of Illinois is well situated for the study of geographic distribution. It covers $5\frac{1}{2}$ degrees of latitude, lying between parallels 37 and $42\frac{1}{2}$. A marked difference in climate exists between the widely separated northern and southern boundaries. In the southern tip near Cairo the weather is so warm that cotton flourishes, and the climate is of a very temperate nature even in the winter months; whereas in the northern part near the Wisconsin border tamaracks grow, and the ground is frozen for a large part of the winter. The difference in climate is reflected in the fauna.

Illinois is partly surrounded by water bodies. The great Mississippi stretches along the entire western side of the state, the almost equally large Ohio borders the southern, and the Wabash flows along a portion of the eastern border. On the

*The dates indicate period of greatest activity. The author of this fieldbook, who should also be mentioned among eminent conchologists of the state, began his study of the land snails of Illinois in 1895.—Editor.



Valley of the Big Vermilion River west of Danville, Vermilion County. The valley walls, ravines and wooded floodplains afford habitats for many species of snails.

northeast, Lake Michigan washes the shores for many miles. Within the state area are several large river valleys. The Illinois, which is the largest river in the United States lying wholly within the borders of a single state, the Rock, Kaskaskia, Big Muddy, Little Wabash, Embarrass, Kankakee, Fox and Sangamon rivers afford many attractive valleys, usually well wooded and providing favorable habitats for snails. Tributaries of these streams form a great network of waterways throughout the length and breadth of the state. Scarcely another state of the Union has so many stream valleys, which means that Illinois presents unusually good hunting grounds for the conchologist.

Plain and valleys.—Much of Illinois is an undulating plain which in a few places has been rather deeply dissected by streams and rivers. In the central and southern parts of the state some of the river banks are towering cliffs which with their castellated crests form picturesque features of the landscape. The bluffs of the Mississippi attain a height 360 feet above the level of the river. The banks of the Ohio rise in places as much as 100 or 200 feet above the water. In the lower Illinois valley, in Calhoun and Jersey counties, some of the cliffs reach an elevation of approximately 300 feet above the river. The banks of the Rock River, especially those near Oregon, are famed locally for their height. Terrain of this rugged type, although not representative of Illinois as a whole, furnishes favorable habitats for certain species of snails.

Hill regions.—South of Harrisburg and Carbondale is an eastward extension of the mountains of Missouri, known as the Ozarkian Uplift. This area, which in places attains an elevation of 1,100 or more feet above sea level, harbors a greater variety of land Mollusca than any other section of Illinois. The dissection of this uplift by erosion has produced many hills, some of them precipitous, which rise 350 to 650 feet above adjacent valleys.

In Jo Daviess County is another hill region which extends into Wisconsin and is sometimes called locally "the little Switzerland of America." Although this region lies at approximately the same distance above sea level as the Ozarkian Uplift, its hills are less precipitous and do not rise to such heights above adjacent valleys.

Neither the Jo Daviess County nor the southern Illinois hill regions felt the influence of the great glaciers which in other places planed the hills and filled the valleys with debris.

Prairie and lake areas.—Outside of the hill regions and the river valleys, Illinois is relatively flat and contains large areas of cultivated land, once prairie, unfavorable to molluscan life. Although Illinois is primarily a prairie state, a large part of the original prairie areas has been so altered by cultivation as to destroy conditions under which snails grow abundantly. Prairie conditions, however, are still found in many localities, some of them isolated.

In the northeastern area bordering Lake Michigan rise some high moraines, where mollusks may be found. In Lake and some of the adjoining counties may be seen a few bodies of water, but aside from this district there is no area in the state comparable to Wisconsin and Michigan with respect to multitude of lakes, large and small. The dune-bordered shores of Lake Michigan afford but poor habitats for land mollusks.

Mollusks in Geological History

Mollusks occur in the oldest stratified rocks, the Cambrian, laid down over 600 million years ago. However, these are all marine animals, snails and clams, a few of which are known from the rocks of Illinois. The first known land snails are from the Carboniferous rocks of the Coal Period, about 300 million years ago. Most of these have been found in fossil tree stumps in Nova Scotia. Several land snails are known from the coal fields of Pennsylvania. In the great Chalk Period, the Cretaceous, land snails became common, and in the period known as the Tertiary, about 60 million years ago, they became abundant. Their number has increased to the present time. No ancient land snails are at present known from Illinois, but it is very likely that such animals lived here, as in Nova Scotia and Pennsylvania, among the luxuriant vegetation of the Coal Period.

Glacial periods.—Very late in geological time a glacial or ice period developed which sent great ice fields into Illinois and other parts of the United States. With the exception of a small area in the northwestern part, mostly in Jo Daviess County, and a larger area in the extreme southern part of the state, Illinois was completely covered with an ice sheet. The ice came into and retreated from Illinois at least three times, the first invasion, the Kansan, as well as the second, the Illinoian, reaching nearly to the southern boundary of the state, stopping

on the north side of the hills of the Ozarkian Uplift. The third invasion reached only the eastern and northeastern parts of the state as far south as Shelbyville in Shelby County.



Limestone bluff in Giant City State Park, Jackson County. Snails are found in the woods above the bluff and in the rock crevices.

These huge ice fields brought down great quantities of clay and rock, which were deposited at the edge of the ice to form moraines, the ridges which are now a marked feature of the landscape in various parts of the state, as near Champaign, Shelbyville, Bloomington, Paxton, Pontiac, Aurora, Algonquin and Summit.

Interglacial intervals.—The geological time of the huge ice fields, known as the Pleistocene or Glacial Period, lasted about one million years, divided among the several ice invasions. The periods between these invasions, called interglacial intervals, were probably of long duration, thousands of years, and the climate at its most genial time is believed to have been warmer



Woods in winter, southeast of Homer, Vermilion County. In this region may be found many small snails together with several species of the large polygyras.

than that of today, since both the pawpaw and the osage orange are found in geological deposits far to the north of their present habitats. Each period was probably subjected to a warm, a cold temperate and a boreal condition as the ice advanced and the climate became arctic. The reverse condition prevailed when the ice retreated and the climate became warmer.

Effect of glacial periods.—The effect of this great field of ice moving over the state was to kill all life that could not retreat in front of it. Such sedentary animals as snails could not get away and must have been killed when the ice filled the valleys and buried the life under the debris brought down. It has been ascertained from a study of the snails in these deposits that the ancient land snail fauna of the state was not exactly like that living today. Members of some species, which differed in a small way from their relatives now living, are known today as races of these species. A few species became wholly extinct. Others no longer live in Illinois but are now found far to the west or north of the boundaries of this state. A few species once common over the state are now found in northern Wisconsin and Minnesota and in southern Canada. A deposit called loess, formed centuries ago probably by the wind blowing fine dust from the river bottoms, usually contains land snail fauna quite unlike that of today.

When the ice began to melt and retreat, and the climate grew warm enough for plant life to become established again, the land snail fauna once more took possession of the state. There was migration from Indiana on the east, Missouri on the west and Kentucky on the south. Since the retreat of the ice, some species of land snails more or less foreign to these areas have come into Illinois, along with the species which normally live in this region, and are now widely distributed over the state. The foreign species are found mostly in the river valleys bordering the southern and western parts of the state. Some of this migration may have been geologically very recent.

The Land Snail Fauna of Illinois

All snails described in this fieldbook—in fact, all snails—are included in the class Gastropoda. The following pages describe 122 species and races of land snails found in Illinois. Of these, all species but one belong to the order Pulmonata. Six of the species described have been accidentally introduced

from foreign countries into greenhouses and other places in cities. The native fauna, therefore, comprises 116 species and races. These are divided among 14 families and 28 genera.

It is of interest to compare this fauna with that of other states. The modern classification and nomenclature of the land Mollusca represent such changes from those in use a few years ago that only five catalogs are at present available for direct comparisons. These relate to the fauna of Michigan (Winslow, 1936), Ohio (Sterki, 1907), Pennsylvania (Brooks, 1931), Indiana (Daniels, 1904, 1915) and Alabama (Walker, 1928). It is probable that additional species of Mollusca will be found in Indiana, bringing the number of species and races of that state to approximately the total of those in Illinois.

Comparisons of two genera, *Polygyra* and *Gastrocopta*, show the large Illinoian fauna of these important groups. Table 1 compares graphically the total land snail fauna, the polygyras and the gastrocoptas of the six states in which the Mollusca have been most carefully studied. Alabama alone exceeds Illinois in the number of species represented.

Table 1.—Total number of species, subspecies, races and varieties of Mollusca and of two important genera reported from six states.

State	Total Number	<i>Polygyra</i>	<i>Gastrocopta</i>	Authority	Date
Illinois	122	34	13	Baker	1939
Michigan	103	23	8	Winslow	1926
Indiana	100	28	5	Daniels	1915
Ohio	105	22	8	Sterki	1907
Pennsylvania	102	22	5	Brooks	1931
Alabama	185	58	14	Walker	1928

It is possible that a few additional species may be found to inhabit Illinois, especially the northern portion bordering Wisconsin and the eastern adjoining Indiana.

Land Snails
Native to Illinois

LAND SNAILS

Native to Illinois

Class GASTROPODA

The class Gastropoda includes all snails, those which live in the ocean, in lakes, rivers and pools, as well as those which live on land.

Order PROSOBRANCHIATA

In the order Prosobranchiata are the snails which breathe by means of plumelike gills. The great majority of the species of this order live in the ocean, but many live in fresh water, and not a few live on land far removed from water. Only one species, however, is known from Illinois.

Order PULMONATA

The order Pulmonata includes all but one of the species of land snails which live in Illinois. The animal breathes by means of a lung, as is explained in the introductory chapter of this fieldbook.

Suborder STYLOMMATOPHORA

Most families, genera and species of snails living in Illinois are included in the suborder Stylommatophora of the order Pulmonata. This suborder embraces most of the land snails of the world.

Animals of this suborder have four tentacles, arranged as pairs. The superior, or longer, tentacles with the snail's eyes at the tips are retractile. The inferior tentacles are very short.

Suborder BASOMMATOPHORA

Animals of this suborder of Pulmonata have tentacles that are more or less flattened and triangular or subcylindrical. The tentacles are contractile but not invertible as in the true land snails, the suborder Stylommatophora. The eyes are placed at the inner base of the tentacles and not at the end, as are those of the true land snails. Most species of this group live in or near fresh water, though they breathe by a lung, much as do the Stylommatophora.

In the following pages, the actual width or length of the specimen is represented by a line near the figure.

KEY TO FAMILIES

1. Animal having a well-developed spiral shell into which it can withdraw, p. 40 (Snail).....2
 Animal having only a rudimentary shell, or shell wanting entirely, pp. 129, 131 (Slug).....14
2. Parietal wall of shell with plaits extending far back into whorl and with one or two plaits emerging from aperture.....STROBILOPSIDAE, p. 110
 Parietal wall of shell not with plaits extending far back into whorl and emerging from aperture, pp. 39, 44.....3
- * 3. Shell broader than high, spire flat or dome shaped, pp. 49, 92..4
 Shell higher than broad, spire pointed or elongate, pp. 96, 122.9
4. Shell with lip reflected or turned back, edge thickened, p. 40..5
 Shell with lip not reflected or turned back, edge sharp, p. 83..7
5. Shell $\frac{1}{8}$ inch or less in diameter...VALLONIIDAE, p. 116
 Shell at least $\frac{1}{4}$ inch in diameter, usually from $\frac{1}{2}$ to 1 inch in diameter.....6
6. Whorls of spire not separated by a suture.....
HELICINIDAE, p. 39
 Whorls of spire separated by a distinct suture.....
POLYGYRIDAE, p. 40
7. Surface of shell dull, coarsely ribbed. ENDODONTIDAE, p. 83-
 Surface of shell polished, smooth, p. 70.....8
8. Spire more or less rounded, p. 66; vitreous, with umbilicus relatively small.....ZONITIDAE, p. 64*
 Spire flattened, p. 92; not vitreous, with umbilicus very wide.....HAPLOTREMATIDAE, p. 91
9. Aperture occupying one-half or more length of shell, p. 122..10
 Aperture occupying not more than one-third length of shell, p. 96.....11
10. Shell with brown markings on surface. .BULIMULIDAE, p. 63
 Shell with surface yellowish, unmarked. SUCCINEIDAE, p. 121
11. Aperture without plications or denticulations of any kind, p. 120.....12
 Aperture with 1 or more plications or denticulations, p. 136..13
12. Shell yellowish, polished.....COCHLICOPIDAE, p. 120
 Shell brown, dull.....PUPILLIDAE (part), p. 93*
13. Aperture round; provided with denticulations.....
PUPILLIDAE (part), p. 93
 Aperture long and narrow, p. 136; provided with a single plait on parietal wall.....ELLOBIIDAE, p. 135
14. Mantle covering only anterior portion of body.....
LIMACIDAE, p. 128
 Mantle almost or entirely covering body.....
PHILOMYCIDAE, p. 131

Family HELICINIDAE

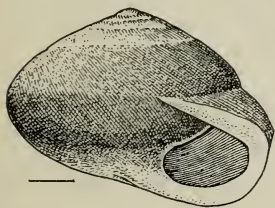
The family Helicinidae is abundantly represented in tropical countries, Mexico, Central America and the islands of the West Indies. Though belonging to the Prosobranchiata, an order of sea and freshwater snails, members of the Helicinidae are truly terrestrial or land animals. Unlike the animals of Pulmonata, the order of land snails common in Illinois, those of the Helicinidae possess a horny operculum or lid with which they may tightly close the shell against all intruders. Animals of the Helicinidae have a rather long snout, truncated at the end, and long, slender tentacles; each eye is on a little swelling at the outer base of a tentacle.

Genus HENDERSONIA A. J. Wagner

The only genus of the family Helicinidae found in Illinois, *Hendersonia* is known in the United States, China and Japan. All of the shells are similar to that of *Hendersonia occulta*.

HENDERSONIA OCCULTA (Say)

The reddish or yellowish shell of *Hendersonia occulta* is very thick, and its surface is marked by fine, curved ribs. It measures about one-fourth inch (5-7 mm.) in diameter. The spire, which is dome shaped, has $6\frac{1}{2}$ whorls. The periphery of the body whorl is made angulate by the presence of a relatively sharp carina which borders the sutures on the spire whorls. The base of the shell is rounded and is without an umbilical opening. The aperture is lunate in shape, and the outer



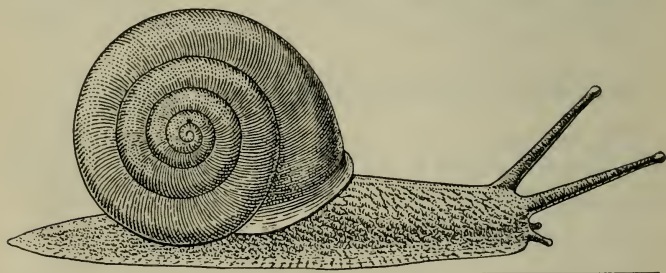
lip is greatly thickened, forming a heavy projecting ridge. Only the adult shell has this ridge.

This snail, formerly named *Helicina occulta*, is now very rare in Illinois, and is at present known only from near Athens, Menard County. It may be found in dry well-wooded places under and about forest debris. Though rare in Illinois as a living member of the fauna, it is very abundant in fossil deposits of the last geological period.

Family POLYGYRIDAE

To the family Polygyridae belong most of the large snails living in Illinois. The shell in the different species varies from one-fourth inch (5 mm.) to an inch and a half (40 mm.) in diameter and may be either globose or depressed. But in all species the shell of the adult specimen has a reflected outer lip. Many species are provided with denticles or plications on the lip or parietal wall.

The young and immature individuals of this family are difficult to identify, because the lip or peristome in young speci-



mens is not reflected, as it is in older individuals, and because an umbilicus is present in the young of even those species in which the shell of mature individuals is imperforate. Usually it is safe to assume that immature specimens belong to the same species as the adults with which they are found.

The animals of the Polygyridae, though large, are completely retractile within the shell. In color they vary from whitish or cream to blackish or brownish. Usually the head, the long, flexible eye peduncles and the short tentacles are of a darker color than the rest of the body, and the underside of the foot is usually of a lighter color.

The body of the animal in some species of the family Polygyridae is conspicuously granulated, and in all species granules of varying sizes are present. The animal of nearly all species of this family has a rather indistinct groove on each side of the body extending from the edge of the shell to the head. In most species the body of the animal is about twice as long as the diameter of the shell. *Polygyra palliata*, a member of this family, is pictured on this page.

Genus POLYGYRA Say

All members of the family Polygyridae found in Illinois belong to the genus *Polygyra*, which is not found outside of North America and certain islands of the West Indies. Characteristics of the genus are those described for the family Polygyridae. The figure on page 40 pictures an Illinois species, *Polygyra palliata* (Say).

The genus *Polygyra* contains the largest species of land snails inhabiting Illinois and also the largest number of species of any genus found within the state. The conspicuous size and color of the shells make them objects easily seen and eagerly sought by collectors.

Key to Species and Varieties

- 1. Base of shell with umbilical opening; sometimes opening partially obscured by reflected lip, p. 60.....2
- Base of shell without umbilical opening; umbilicus completely closed by a callus, p. 54.....17
- 2. Aperture or parietal wall of shell with denticles, p. 44.....3
- Aperture or parietal wall of shell without denticles, p. 48....13
- 3. Denticles in aperture only on parietal wall, p. 56.....4
- Denticles in aperture only on outer lip, or on both parietal wall and outer lip, p. 44.....8
- 4. Shell $\frac{3}{4}$ to 1 inch in diameter; large umbilical opening partly covered by widely spreading lower lip; denticle on parietal wall short and narrow.....*thyroidus*, p. 56
- Shell $\frac{1}{2}$ inch or less in diameter; umbilicus wide, often not partly concealed by lower lip; denticle on parietal wall small, tubercular, p. 60.....5
- 5. Umbilicus not at all concealed by lower lip.....
-*tridentata unidentata*, p. 45
- Umbilicus partly concealed by lower lip, p. 61.....6
- 6. Umbilical opening small, a mere slit, almost entirely covered by reflected lower lip.....*fraterna fraterna*, p. 61
- Umbilical opening distinct, only partly covered by reflected lower lip, p. 60.....7
- 7. Denticle long; umbilicus round, partly obscured by lower lip.....*fraterna cava*, p. 61
- Denticle short; umbilicus only very slightly obscured by lower lip.....*monodon*, p. 60
- 8. Denticles in aperture only on outer lip.....
-*tridentata bidentata*, p. 45
- Denticles in aperture on both outer lip and parietal wall, p. 44.....9

9. Parietal denticle quadrate, but not wider than high, forming a letter U.....*dorfeuilliana*, p. 44
- Parietal denticle long, narrow, not forming a letter U, pp. 45, 62; or quadrate and twice as wide as high, p. 46... 10
10. Shell less than $\frac{1}{4}$ inch in diameter; umbilicus small, deep, partly closed by reflected lower lip; parietal denticle long, narrow.....*leporina*,* p. 62
- Shell $\frac{1}{2}$ inch in diameter; umbilicus not partly closed by reflected lower lip; parietal denticle quadrate or pyramidal, pp. 45, 46..... 11
11. Spire dome shaped; parietal denticle quadrate, twice as wide as high; space between labial denticles as deep as wide..
.....*fraudulenta*, p. 46
- Spire flattened; parietal denticle pyramidal, roundly pointed at end; space between labial denticles wider than deep, p. 45..... 12
12. Denticles on outer lip or peristome widely spaced, parietal denticle pointing between them....*tridentata tridentata*, p. 45.
- Denticles on outer lip or peristome not widely spaced, parietal denticle pointing to labial denticle.....
.....*tridentata frisoni*, p. 45
13. Shell approximately 1 inch in diameter..... 14
- Shell approximately $\frac{1}{2}$ inch in diameter..... 16
14. Spire encircled by a wide brown band.*profunda profunda*, p. 48
- Spire without a brown band, shell uniformly yellowish.... 15
15. Umbilicus narrow, partly concealed by lower lip.....
.....*thyroidus*, p. 56
- Umbilicus wide, not at all concealed by lower lip.....
.....*profunda efasciata*, p. 48
16. Spire dome shaped; umbilical opening very small and partly concealed by lower lip.....*clausa*, p. 57
- Spire almost flat; umbilicus wide and deep, not at all concealed by lower lip.....*tridentata edentilabris*, p. 45
17. Lower lip of shell not notched, p. 51..... 18
- Lower lip of shell with a notch in middle, p. 59..... 34
18. Parietal wall of shell without denticles, p. 51..... 19
- Parietal wall of shell with denticles, p. 50..... 25
19. Shell with color bands encircling whorls, p. 51..... 20
- Shell without color bands encircling whorls..... 21
20. Upper and lower margins of aperture almost parallel; shell 1 inch in diameter.....*multilineata multilineata*, p. 51*
- Upper and lower margins of aperture diverging toward columellar region; shell approximately $\frac{1}{2}$ inch in diameter
.....*multilineata algonquinensis*, p. 51

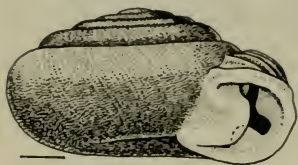
*This species may belong to the genus *Lobosculum* Pilsbry.

21.	Shell 1 inch or more in diameter.....	22
	Shell $\frac{3}{4}$ inch or less in diameter.....	23
22.	Peristome wide and pure white.... <i>albolabris albolabris</i> , p. 49*	
	Peristome narrow and pinkish in color. . <i>albolabris allenii</i> , p. 49	
23.	Aperture of shell contracted, three-fourths as high as wide. <i>pennsylvanica</i> , p. 55*	
	Aperture of shell broad, four-fifths as high as wide, p. 51...	24
24.	Color of shell brownish or chestnut. . <i>multilineata rubra</i> , p. 51	
	Color of shell yellowish or whitish. . . <i>multilineata alba</i> , p. 51	
25.	Peristome without denticles, p. 50.....	26
	Peristome with 1 or 2 denticles, pp. 47, 53.....	29
26.	Shell $\frac{1}{2}$ inch or less in diameter; parietal denticle long and narrow, extending backward almost to umbilical region. <i>inflecta edentata</i> , p. 47	
	Shell approximately 1 inch in diameter; parietal denticle short, not extending backward almost to umbilical region. .	27
27.	Shell convex, much wider than high; parietal denticle only slightly developed. <i>albolabris dentata</i> , p. 49	
	Shell globose; parietal denticle well developed, p. 50.....	28
28.	Spire depressed-dome shaped; aperture large, round; parietal denticle, short, tubercular in shape. <i>zaleta</i> , p. 50	
	Spire elevated-dome shaped; aperture contracted, elongate; parietal denticle long, curved..... <i>elevata</i> , p. 55	
29.	Periphery of shell angled or sharply keeled, pp. 52, 53; upper denticle on outer lip large and extending con- spicuously from peristome, p. 53.....	30
	Periphery of shell rounded, p. 47; upper denticle on outer lip small and tubercular, or wanting entirely, pp. 47, 54. .	31
30.	Periphery of shell angled. <i>palliata</i> , p. 52	
	Periphery of shell sharply keeled..... <i>obstricta</i> , p. 53	
31.	Denticle on parietal wall of shell not extending backward to umbilical callus, p. 54.....	32
	Denticle on parietal wall of shell extending backward to umbilical callus, p. 47.....	33
32.	Outer lower lip of shell with 1 small denticle; parietal denticle short, only slightly curved..... <i>appressa</i> , p. 54	
	Outer lower lip of shell with 2 distinct denticles; parietal denticle long, curved..... <i>fosteri</i> , p. 54	
33.	Outer lip of shell with well-defined denticles..... <i>inflecta inflecta</i> , p. 47	
	Outer lip of shell with denticles vague, reduced to mere swellings..... <i>inflecta media</i> , p. 47	
34.	Parietal denticle, viewed from front, obscuring all but a small opening at upper part of aperture. . . <i>stenotrema</i> , p. 58*	
	Parietal denticle viewed from front, not obscuring most of aperture, but leaving a part of lower lip visible..... <i>hirsuta</i> , p. 59	

POLYGYRA DORFEUILLIANA (Lea)

The shell of *Polygyra dorfeuilliana* is about one-fourth inch (5-7 mm.) in diameter, has 6 whorls and a small but deep umbilicus. The spire, which is flattened, has coarse, rather

evenly spaced riblets, and the roundly flattened base shows $1\frac{1}{2}$ turns of the whorls. The outer lip or peristome is thickened, and the large, squarish, U-shaped plication on the parietal wall almost closes the aperture. Just within the peristome



are two tubercles which still further constrict the aperture. The shape of the plication on the parietal wall at once distinguishes this shell from any other found in Illinois. The color is yellowish horn in living specimens, but this becomes whitish when the shell is empty.

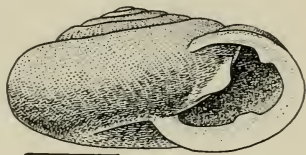
The Polygyras have been divided into a number of subgroups according to the shape of the aperture of the shell and the position of the denticles within the aperture. The species *dorfeuilliana* is the only Illinois member of a subgroup known as typical *Polygyra*. All other members of this subgroup, which is characterized by an elevated V- or U-shaped denticle across the parietal wall, live in the southern part of the United States.

In Illinois, *dorfeuilliana* is known only from the upper part of the relatively dry bluffs along the Mississippi River in Monroe and Jackson counties where the forest is composed of oak and elm, mixed with some pine, and where the underbrush is very sparse.

Polygyra dorfeuilliana was originally described from Kentucky, opposite Cincinnati, Ohio. It is evident, however, that this record is an error. The species has not been reported from that locality within recent years, and a gap of more than 300 miles exists between the Illinois colonies and the Kentucky locality from which it was originally described; *dorfeuilliana* has not been seen from eastern or southeastern Illinois. Possibly the Kentucky record is based upon specimens from another locality, which had become mixed with Kentucky material. The species *dorfeuilliana* is present in eastern Missouri; it undoubtedly crossed the Mississippi River to Illinois.

POLYGYRA TRIDENTATA (Say)

The shell of *Polygyra tridentata* is approximately one-half inch (13 mm.) in diameter and about twice as wide as high, is horn colored, much depressed, has $5\frac{1}{2}$ whorls and a distinct umbilicus. In this species the aperture normally has 3 denticles or plications, 1 on the parietal wall and 2 on the white peristome, which is widely reflected. The sculpture of the shell of *tridentata* consists of distinct riblike lines of growth.



The animal is dark blue or slate in color, and the eye peduncles are one-fourth inch (6.5 mm.) in length.

The shell of this species is abundant in parts of Illinois. Most common in the southern part, it has been collected in the Illinois Valley from Cook County southward to Fulton County. Its metropolis is in forests of oak, elm, hickory, dogwood and sassafras on limestone bluffs near the junction of the Ohio and Mississippi rivers. It may be found under forest debris, particularly in ravinelike spaces between ledges of limestone.

Polygyra tridentata tridentata (Say). In the typical form of *tridentata* the two denticles on the peristome are widely separated, the space between being almost twice as wide as deep, as shown in the figure. Four distinct variations from the typical form are found in Illinois. The distinguishing characteristics of these are noted below.

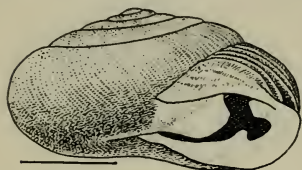
Polygyra tridentata frisoni F. C. Baker. In this variation the denticles on the peristome are larger and nearer together than in the typical form, and the width and height of the space between the denticles are about equal. The shell of this variety is pictured on page 18.

Polygyra tridentata bidentata F. C. Baker. This is a form in which the two denticles on the peristome are present, but the plication on the parietal wall is absent.

Polygyra tridentata unidentata F. C. Baker. The one-toothed form has a plication on the parietal wall, but the denticles on the peristome are absent.

Polygyra tridentata edentilabris Pilsbry. In this variation the aperture is entirely without denticulations.

POLYGYRA FRAUDULENTA (Pilsbry)



The shell of *Polygyra fraudulenta* greatly resembles and is often mistaken for that of *Polygyra tridentata*. Shells of both species are about one-half inch (13 mm.) in diameter, both are umbilicated and both have 3 denticulations in the aperture. But the spire of *fraudulenta* is higher, the umbilicus is larger and deeper, the body whorl is more rounded and the aperture is much higher. The notch between the two peristome den-

ticles is also much deeper and narrower than that in *tridentata*.

The shells of *fraudulenta* vary much in color and may be described as ashy, horn, light brown or reddish brown. The pure white expansion of the aperture and the white tubercle on the parietal wall stand out in marked contrast against the darker shell.

The animal of *Polygyra fraudulenta*, resembling that of *Polygyra tridentata*, is dark blue or slate in color.

In Illinois, this species is now found only in the tributary valleys of the Wabash, Ohio and Mississippi rivers, where it is very abundant in well-wooded areas in forest debris, under logs and about limestone boulders. Because it seems to prefer the small ravines and valleys, *fraudulenta* is not usually found with *tridentata*, which more frequently inhabits the cliffs of the larger streams.

Polygyra fraudulenta was first recognized by Dr. Henry A. Pilsbry, of the Academy of Natural Sciences of Philadelphia, in 1894. It had been mistaken by Dr. William G. Binney for *Polygyra fallax* (Say), which is an eastern species, while *fraudulenta* is a snail of the Middle West, although its distribution eastward is as far as Maryland.

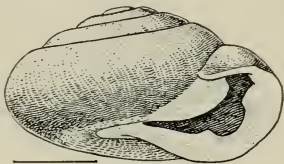


Be Thine own home, and in thyself dwell;
Inn anywhere; continuance maketh hell.
And seeing the snail, which everywhere doth roam,
Carrying his own house still, still is at home,
Follow (for he is easy-paced) this snail,
Be thine own palace, or the world's thy jail.

—JOHN DONNE, *Verse to Sir Henry Wotton*

POLYGYRA INFLECTA (Say)

The light brown shell of *Polygyra inflecta* is nearly one-half inch (11 mm.) in diameter and is much wider than high. It has an imperforate base. The surface of the shell is covered with very short, hairlike projections from the epidermis. In all but one rare variety, shells of this species found in Illinois are characterized by 2 denticles on the peristome and a single long plication on the parietal wall.



The animal of this species is dark bluish slate in color; the head, tentacles and eye peduncles are blackish. The foot is very narrow.

This *Polygyra* is confined largely to the southern part of Illinois. No specimens have been seen north of Edgar County. It is very abundant in the Wabash, Ohio and Mississippi valleys, in the last as far north as Calhoun County, where it lives on the limestone cliffs associated with *Polygyra tridentata*. It appears to be gregarious, for in any location it nearly always occurs in great numbers.

Like the other species of the dentate polygyras, *inflecta* is subject to great variation in the development or presence of the denticles within the aperture. The following variations occur in Illinois.

Polygyra inflecta inflecta (Say). The denticles on the peristome of the typical form are rather widely separated, the space between being much wider than the depth. The figure shows a shell of this variety.

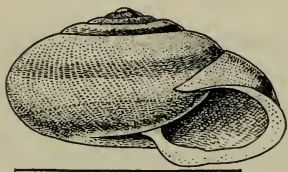
Polygyra inflecta media Pilsbry. In this variety the lip denticles are widely spaced as in *inflecta inflecta*, but are reduced in size to mere swellings on the peristome. The parietal plication is also smaller and less massive than in the typical *inflecta*.

Polygyra inflecta edentata (Sampson). The variation known as *edentata* occurs in only about 1 per cent of the specimens of *Polygyra inflecta* examined from Illinois. Denticles on the peristome are indistinct, their presence being indicated in a few examples by only a very small swelling. This variation was first noted in Arkansas, and no records of it have been seen from states other than Arkansas, Illinois and Indiana. The Illinois

specimens are similar to those from Arkansas. This variation is found mostly on the bluffs of the Ohio and Mississippi rivers; only one individual was noted among several hundred specimens of *Polygyra inflecta* collected in Clark County on the Wabash River.

POLYGYRA PROFUNDA (Say)

The large land snail *Polygyra profunda* has a yellowish shell over an inch (25-30 mm.) in diameter. It may at once be distinguished by the flattened spire, the widely open umbilicus and the rather prominent swelling near the umbilicus on the lower part of the wide, flat peristome.



The animal is large, light reddish-brown in color and it has smoke-colored eye peduncles and tentacles.

In its geographic distribution *profunda* is confined to the northern part of Illinois. Although it is abundant wherever found, no living specimens have been seen south of Fulton County. Its usual habitat is in moist woodlands of oak, hickory and birch where there is an abundance of fallen timber. In past ages, this species lived in southern Illinois, and the bleached shells are often found in fossil deposits.

Several varieties, distinguished by color differences, occur in this species. Only one variety besides the typical is found in Illinois.

Polygyra profunda profunda (Say). The shell of the typical *profunda* is distinguished by a wide brown band just above the periphery of the body whorl and smaller brown bands on the base of the shell and on the spire whorls above the wide band. A shell of this variety is illustrated by the figure.

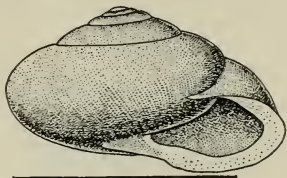
Polygyra profunda efasciata Walker. The color bands are not developed in this variety, as they are in the typical *profunda*, and the shell is uniform yellowish horn. About one specimen in every six of this species in Illinois belongs to this variety.



"The snail," say the Hindoos, "sees nothing but his own shell, and thinks it is the grandest place in the Universe."—SIDNEY SMITH, *Peter Plymley Letters*

POLYGYRA ALBOLABRIS (Say) 1

The common white-lipped snail is one of the largest found in Illinois, and shell specimens measuring $1\frac{1}{4}$ inches (27-33 mm.) in diameter are not uncommon. It is imperforate, of a uniform yellowish-horn color and has a spire that is dome shaped. The aperture is usually without denticulations, and the wide and rather heavy peristome forms a flattened expansion bordering the aperture. The shell of this species has $5\frac{1}{2}$ whorls.



The animal is variable in color, shading from cream on the body to gray, black or brown on the head.

This fine species of land snail is found in all parts of Illinois, although the localities are rather widely separated. In habitat the species seems to prefer forests of oak, hickory, elm and walnut where there is a forest debris of long accumulation.

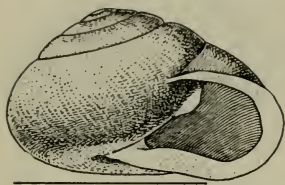
Polygyra albolabris albolabris (Say). In the shell of the typical variety, shown in the figure, the spire is high and the peristome is wide and flattened. The surface is dull. This variety is found mostly in the northern part of the state, north of Vermilion County. The white-lipped snail is subject to considerable variation from the typical, some of which appears to be coincident with geographic distribution. The variations are noted below.

Polygyra albolabris alleni (Wetherby). The spire of this variety is more depressed than that of the typical form, and the peristome is narrower and inclined to be rounded. The surface is shining, almost polished in some specimens. The lower part of the peristome has a prominent denticle or callus which is not so conspicuously developed in the typical form. This variety is confined to the southern part of Illinois and has not been seen north of Clark County.

Polygyra albolabris dentata (Tryon). This unimportant variety has a shell about an inch (27 mm.) in diameter. It is distinguished by having a small denticle on the parietal wall. The variety *dentata* is very rare in Illinois and has been recorded only from Cook County in the northern part of the state and from Williamson County in the southern part.

POLYGYRA ZALETA (Binney)

The common *Polygyra zaleta* greatly resembles the white-lipped snail, *Polygyra albolabris*, and particularly the variety *dentata*. Its horn-colored shell is much more globose than that of *albolabris*, which is wider than it is high. The species *zaleta*



has also a distinct, rather massive denticle on the parietal wall which is absent in *albolabris albolabris* and only very feebly developed in *albolabris dentata*. The shape of the shell and the parietal denticle separate the two species *zaleta* and *albolabris*.

The only variation among individuals of the species *zaleta* in Illinois is in the size of the shell, the extremes of which are less than 1 inch and more than 1½ inches (24 and 29 mm.). This variation, however, occurs in the same colony and is to be considered simply variation in different individuals.

The animal resembles that of *albolabris* in form. It is grayish-brown or blackish in general color, lighter near the foot and at the posterior end. The eye peduncles are long, slender and black. The animal is never so light colored as that of *albolabris*.

Polygyra zaleta is widely distributed over Illinois and, as with *Polygyra albolabris*, this distribution is very sporadic. It is most abundant in the eastern and southern parts of the state, where it lives in ravines of the smaller river tributaries as well as on the bluffs of the larger rivers. It prefers regions of oak, elm and hickory where there is much debris on the ground. Singularly, the species is not known in the Mississippi Valley north of Calhoun County.

This species was once named *Polygyra exoleta* Binney, as explained by William G. Binney. "When Dr. Binney (Dr. Amos Binney, father of William G. Binney) published the first description of this snail, in 1837, he adopted, without examination, the name *zaleta*, which he found applied to it in some cabinets, and which he then supposed had been applied by Mr. Say. Finding no description of it, he subsequently applied the name, *exoleta*, originally suggested, no doubt, by the idea that the species is an old, or superannuated form of *albolabris*."

✓ **POLYGYRA MULTILINEATA (Say)** •

Most specimens of *Polygyra multilineata* have dark brown bands on a horn-colored background. The field records indicate that *Polygyra multilineata* is more abundant in northern than in southern Illinois; nevertheless, some of the finest specimens have been collected near Cairo, Alexander County. This *Polygyra* is usually found along the edges of swamps, in low ground subject to overflow or in damp woods of oak, hickory, box elder, tamarack, maple or cottonwood.

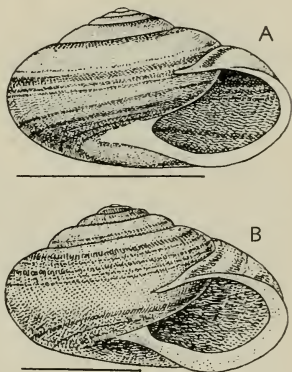
The animal is generally blackish, but with granules which are whitish; darker zones lie between the granules. The under part of the foot is black.

Several varieties of *multilineata* are known.

Polygyra multilineata multilineata (Say). Fig. A. The shell of the typical variety is about an inch (23-28 mm.) in diameter. The bands nearest the periphery are widest.

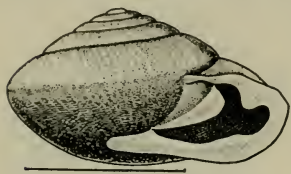
Polygyra multilineata algonquinensis Nason. Fig. B. The shell of this variety is a little more than one-half inch (16-18 mm.), slightly more than half as large as the usual size of *multilineata multilineata*. In some specimens the color bands are distinct and in others the shell is almost devoid of color ornamentation. The umbilical region is rather deeply impressed, and in many specimens there is a little slit or chink behind the reflected lip which forms a false umbilicus. The aperture of this variety is not so nearly round as that of the typical form. It is known in Illinois from McHenry, Kane and Cook counties. It was discovered near Algonquin, Illinois.

Polygyra multilineata alba and *rubra* Witter. These are color variations, shells of the first being whitish or yellowish and those of the second reddish or brownish; both are without color bands of any kind. Each has a shell about three-fourths inch (20 mm.) in diameter. The *rubra* form is common in Illinois, but the *alba* form is rare in this state.



POLYGYRA PALLIATA (Say)

The species *Polygyra palliata* is a rather large snail whose shell, when mature, usually attains a diameter of nearly an inch (21-22 mm.). The shell is of a uniform yellowish-brown color, and its surface is covered with short, stiff hairs. It has 5 whorls. The spire of *Polygyra palliata* is less elevated than is that of many other species of *Polygyra*, and the periphery, or outermost edge of the shell circle, is marked by a rather distinct ridge or carina.



The umbilicus is closed, and the peristome, which is widely reflected, has a distinct labial denticle and a smaller, less distinct peristomal denticle. A long, curved plait on the parietal wall extends backward to the callus, closing the umbilical region. The denticles in the aperture of *Polygyra palliata* are white.

The animal (see page 40) is of a uniform slate color over the upper surface and of a somewhat lighter color beneath. It appears to be much too large for the shell.

This snail, which is probably an emigrant from Indiana, where it is common in places, is very rare in Illinois. At present it has been reported from only White and Wabash counties, where it has been found in forests of oak and hickory along the floodplain of the Wabash River.

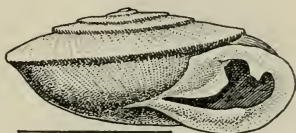
Dr. Henry A. Pilsbry raises the question as to whether *Polygyra palliata* is distinct from *Polygyra obstricta*. He writes, "While *P. palliata* occupies an area generally north of that of *P. obstricta* there is a broad belt of territory common to the two, in some parts of which intergradation takes place, or, in other words, remnants of a variable, undifferentiated, parent race still exist." It would be of interest if similar series of shells could be found in the overlapping area of distribution occupied by these two species.



Snails were used in love divinations; they were set to crawl on the hearth, and were thought to mark in the ashes the initials of the lover's name. On the subject of these divinations there is a most curious passage in the third Idyl of Theocritus.—W. CAREW HAZLITT, *Faiths and Folklore*

POLYGYRA OBSTRACTA (Say)

The brown shell of *Polygyra obstricta*, about an inch in diameter (20-22 mm.), differs from that of *Polygyra palliata* in having a flatter spire and a carina which is sharp and keellike at the periphery, as though pinched with the fingers. The surface of *obstricta*, unlike that of *palliata*, is not covered with hairlike processes of the epidermis. The denticulation in the aperture is about the same in both species.



Animals of these species are similar in color, size and shape.

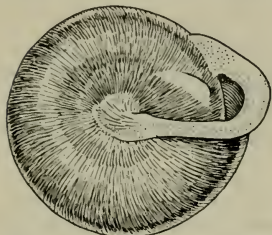
Polygyra obstricta is probably the rarest species of land snail in Illinois and is known only from the valley of Big Creek, in Clark County, a tributary of the Wabash River. The ravine in which it was collected is forested with oak, elm, hickory and some sycamore, and the ground is plentifully supplied with old logs and other forest debris. *Polygyra obstricta* is also rare in Indiana, its nearest locality in that state being Posey County.

Some years ago the late L. E. Daniels, a careful conchological student of Indiana Mollusca, collected a series of *Polygyra obstricta* which shows a remarkable relationship between *obstricta* and *palliata*, two species usually markedly distinct. These were submitted to Dr. Henry A. Pilsbry who commented on them as follows: "A series of 18 specimens from Grand Chain, Posey County, taken by Mr. Daniels in bottom land near the Wabash River, and in its floodplain shows a complete series of transitions from *palliata* to *obstricta*. These supposed species have been separated not only on account of the acute keel of *obstricta*, and its absence in *palliata*, but more because of the rough epidermis of the latter. This series, as far as I can see, shows intergradation in the development of the cuticular processes, as well as in the contour of the shell.

"A few of the specimens agree almost exactly with Say's type specimen of *palliata*, the periphery being moderately angular, the angle disappearing on the last third or fourth of the whorl; and the surface, besides having low, coarse striae, bears numerous cuticular asperities, as though a loose cuticle had been pinched up into many little points, and more or less wrinkled in consequence between them."

POLYGYRA APPRESSA (Say)

Usually about one-half to three-fourths inch (15-21 mm.) in diameter, the depressed, horn-colored shell of *Polygyra appressa* is almost twice as wide as high. The umbilicus is covered by a callus. The shell, which has 5 whorls, is marked by a well-developed plait or denticle on the parietal wall and a very small denticle on the peristome.

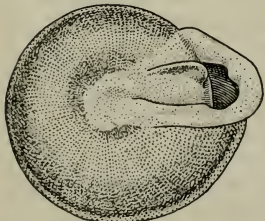


In the form of the aperture, *appressa* somewhat resembles three other species of *Polygyra* found in Illinois: these are *tridentata*, *palliat*a and *fosteri*.

Polygyra appressa is rare in the northern part of Illinois and has not been seen from the region north of La Salle and Will counties. It is most abundant in the southern part of the state on the bluffs in the Ohio, Wabash and Mississippi valleys.

POLYGYRA FOSTERI F. C. Baker

The horn-colored *Polygyra fosteri* shell, over one-half inch (15 mm.) in diameter, is characterized by a long, curved, rather heavy plait on the parietal wall and a relatively large labial denticle. These features very readily separate *fosteri* from *Polygyra appressa*, for in *appressa* the plait on the parietal wall is small, short and almost straight, and the peristome is marked by only a slight ridge on the lower part of the outer lip.

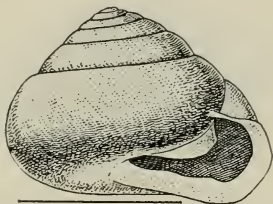


There are anatomical differences between the animals of *fosteri* and *appressa*.

Polygyra fosteri is the common *appressa*-like shell on the limestone bluffs of the Ohio and Mississippi rivers. It is interesting to note that the great naturalist Thomas Say distinguished this shell more than a hundred years ago (1821), calling it *var. a*. The name *Polygyra fosteri* was published in October, 1932, in the conchological monthly periodical, the *Nautilus*.

✓ POLYGYRA ELEVATA (Say)

This species of *Polygyra* has been called *elevata* because of the very high spire characteristic of its shell. This shell has 6 full whorls, a greater number than is found in many of the larger snails. Aside from the large yellowish spire standing up like a beehive, the most noticeable feature of *elevata* is the heavy, tonguelike denticle on the parietal wall. The shell has also a small indistinct swelling on the lower part of the peristome. The size of this shell has been found to vary considerably, from three-fourths inch to about an inch (19-25 mm.) in diameter, but all sizes may and do occur in the same colony.



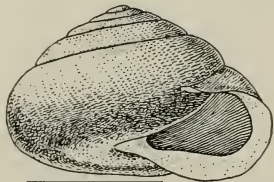
The animal is light brown on the upper surface and lighter on the sides and the posterior part.

This snail with the elevated shell is most abundant in ravines where there is a heavy growth of oak, maple, hickory or sycamore trees and a considerable cover of forest debris. It is very plentiful wherever it is found, but it is at present known in Illinois only from Fulton, Vermilion, Clark, Lawrence, Madison, Jackson and Alexander counties.

✓ POLYGYRA PENNSYLVANICA (Green) •

The yellowish shell of *Polygyra pennsylvanica*, about three-fourths inch (16-20 mm.) in diameter, appears to be almost a miniature example of the species *Polygyra elevata*. Both have a high spire and are imperforate, but *pennsylvanica* lacks the heavy denticle on the parietal wall and it has no denticles on the peristome.

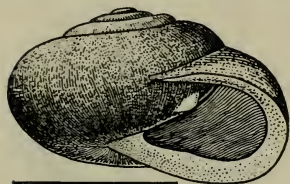
The animal is lead colored, with the under part of the foot a lighter color.



This species is widely distributed over Illinois and is found in the same habitats as *Polygyra elevata*: in ravines where there is a heavy growth of oak, maple, hickory or sycamore trees.

✓ POLYGYRA THYROIDUS (Say) ✓

A snail with a horn-colored shell, often about an inch (20-25 mm.) in diameter, *Polygyra thyroidus* may be recognized by the distinctly open umbilicus and the wide, flaring peristome.



The majority of specimens have a rather distinct denticle on the parietal wall, but this denticle is absent in many individuals. The characteristics noted will distinguish *thyroidus* from any other snail found in Illinois.

A notable feature of *thyroidus* is the great variation in size (15-30 mm.). This may occur in the same colony, or one colony may consist of large individuals and another of small specimens. The largest specimen collected in Illinois measures over $1\frac{1}{8}$ inches (29 mm.) and the smallest about five-eighths inch (16 mm.) Studies of Illinois *thyroidus* made by Dr. Thural Dale Foster indicate that the size variation occurs in all material examined, and also that the absence or presence of the parietal tooth is simply an individual variation which cannot be used in classification.

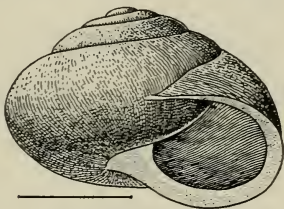
The animal is grayish or yellowish-white with eye peduncles darker in color. The underside of the foot is a dirty white.

This snail is found over most parts of Illinois but is apparently not common in the extreme northern portion. Its most favorable habitat is on the floodplains of the larger river valleys in woods of oak, elm, beech, hickory and willow. In these places there is usually an abundance of fallen timber rotting on the ground, and a large amount of debris which affords shelter for the snails. On humid days, the snails may often be seen crawling over the ground, over logs or even on standing trees several feet from the ground.

The name here used, *thyroidus*, is given the original spelling applied by Thomas Say in 1817 in the *Journal of the Philadelphia Academy of Natural Sciences*. Say later used the same spelling in his *American Conchology*. Subsequent authors have used the spelling *thyroides*, which is probably etymologically correct, but, since Say has used the original spelling in several places, later authorities have no right to introduce a different spelling.

POLYGYRA CLAUSA (Say)•

The snail *Polygyra clausa* is easily confused with small specimens of *Polygyra thyroidus*. However, *clausa* generally averages smaller than *thyroidus*, the shell of the former measuring about one-half to five-eighths of an inch (14-17 mm.) in diameter. The shell of *clausa*, which is yellowish, is comparatively higher than that of *thyroidus*. Furthermore, the umbilicus of *clausa* is much smaller than that of *thyroidus*; sometimes it appears as a mere slit behind the reflected peristome, which is comparatively narrow and somewhat rounded, not widely expanded and flat as in *thyroidus*; *clausa* never has a parietal denticle. These details separate the two species.



The animal of *Polygyra clausa* is generally blackish in color.

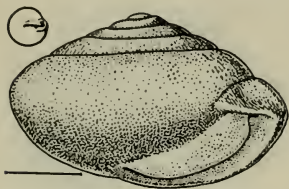
Polygyra clausa is widely distributed over Illinois, although usually not many individuals occur in a single colony. For the most part, it lives in river valleys, in forests of oak, elm and hickory. It has been collected from railway embankments and other parts of the rights-of-way where grass and small shrubs grow abundantly. Such places may be described as prairie habitats.

Thomas Say described this species as *Helix clausa* in 1821, in the *Journal of the Philadelphia Academy of Natural Sciences*, in which were published descriptions of many of the land and freshwater species which he discovered. It is interesting to know that the first specimens came from Illinois, and that Say gave this state as the type locality.

Polygyra clausa is found in many parts of the United States. Records are available indicating its presence from Minnesota southward to Kansas and Alabama and eastward to western Pennsylvania. Throughout this area it exhibits little variation and in this respect it appears to be one of the most distinct species of American land snails. In Alabama and other parts of the South it might be confused with the small form of *thyroidus*, known as *bucculenta*, but in that variation the shell is usually without an umbilical opening and the aperture is not rounded as in *clausa*.

POLYGYRA STENOTREMA (Ferussac)

Shells of the species *Polygyra stenotrema* and the species *Polygyra hirsuta* may be distinguished from all others in Illinois by a little notch on the base of the peristome and by a long,



curved plait located on the parietal wall. This fold in *stenotrema* is so large that it almost closes the aperture. The brownish shell of *stenotrema* is less than one-half inch (10 mm.) in diameter and much wider than high. It has 5 whorls. The upper end of the

heavy, curved parietal plait fits into a baylike cavity in the outer lip or peristome. The lower part of the peristome is thickened and has a small notch near the middle. The surface of the shell is covered with small hairlike projections from the epidermis. The large white lamella which completely hides the aperture when the shell is viewed from the front is its chief distinguishing character.

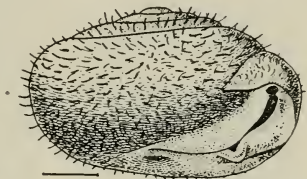
This is typically a southern species, which is abundantly distributed throughout Tennessee, Alabama and Georgia. The only lot from Illinois which has been examined by the author was collected by a survey party in an old quarry near Elizabethtown, Hardin County, on the Ohio River.

Polygyra stenotrema is abundant in the southern part of Indiana and is distributed up the Wabash Valley as far as Parke County. The Illinois specimens of Hardin County are evidently emigrants from Indiana. The species should be found in other places in Illinois along the Ohio and Wabash rivers, but diligent search during several seasons has failed to discover it in the localities examined.

In the *Classified Catalogue of American Land Shells* by Pilsbry and Johnson, published in 1897, *stenotrema* is listed as from Henry County, Illinois. This record is republished in *A Catalogue of the Mollusca of Illinois*. No specimens of *stenotrema* have recently been collected from Henry County, and none occurs in the Nason or Hinkley collections in the Natural History Museum of the University of Illinois. Because Henry County is rather far north for *stenotrema*, the record for this county should be viewed with suspicion.

POLYGYRA HIRSUTA (Say)

One of the smallest of this genus of snails, *Polygyra hirsuta* has a shell measuring but slightly more than one-fourth inch (7-9 mm.) in diameter. It differs from its relative, *Polygyra stenotrema*, in its smaller size, in its much smaller parietal plait, which does not seem to close the aperture when observed from the front view, and in the notch on the lower lip, which is larger and is not centrally placed as it is in *stenotrema*. The brown shell of *hirsuta*, also, is more nearly globular in shape and is much more hairy. The hirsute processes of the epidermis are placed in regular rows and stand out from the shell to a considerable distance. This regularity is seen only in fresh, unworn specimens, as the hairs are easily rubbed off. The umbilical region is more deeply indented in *hirsuta* than in *stenotrema*. The differences between these two closely related species are well shown by the figures in this volume.



The animal of *hirsuta* is whitish, with the head, eye peduncles and tentacles slate colored. The foot is semitransparent and is very narrow when extended.

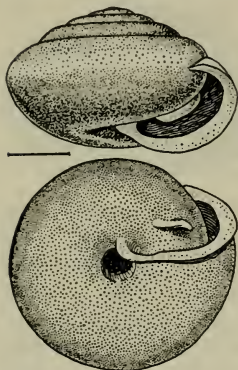
This is one of the commonest and most widely distributed snails in Illinois. Its usual habitat is in forests along river valleys where there is a growth of oak, hickory, elm, basswood and box elder trees. The snail is found under and in old logs, under forest debris and sometimes in the washed up brush and other material deposited by high water. It seems to prefer moist locations, but has been found in some places which are relatively dry.

The distribution of *hirsuta* includes both the United States and Canada. It may be found in Canada and Minnesota, south to Kansas and eastward to New York and Alabama.

Polygyra hirsuta was among the first species of land snails described by Thomas Say. Since the original description, published in 1817, is accurate and very minute, later authors have not improved upon it. Say had a peculiar insight into the details which separate one species from another, and his descriptions are models of accuracy in this respect.

POLYGYRA MONODON (Rackett)

The shell of the species *Polygyra monodon* is small. It rarely exceeds five-sixteenths inch (8 mm.) in diameter and it sometimes measures only a little more than one-fourth inch (7 mm.).



The dome-shaped spire of *monodon* has usually 6 closely coiled whorls. The base of the shell appears flattened when viewed from below, and a large round umbilical opening is distinctly present in this species. Just behind the peristome, which is white and rather thick, is a notable constriction of the body whorl. The parietal wall has a short well-marked plait, and the peristome has no denticles on it. The color of the shell is brown.

No other shell in Illinois could possibly be confused with a shell of *monodon*, excepting perhaps that of some specimens of *Polygyra inflecta edentata*, which is completely imperforate, whereas *monodon* is widely umbilicated.

The animal of *Polygyra monodon* is yellowish brown; darker on the head, eye peduncles and tentacles. The color varies in intensity.

This is one of the most abundant snails in Illinois and is found in all suitable localities throughout the state. It is more common in the northern than in the southern part of Illinois.

The habitat of *Polygyra monodon* is in lowlands, usually on the floodplains of rivers and creeks or the margins of lakes, in woodlands of oak, hickory, elm and willow. The animal is somewhat gregarious; usually six to a dozen specimens are found together under old logs and in forest debris.

The author of this species, T. Rackett, was an English zoologist who lived in the early part of the nineteenth century. He described this species as *Helix monodon* in 1822.



A wife, domestic, good and pure
Like snail, should keep within her door;
But not like snail with silver track,
Place all her wealth upon her back.

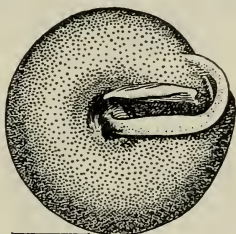
—WILLIAM WALSHAM HOW, *Good Wives*

POLYGYRA FRATERNA (Say)

The brown shell of *Polygyra fraterna* is usually larger than that of *Polygyra monodon*, and specimens almost one-half inch (11 mm.) in diameter are not uncommon.

An upland species, *Polygyra fraterna* inhabits forests of oak, elm, hickory and ironwood, on hillsides or on limestone cliffs.

Polygyra fraterna fraterna (Say). The typical *fraterna*, with a shell almost one-half inch (10 mm.) in diameter, differs from *Polygyra monodon* in having the umbilical region almost closed and rather deeply indented, and also in having a heavier and longer parietal plait, as shown in the figure. It is abundant on the bluffs of the Ohio and Mississippi rivers, where *monodon* is absent. In distribution, *fraterna fraterna* is more common in the southern than in the northern part of Illinois.



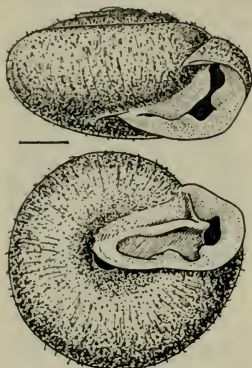
Polygyra fraterna cava Pilsbry & Vanatta. The shell of the variety *fraterna cava* is larger (11 mm.) than that of *Polygyra monodon* or *fraterna fraterna*. It is characterized by an indented umbilical region and by a distinct umbilical perforation which is not so wide nor so nearly round as that of *monodon*. The variety *fraterna cava* is rare in Illinois. It has been collected only from Jo Daviess, Carroll, Whiteside, McHenry, Menard and Clark counties. It is, therefore, a form of the northern and central parts of the state.

The changes of molluscan names and the shifts in their positions in classification are well shown by the history of the *monodon-fraterna* group of land snails. At one time the small form now known as *Polygyra monodon* was known as *Polygyra leai*. Dr. Henry A. Pilsbry indicated that this form was the same as Rackett's *monodon*, and that the larger form with the partly closed umbilicus was *fraterna*. For a long time *fraterna* was placed as a variety or race of *monodon*, but it is now considered a distinct species.

Like all other snails of wide distribution, for *monodon* and *fraterna* are found from northern United States to Texas, these species have developed several varieties or races, especially in the southern states.

POLYGYRA LEPORINA Gould

Sometimes known as *Lobosculum leporinum*, *Polygyra leporina* has a shell measuring about one-fourth inch (5-6 mm.) in diameter. It is easily recognized by its small size, small umbilicus, hirsute surface and two denticles on the peristome, which produce a U-shaped notch in the lower part of the lip. The brownish shell has a long, slightly curved plait on the parietal wall. The hirsute surface may be seen only in unworn specimens.



The only Illinois snail that might be confused with this species is *Polygyra hirsuta*, but *hirsuta* lacks the two denticles on the peristome and it has a parietal plait that is different.

Polygyra leporina is found in Illinois only in the southern half and, with

the exception of one record from Clark County, it has been found only in the counties of Randolph, Perry, Jackson, Union, Saline and Hardin.

Kentucky, Tennessee, Missouri, Oklahoma and Texas are other states in which *leporina* is found.

This snail occurs in woodlands of oak, hickory, elm, ironwood and hawthorn, usually about midway between top and base of hills. It may be found under debris, on flat-topped rocks under limestone outcrops and among leaves. In Clark County it has been found in the bottom lands of the Wabash River; in Randolph County on the Mississippi bluff near Chester, the only locality in which it has been observed in the valleys of the great Illinois river systems. This species appears to be a migrant from Kentucky or Missouri, in both of which states it is abundant.

The genus *Lobosculum* was instituted in 1930 by Dr. Henry A. Pilsbry to contain certain small *Polygyra*-like snails which differ from the true *Polygyra* in details of anatomy. The species previously known as *Polygyra pustula* (Ferussac) was made the type of the new genus *Lobosculum*. The snail described here is the only Illinois species which may possibly be referable to this new genus.

Family BULIMULIDAE

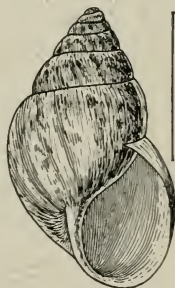
Snails of the family Bulimulidae have elongated shells which measure from one-half inch to 5 inches (12-130 mm.) in length. Because this family as it is distributed in many parts of the world is predominantly semitropical or tropical it is sparsely represented in temperate climates. In Arizona and Texas several species having shells an inch to an inch and a half in length are found. The one species found in Illinois has a shell that is smaller than the shells of many of the southern species.

Genus BULIMULUS Leach

Only one genus of the family Bulimulidae is known to occur in Illinois. And of this genus, *Bulimulus*, only one species is recorded from this state.

BULIMULUS DEALBATUS (Say)

The ovate shell of *Bulimulus dealbatus* is less than an inch (19-22 mm.) in length. The spire is elongated, the 6 whorls are rounded and the sutures are deeply indented. The body whorl is very large and relatively ventricose. A large ovate aperture with no denticles of any kind occupies nearly half the length of the shell, and the inner lip or parietal wall forms a flattened expansion which projects over the deep, distinct umbilicus. The shell is white, blotched with ashy streaks and spots, and its walls are relatively thin.

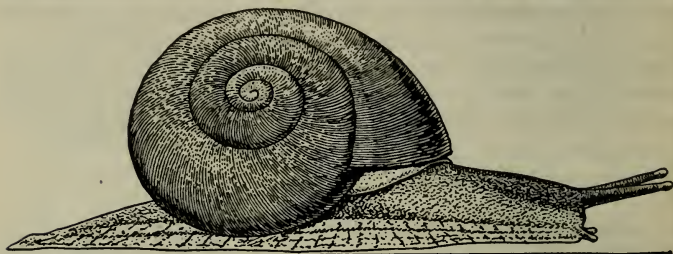


This snail is a new member of the recorded fauna of Illinois. No specimens were known from the state until about 1925. The top of the south end of a Mississippi River elevation known as Fountain Bluff, in Jackson County, is the only known locality in the state where this snail lives. Probably this species is a migrant to Illinois from Missouri, a state in which *Bulimulus dealbatus* is abundant.

Bulimulus dealbatus is a common snail in the southern states, its known distribution being from South Carolina and Alabama west to Oklahoma and Texas.

Family ZONITIDAE

To the family Zonitidae belong several species of snails having yellowish, horn-colored or hyaline shells with a glassy or shining surface. They vary in size from less than one-sixteenth



inch to 1 inch (1.5-26.0 mm.) in diameter. The peristome of the aperture is always simple and sharp, never reflected as is that of the Polygyridae. The surface sculpture is nearly always fine and seldom appears as riblets.

The shell at times completely covers the large animal, which, however, is well extended from its horny covering when in locomotion. The body and foot of the animal are about twice as long as the diameter of the shell. The eye peduncles are long and slender, the tentacles short. The figure illustrates the animal and shell of *Mesomphix cupreus*, a species of this family.

The Nearctic Zonitidae north of Mexico number approximately 135 species and races divided among about 15 genera. Of these, 20 species and varieties, divided among 8 genera, occur in Illinois. Most of the species are restricted to North America but several, among which are *Euconulus fulvus* and *Zonitoides nitidus*, are found on three continents.

Perhaps no group of American land snails has changed so much in nomenclature during the past 15 years as have the Zonitidae. The student of a decade or more ago would scarcely know the species under the generic names now accepted. These changes have been made necessary by the anatomical studies of such zoologists as Dr. H. A. Pilsbry and Dr. H. B. Baker.

These somewhat drastic changes in familiar names of old and well-known species are deplored by some teachers, but the advancement of scientific knowledge has made them necessary. In many cases the changes have been necessary because of errors

made by previous conchologists. It may be more convenient for some people to use the old names but, since such use would be incorrect at the present time, it is much better to become familiar with the new names and to use them.

Key to Genera

1. Shell $\frac{1}{2}$ inch or more in diameter.....2
 Shell $\frac{1}{4}$ inch or less in diameter.....3
2. Body whorl increasing greatly in diameter, p. 66; aperture round, without callus on base.....*Mesomphix*, p. 65
 Body whorl not greatly increasing in diameter; aperture lunate, with yellowish callus at base.....*Ventridens*, p. 81•
3. Shell about $\frac{1}{4}$ inch in diameter.....4
 Shell less than $\frac{1}{8}$ inch in diameter.....6
4. Body whorl greatly enlarged toward aperture...*Retinella*, p. 69•
 Body whorl not enlarged toward aperture; whorls evenly coiled, p. 79.....5
5. Shell with 4 whorls; base rounded.....*Zonitoides*, p. 78
 Shell with 6 whorls; base flattened.....*Paravitrea*, p. 73
6. Spire elevated, dome shaped; diameter equal to or less than height; whorls 6; aperture not extending beyond contour of whorls.....*Euconulus*, p. 75
 Spire flattened; diameter greater than height; whorls 4; aperture extending well beyond contour of whorls, p. 72...7
7. All whorls increasing regularly in size, last or body whorl not expanding toward aperture; umbilicus deep and round ..
*Hawaiiia*, p. 72
 All whorls increasing rapidly in diameter, last whorl notably expanding toward aperture; umbilicus shallow and oval, whorls loosely coiled around it.....*Striatura*, p. 77

Genus MESOMPHIX Rafinesque

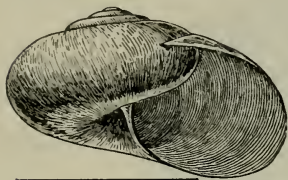
This genus includes the species of the family Zonitidae having the largest shells. In this genus, the aperture as well as the shell itself is relatively large.

Key to Species

1. Base of shell smooth and shining, greenish or yellowish colored; upper surface ribbed and brown.....
*perlaevis vulgatus*, p. 68
 Surface of shell uniform in texture and color above and below...2
2. Aperture round; interior of aperture violet or purplish.....
*friabilis*, p. 67
 Aperture obliquely ovate; interior of aperture pearly.....
*cupreus*, p. 66

MESOMPHIX CUPREUS (Rafinesque)

The copper-colored shell of the snail *Mesomphix cupreus* attains a diameter of about an inch (24 mm.). In specimens from Illinois the height of the shell is approximately two-thirds of the diameter. The depressed although somewhat dome-shaped spire has $4\frac{1}{2}$ whorls. Of these the outermost, or the body whorl, is widely expanded transversely. The base of the shell is rounded and has a deep, though not wide, umbilicus. The transversely elliptical aperture, pearly within, has an indistinct bluish-white callus near the edge of the lip. The lustrous shell is of a rich copper or yellow color with shades of green and brown.



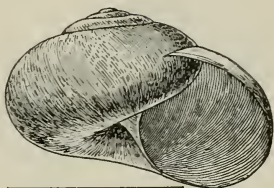
The animal is black or blue-black in color; the head, neck and eye peduncles are darker than the rest of the body. The base of the foot is whitish. The eye peduncles, which are rather short as compared with the length of the body, are set wide apart.

This snail, once known as *Zonites fuliginosa* and *Omphalina cuprea*, is abundant in southern Illinois, ranging as far north as Calhoun and Moultrie counties. It is common to abundant along the river valleys, particularly on the limestone bluffs of the Mississippi River. Its most favorable habitat is in forests of oak, elm, hickory, walnut and ironwood in which there is often a sprinkling of pine. Such situations afford a good cover of logs and general forest debris, where snails of the species *cupreus* may find concealment.

Specimens of Illinois *Mesomphix cupreus* differ from those that occur in Kentucky, Tennessee, Indiana and Ohio in being more globose. The spire of the Kentucky specimens is relatively flat, and the diameter of the shell is almost twice the height. The Illinois shells more nearly resemble the form found in Missouri, Arkansas and Oklahoma. In the Illinois shells the bluish-white callus found just within the lip is not so distinctly marked as in the Kentucky and Tennessee specimens. *Mesomphix cupreus* reaches its greatest development in Tennessee, in the Great Smoky Mountain region, where also occur several varieties or races of *cupreus* which are absent from the Illinois fauna.

MESOMPHIX FRIABILIS (W. G. Binney)

So closely related to *Mesomphix cupreus* is *Mesomphix friabilis* that the collector may have difficulty in telling the two apart. However, shells of the two species, each almost 1 inch (24 mm.) in diameter, may be distinguished by certain general characteristics. In *friabilis* the shell is thinner and more brittle than in *cupreus*. The spire of *friabilis* is higher, the height of the shell usually being more than two-thirds and sometimes as much as five-sixths its diameter. In *friabilis*, the aperture is large and round, rather than expanded transversely, and the umbilicus is smaller than that in *cupreus*. A feature which will usually separate the two species as found in Illinois is that in *friabilis* the apical or nuclear whorls are hyaline and not eroded, while in *cupreus* these whorls have the cuticle removed. The color of the *friabilis* shell is smoky horn with reddish tones near the aperture. The interior of the aperture is violet or purplish. Altogether, this is a handsome shell.



Mesomphix friabilis lives in moist localities. It is a rare species in Illinois, and only three places are at present known where it has been found. These locations are on the Wabash River near Mount Carmel in Wabash County, near Athens in Menard County and south of Marion in Williamson County.

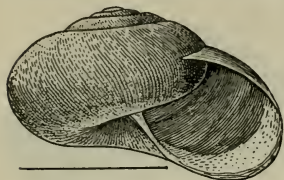
The animal, which is a bluish-slate color, resembles that of *Mesomphix cupreus* in form.

William G. Binney, writing in 1885 of the snails of North America, remarked upon the presence of *friabilis* in southern Illinois. "The species belongs to the Interior Regions, but reaches its greatest development in the vicinity of Wabash County, Illinois. I have also received it from Indiana, from the northern and northeastern counties of Kentucky, and from Franklin County, Tennessee."

Though rare in most parts of Illinois, *friabilis* is abundant in southern Indiana. The finest specimens of this very delicate shell have been collected in Indiana from the cypress swamps in Knox County and from localities in Gibson County, where the shells attain a full inch in diameter.

MESOMPHIX PERLAEVIS VULGATUS H. B. Baker

The shell of *Mesomphix perlaevis vulgatus* is likely to be confused with shells of *Mesomphix cupreus* and *Mesomphix friabilis*. It differs from them in the following particulars. The



shell is smaller and measures less than an inch (20 mm.) in diameter; the body whorl is of relatively less height; and the aperture, considerably wider than high, is more transversely elliptical than those of *cupreus* or *friabilis*. The base is smooth and shining; the upper sur-

face is very finely ribstriate; the umbilicus is almost closed. This shell, of a satin-finish luster, is brown above and greenish or yellowish below. A wide white callus borders the edge of the lip. *Mesomphix perlaevis perlaevis* is not found in Illinois.

The body and foot of the animal are pearly white; the head and eye peduncles are dark blue.

The variety *Mesomphix perlaevis vulgatus* is common to abundant in the hill region of southern Illinois and on the bluffs of the Ohio River. It prefers forests of oak, elm and hickory, with bushes of hawthorn, hazel, gooseberry and sassafras, and vines such as Virginia creeper and poison ivy. It is found under logs and among forest debris. In some of the smaller valleys it can be found under large blocks of stone in gullies, where it has sought concealment and moisture. It is at present known in Illinois only from the counties of Saline, Gallatin, Pope and Hardin.

This species was long known under the name *Zonites laevigata*, a figure of which was published in Ferussac's *Natural History of Mollusks*. Special inquiries carried on by Dr. H. B. Baker revealed the fact that Ferussac had never described this shell, but had mistakenly attributed the authorship of the name to the eccentric French naturalist Rafinesque. *Zonites laevigata* thus becomes what is known as a nude name, not described by anyone. Dr. H. B. Baker in 1933 applied this name to a race of the species *perlaevis*. A complete revision of the shells formerly classified under the name *laevigata* has been made by Dr. H. B. Baker in his *Check List of Nearctic Zonitidae*, published in 1933.

Genus RETINELLA (Shuttleworth) Fischer

Snails of the genus *Retinella* have small hyaline shells. In none of the species of *Retinella* does the shell greatly exceed one-fourth inch (6.5 mm.) in diameter. The shells of these snails are glassy and shining; after the animal has been removed, they appear almost as though varnished. They appear black when the animal is present. They range from light brown to creamy white in tint, the color differences pertaining to individual shells rather than to all the members of a species.

Snails of the genus *Retinella* usually live in woodlands of oak, hickory, maple and elm. Some species are solitary in habit, but the majority live in colonies, and usually a number of specimens may be collected from one piece of rotting timber.

The four species of *Retinella* occurring in Illinois may be known from all of the other small species of zonitoids by the presence of regular, radiating impressed lines extending from the suture to the base of the body whorl. The impressed lines are parallel with the growth lines, but are evenly spaced, with growth lines between.

The animal of *Retinella* is bluish or blackish in color.

Key to Species

1. Base of shell flattened; umbilical region indented and having a very small perforation.....*indentata*, p. 71
Base of shell not flattened; distinct umbilical opening, p. 70.. 2
2. Umbilical opening elliptical.....*wheatleyi*, p. 70
Umbilical opening round, p. 70, fig. C..... 3
3. Shell with impressed radiating lines widely and regularly spaced.....*rhoadsi*, p. 70
Shell with impressed radiating lines close together.....
.....*electrina*, p. 69

RETINELLA ELECTRINA (Gould)

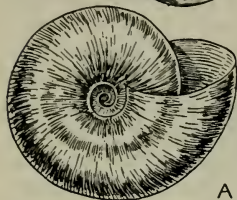
The shell of *Retinella electrina*, less than one-fourth inch in diameter (5 mm.), is over twice as broad as high. Yellowish in color, it has a shining, glassy surface, upon which the radiating impressed lines occur rather close together. The shell has 4 whorls, a rounded base and a round, wide and deep umbilicus, fig. A, page 70.

Retinella electrina, also known as *Vitrea hammonis* and

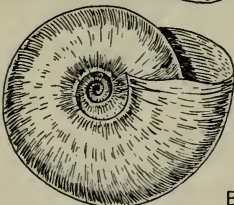
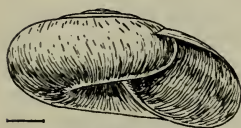


Vitrea viridulus, is common under logs and loose bark in some of the large Illinois river valleys and their adjoining ravines. The distribution is sporadic.

RETINELLA WHEATLEYI (Bland)



A

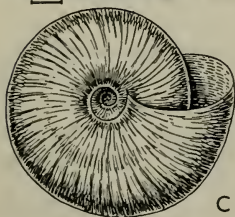


B

The yellowish, glassy shell of *Retinella wheatleyi*, fig. B, less than one-fourth inch (5 mm.) in diameter, is wider than that of *Retinella electrina* in proportion to its height and has a more depressed spire, a flatter base and a wider umbilicus. The umbilicus is peculiarly expanded, causing it to be elliptical, in contrast to the round umbilicus in *electrina*.

The species *wheatleyi* is found in much the same habitats as *electrina*; rarely in woodlands bordering agricultural lands. In Illinois it appears to be confined to the southern half.

RETINELLA RHOADSI (Pilsbry)



C

The yellowish shell of *Retinella rhoadsi*, fig. C, less than one-fourth inch (4 mm.) in diameter, may be known from that of *Retinella electrina*, which it resembles, by the fact that its impressed, radiating lines, which are especially well developed on the upper surface, are widely and regularly spaced, resembling those of the shell of *Retinella indentata*.

In Illinois, *rhoadsi* is known only from the south end of Fountain Bluff in Jackson County.

RETINELLA INDENTATA (Say)

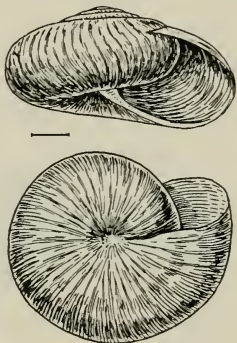
The small, yellowish, glassy shell of *Retinella indentata* measures about one-fourth inch (5 mm.) in diameter and is only about half as high as wide. The impressed radiating lines are equally spaced and widely separated. The base is flattened, and the umbilical region, which is markedly indented, has only a very small chink or perforation. No other shell in Illinois has this peculiarly indented and almost imperforate base.

The animal is blue-black, and has lighter shades of coloring on the margin and posterior extremity.

This snail, which was first observed by Thomas Say more than a hundred years ago, is one of the most abundant Illinois species. It may be found living in almost every county in the state. It is found in the river valleys, in wooded areas and in former prairie lands, associated with *Retinella electrina*, *Zonitoides arboreus* and other small snails. Its most favorable habitat, like that of so many other small snails of the state, is in woodlands of oak, elm, maple and hickory. It may be found under loose bark, woodland debris and fallen limbs of trees.

Retinella indentata is widely distributed throughout the United States and parts of Canada and Mexico. Its range as known at present is from Ontario, Canada, southwest to lower California and central Mexico, and from the Dakotas eastward to the Atlantic states. Throughout this wide area it exhibits little variation. Only one race besides the typical is known in this area, and that is confined to the southern United States and Mexico.

A closely allied species, *Retinella cryptomphala*, is common in Tennessee and Alabama but has not surely been detected in Illinois, since specimens reported as *cryptomphala*, collected at Albion, Edwards County, proved upon close examination to be a variation of the common *indentata*. This Illinois locality is far removed from the usual localities in which *cryptomphala* lives, and the record appears to be erroneous.

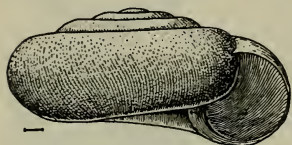


Genus HAWAIIA Gude

Only one species of the genus *Hawaiiia* is found in Illinois. The small size, peculiar umbilicus and silky appearance of the shell distinguish this genus.

HAWAIIA MINUSCULA (Binney)

A little snail, *Hawaiiia minuscula* has a shell less than one-eighth inch (2.5 mm.) in diameter. Each of the 4 tightly coiled whorls is separated from the next by a distinct suture. The spire is depressed and the base flattened. The whitish, hyaline surface is marked by many closely set lines of growth that give the shell a silky appearance. A large, round



umbilicus at the base shows all of the whorls clear to the apex.

The small size and the peculiar umbilicus separate this shell from all others found in Illinois, except that of *Helicodiscus singleyanus inermis*, the surface of which is not silky, but smooth like paraffin, and the umbilicus of which, although resembling that of *Hawaiiia minuscula*, is not so deep.

Long known as *Zonitoides minusculus*, *Hawaiiia minuscula* is abundantly though sporadically distributed throughout Illinois. It has doubtless been overlooked by many collectors on account of its small size. Its most common habitat is in woodlands of oak, hickory and sycamore.

The name *Hawaiiia kawaiensis* was first given to a small zonitoid snail living in the Island of Kauai of the Hawaiian group, by the English conchologist, G. K. Gude, in 1911. This snail previously had been named *Helix kawaiensis* by the German conchologist, L. Pfeiffer, in 1854. Suspecting that the Hawaiian snail might be an American form, Dr. H. B. Baker dissected the animal and found its anatomy to agree essentially with that of Michigan specimens of *Helix minuscula*.

It appears, therefore, that the Hawaiian snail *kawaiensis* was described from specimens of the American *minuscula* which had been introduced into the Island of Kauai. Thus, the generic name *Hawaiiia*, first bestowed upon a snail in far off Hawaii, becomes the name of a common snail of Illinois.

Genus PARAVITREA Pilsbry

In Illinois occur two species of the genus *Paravitrea* which might at first sight be taken for variations of one of the *Retinella* snails, especially *electrina*, *wheatleyi* or *rhoadsi*. Three distinct differences separate the *Paravitrea* snails from any of the *Retinella* group. The shells of *Paravitrea* have 6 whorls (*Retinella*, 4); the whorls are very tightly coiled (in *Retinella*, loosely coiled); and the small, round and deep umbilicus is placed exactly in the center of the base of the shell (*Retinella* has the umbilicus somewhat off center because the last whorl is expanded).

The genus *Paravitrea* is a group new to Illinois collectors, neither of the two species represented appearing in *A Catalogue of the Mollusca of Illinois*. The genus includes 18 species and races, mostly southern in distribution. Central Illinois appears to be the northern extension for the genus except for one peculiar form, *Paravitrea multidentata*, named by William G. Binney, which extends its range as far north as the states of Maine and Michigan.

Key to Species

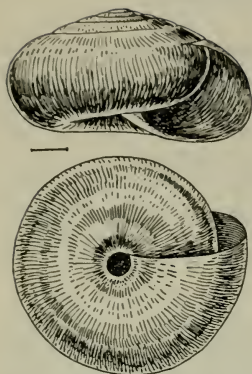
- Aperture obliquely ovate.....*significans*, p. 74
 Aperture horizontally ovate.....*capsella*, p. 73

PARAVITREA CAPSELLA (Gould)

The pellucid amber shell of the snail *Paravitrea capsella* is less than one-fourth inch (5 mm.) in diameter. The height is one-half the diameter. The 6 whorls are very tightly coiled, the spire is flattened and the surface is marked with distinct, spaced, radiating and impressed lines. The aperture is regularly lunate, and the deep umbilicus is placed in the center of the round base.

The animal is blackish in color.

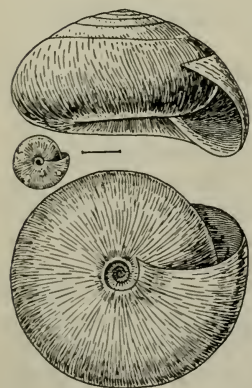
This zonitoid, formerly known as *Vitrea capsella*, in Illinois is confined largely to the southern half of the state, its northernmost record being Vermilion County. It may be found under loose bark, on the underside of fallen branches and, rarely, under leaves in woodlands of oak, hickory, elm and pine. As a rule only a few specimens of *Paravitrea capsella* are found in one locality.



Pleistocene deposits of early Wisconsin age in Stony Creek, near Muncie, Vermilion County, Illinois.

PARAVITREA SIGNIFICANS (Bland)

The shell of *Paravitrea significans* is similar in size, color and general appearance to that of *Paravitrea capsella*, measuring less than one-fourth inch (5 mm.) in diameter. It may be distinguished from the *capsella* shell by its peculiarly flattened and concave base, and the position of the periphery of the body whorl, which is placed well below the middle of the whorl, causing the aperture to be strikingly diagonal to the vertical plane of the shell. In *significans* the spire is somewhat higher than in *capsella*. In these two species half-grown shells are more difficult to distinguish than are mature shells. Young shells of *significans* usually have one or two pairs of small denticles which show through the shell as white spots, illustrated in the small figure.



More common than *capsella*, but with similar habitats, *significans* also is confined, in Illinois, to the state's southern half.

Genus EUCONULUS Reinhardt

The genus *Euconulus* is distinguished by small, glassy, yellowish-white, beehive-shaped shells, none of which much exceeds one-eighth inch (3-4 mm.) in diameter. The height of the shell is usually over three-fourths the diameter. The base of the body whorl is convex. The upper surfaces of the whorls are well rounded, and the sutures are deeply indented. The umbilical opening is small. The edge of the outer lip is thin.

The animal is bluish black on the head and upper part of the body, which shades to a lighter color on the sides and base. The foot is very narrow and elongated.

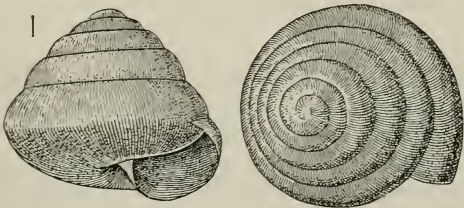
The *Euconulus* snails, most abundant in floodplain areas bordering streams, live under loose bark and on decayed logs in forests of oak, elm, hickory and persimmon. Only rarely are more than two snails found in one spot.

Key to Species

- Shell with 6 to 6½ whorls; body whorl rounded. . . . *chersinus*, p. 76
- Shell with 5 whorls; body whorl angular. *fulvus*, p. 75

EUCONULUS FULVUS (Müller)

The small, yellowish-white shell of *Euconulus fulvus* measures about one-eighth inch (3 mm.) in height and slightly more (4 mm.) in diameter. The whorls, 5 in number, are rounded on



the spire, but slightly angulated at the periphery on the body whorl, the angle usually disappearing at the end of the first half turn of the whorl. The whorls are wider than those in *Euconulus chersinus*, and the aperture is elliptical. Occasionally specimens are found in which the carination of the body whorl is rather sharp and is continued to the aperture.

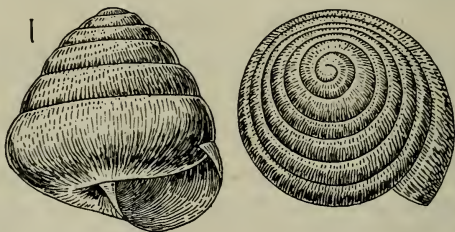
The species is found widely scattered throughout Illinois.

EUCONULUS CHERSINUS (Say)

The glassy, yellowish-white shell of *Euconulus chersinus* has at least one more whorl, 6-6½, than that of *Euconulus fulvus*, and the whorls are more closely coiled. The body whorl of the mature shell is usually rounded and not angulate as in *fulvus*. However, all immature shells of the genus are distinctly angulate on the periphery.

Euconulus chersinus, especially the typical form, is abundant in hilly regions bordering the large Illinois rivers. Occasionally it is found in isolated woodlands containing oak, cherry, hickory or ironwood. Of the two species, *fulvus* and *chersinus*, the latter is the more abundant and more generally distributed throughout Illinois.

Euconulus chersinus chersinus (Say). The height of the typical *chersinus* shell, shown in the figures below, is as great



as or greater than the diameter; each dimension is about one-eighth inch (2.8-3.0 mm.). The spire is higher than that of *fulvus*.

Euconulus chersinus polygyratus (Pilsbry). Although the shell of this race is about the same size as that of the typical form and has the same number of whorls, the spire is less elevated, because the whorls are narrower and more tightly coiled. In *chersinus polygyratus*, the periphery is higher on the body whorl, causing the aperture to be narrower and higher than in *chersinus chersinus*.



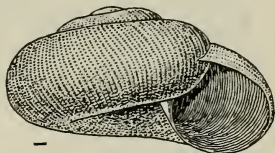
Known records indicate that *chersinus polygyratus* in Illinois is confined to the northern part, Cook and Henry counties being probably the southern limit.

Genus STRIATURA Morse

Five species and races of *Striatura* are found in the United States. The one species and one race occurring in Illinois are characterized by their small size and by the surface sculpture of raised folds or ribs.

STRIATURA MILIUM (Morse)

One of the smallest species of land snails found in the state, *Striatura milium* has a greenish-white shell measuring less than one-sixteenth inch (1.5 mm.) in diameter. It may be recognized by its diminutive form, its widely open umbilicus and the sculpture of the 3 whorls, which consists of many raised folds or ribs that at times run together. In the upper surface of these folds, fine impressed lines cross the vertical ribs in such a manner as to form a reticulated surface sculpture.



Striatura milium milium (Morse). In the typical variety, shown in the figure, the apical or nuclear whorls are smooth or only faintly lined. The spiral lines on the lower whorl are faintly developed.

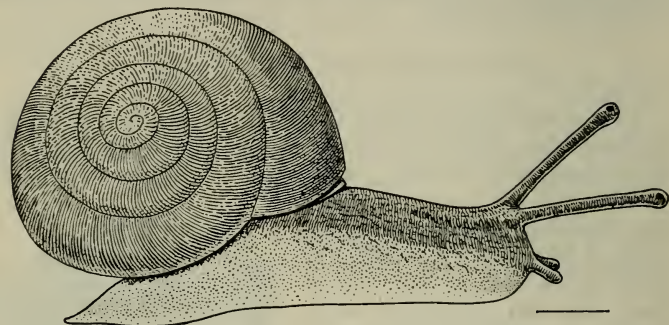
This variety lives in woodlands in old decaying wood. The only Illinois locality from which it has been recorded is in McHenry County.

Striatura milium meridionalis (Pilsbry & Ferriss). The variety *Striatura milium meridionalis*, found in the southern part of Illinois, differs from the northern form in certain constant variations. It is a trifle larger. Strong, incised spiral lines mark the apical or nuclear whorl. The spiral lines are distinct in the base of the shell and are conspicuous in the widely open umbilicus. The oblique wrinkles or ribs are also much coarser in *meridionalis* than in the typical shell. This sculpture can be seen only with the aid of a good hand lens magnifying 12 to 15 diameters, or with a microscope.

The form *meridionalis*, noted in Washington and Monroe counties, appears to be the dominant variety of *milium* in southern Illinois. It is probably an example of a migrant from the south, since *meridionalis* is common there.

Genus ZONITOIDES Lehmann

The shells of *Zonitoides*, about the size of those of *Retinella* and *Paravitrea*, do not have the latter's tightly coiled whorls, nor the former's spaced, impressed lines on the body whorl



which extend from the suture to the base. All species of *Zonitoides* have depressed, shining shells, strikingly umbilicated. The lines of growth are visible to the human eye only when aided by a simple lens. Fine microscopic spiral lines are also present in some species, but a powerful magnifying glass is needed to find them. The figure shows the shell and animal of *Zonitoides arboreus*, which is one of the most common of the land snails found in the state of Illinois.

Key to Species

1. Umbilicus wide and shallow; surface of shell sculptured....
limatulus, p. 80
- Umbilicus deep and narrow, p. 79; surface of shell smooth and shining.....2
2. Aperture round, p. 80; umbilical opening one-fifth diameter of shell; diameter of shell about $\frac{1}{4}$ inch (6.0-7.5 mm.)....
nitidus, p. 79
- Aperture ovate, p. 79; umbilical opening one-sixth diameter of shell; diameter of shell less than $\frac{1}{4}$ inch (5.0 mm.).....*arboreus*, p. 78

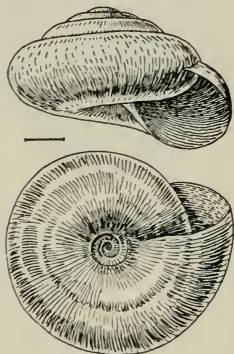
ZONITOIDES ARBOREUS (Say)

The snail *Zonitoides arboreus* is smaller than *Zonitoides nitidus*, but is in many other respects similar to it. The yellow-

ish horn-colored shell of *arboreus* measures less than one-fourth inch (5 mm.) in diameter. The spire is more depressed, the umbilicus is smaller and the base of the shell flatter than in *nitidus*. These three points will usually separate the two species.

The animal of *arboreus* is black or bluish on the head and upper parts of the body. The posterior part is whitish and somewhat transparent. The foot is narrow.

Among the most abundant of the land snails found in Illinois, *arboreus* is distributed throughout the entire state. There is scarcely a county from which this species has not been reported. Its habitat is varied. It is found in deep woods, in isolated woodlands, on bluffs and the banks of streams, among shrubbery and even in the hot environment of railway embankments. It lives under loose bark, under fallen timber of all sorts, in grass and under rock piles. It is our commonest snail, invading the farm woodlot, the village or city yard and the small fruit and truck garden. In several places outside Illinois, *arboreus* has become an enemy to agriculture by feeding on tender vegetation, or by damaging the root ends as it does in Louisiana sugar cane plantations.

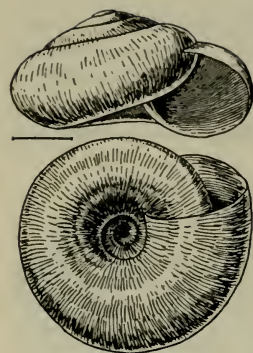


ZONITOIDES NITIDUS (Müller)

The shell of *Zonitoides nitidus* is about one-fourth inch (6.0-7.5 mm.) in diameter. The spire is only slightly elevated, the 5 whorls rising to about half the height of the diameter. The shining and somewhat polished surface of the shell is yellowish in color. Conspicuous surface sculpture, such as is found in the shell of *limatulus*, is absent in that of *nitidus*, which is marked only with fine lines of growth. The rounded base of the *nitidus* shell has a large, deep umbilicus in the center.

The animal resembles that of *Zonitoides arboreus*.

In Illinois *Zonitoides nitidus* lives in decaying logs and under forest debris on floodplains of streams. It shows a preference for muddy places. Trees usually characteristic of its habitat are elm, oak, maple or hickory. The species is known at present

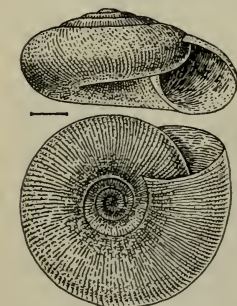


from only the northern part of the state, Will County and north.

A common species rather widely distributed in Europe, Asia and in North America, *Zonitoides nitidus* is thought to have been introduced artificially into the United States, but its wide distribution might suggest that it is a circumboreal species like very many of our other North American land snails. It ranges in North America from New England westward to the state of Washington, and from the northern part of Canada southward to Pennsylvania and Ohio. A record from Baldwin County, Alabama, is founded probably upon specimens artificially introduced on plants.

ZONITOIDES LIMATULUS ("Ward" Binney)

The rather rare snail *Zonitoides limatulus* has a greenish-white shell about one-fourth inch (5 mm.) in diameter and usually of $4\frac{1}{2}$ whorls. The spire is depressed, the height of the shell being less than half the diameter. The flattened base of the shell has a very wide and shallow umbilicus.



The sculpture of the whorls consists of conspicuous parallel lines of growth which appear much like thread wound upon a spool. These lines are much coarser on the spire than on the base of the shell. This species is easily identified by its color, by its very wide umbilicus, which shows all of the whorls, and by its peculiar, threadlike sculpture.

This species is known at present only from Clark, Washington and Hamilton counties, all in the central or southern parts of the state. In Clark County, *Zonitoides limatulus* has been found living under logs in a rocky ravine, in a forest of oak, hickory, elm and sycamore.

Genus VENTRIDENS W. G. Binney & Bland

Members of the genus *Ventridens* are like large specimens of *Euconulus*. Shells of *Ventridens* have a dome-shaped spire, a body whorl with a rounded base and a very small umbilical perforation. They have 6 or 7 closely coiled whorls which are sculptured with fine growth lines arranged in the form of flattened ribs. These lines disappear on the base of the shell.

Two species of *Ventridens* have been found in Illinois. In the older books on the Mollusca these species are arranged under *Zonites* and *Gastrodonta*.

Key to Species

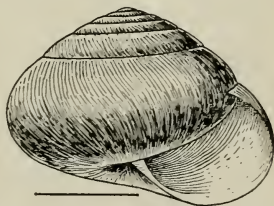
- Aperture a half circle; spire elevated; color yellowish . . . *ligerus*, p. 81
 Aperture crescent shaped; spire depressed; color whitish
 *demissus*, p. 82

VENTRIDENS LIGERUS (Say)

The yellowish horn-colored shell of the snail *Ventridens ligerus* is a little over one-half inch (13-15 mm.) in diameter. Its height equals three-fourths to five-sixths the diameter. On the base of the shell, near the aperture, *ligerus* has a bright yellow callus.

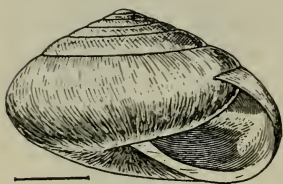
The animal is of uniform dark slate color on the upper surface, somewhat paler on the posterior part and on the sides of the foot. It has long, pointed eye peduncles.

Ventridens ligerus is found over much of Illinois, but is more abundant in the southern than in the northern half. It is particularly abundant in the hill and bluff region of the extreme southern part of the state. It lives in a variety of habitats and appears equally at home in the ravines of small streams, on the bluffs of large river valleys, and in floodplain and lowland areas bordering streams. In the bluff region, the forest habitat contains oak, elm, locust, dogwood and some sumac. In the floodplain areas, the habitat contains maple, elm, cottonwood, willow and oak. The species is found under logs, in the brushwood of floodplains and in limestone rock debris.



VENTRIDENS DEMISSUS (Binney)

The snail *Ventridens demissus* must not be confused with immature specimens of *Ventridens ligerus*, which it somewhat resembles. As the fully matured whitish shell of *demissus*



usually measures considerably less than one-half inch (10 mm.) in diameter, it is smaller than that of *ligerus*. Small differences in the proportion and shape of the shells further serve to distinguish the two species. In *demissus*, the spire of 7 whorls is somewhat more depressed than the spire of

ligerus with its 6 whorls. In *ligerus*, the first 3 or 4 whorls are wider than the corresponding whorls in *demissus*. The small aperture in *demissus* is crescent shaped; the larger aperture in *ligerus* is shaped like a half moon.

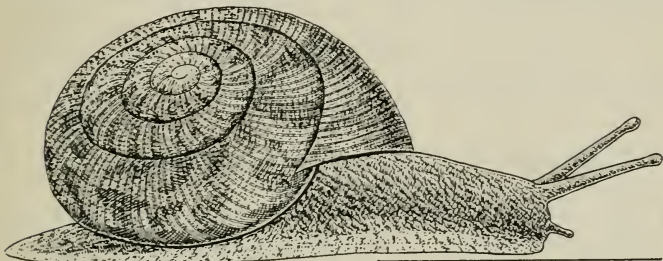
The animal of *demissus* differs from that of *ligerus* in being whitish or slaty, and in having blue head and eye peduncles.

Authentic records of this rare species are known from but two Illinois counties. In Shelby County the shells have been found on the bluffs of the Kaskaskia River, and in Effingham County on a railroad right of way. It is a southern species which has apparently migrated into Illinois from Kentucky or Indiana.

Two other species of *Ventridens* have been reported from Illinois by collectors. *Ventridens intertextus* (Binney), once known as *Gastrodonta intertexta*, has been reported from Vermilion County by Marsh, but almost certainly it does not live there, for this record has not been verified after 20 years of collecting by many other students. Hinkley records it from White County, and since the species lives in Posey County, Indiana, just across the Wabash River, it would be logical for it to inhabit eastern Illinois, but thus far subsequent collections from this region have failed to include *intertextus*. Careful collecting in White County opposite New Harmony, Indiana, has failed to locate even a single dead or bleached shell. The record of *Gastrondonta gularis* from northern Illinois by Calkins is very doubtful. This species, now known as *Ventridens gularis*, has not with certainty been found north of Tennessee.

Family ENDODONTIDAE

Snails of the family Endodontidae have shells that are never smooth and shining as in the Zonitidae. The shells are opaque, usually brown in color, and the sculpture is usually ribbriate,



the ribs in many cases being conspicuous. Shells of this family differ from those of the family Polygyridae in having a thin, sharp lip or peristome, which is never expanded. Size of shells varies from that of *Punctum pygmaeum*, less than one-sixteenth inch (1.5 mm.) in diameter, to that of the large *Anguispira kochi*, with a diameter of an inch or more (25-28 mm.). Some species are uniformly brown in color while others have brown bands or vertical streaks of color.

The animal has a large, fleshy foot and body. In some species the body appears too large for the shell. The eye peduncles are long and slender, and the tentacles are small and inconspicuous. *Anguispira alternata* is pictured above.

The family Endodontidae is distributed throughout nearly the entire world, embracing in its range all of the continents and many of the islands of the seas. In North America the family is distributed from Alaska to Central America and from the Atlantic states to California and British Columbia.

Key to Genera

- 1. Shell ¾ to 1 inch in diameter and marked by brown spiral bands or scattered blotches of brown color. . . *Anguispira*, p. 84
- Shell ¼ inch or less in diameter and without contrasting markings; even brown or horn in color, p. 87. 2
- 2. Shell brown in color; about ¼ inch in diameter. . . *Discus*, p. 86 •
- Shell horn or yellowish in color; ⅛ inch or less in diameter. . . . 3
- 3. Spire flattened; umbilicus wide and shallow. . *Helicodiscus*, p. 88
- Spire dome shaped; umbilicus narrow and deep. . *Punctum*, p. 90

Genus ANGUISPIRA Morse

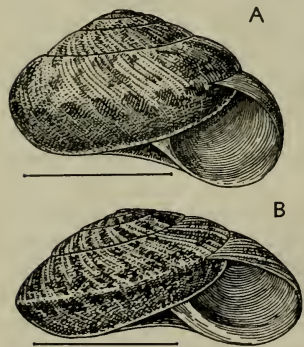
The genus *Anguispira* includes the largest species of the family Endodontidae which live in Illinois. The shell is about an inch in diameter and is easily recognized either by bands of brown or by dashes and spots of the same color.

Key to Species

- Whorls with irregular vertical dashes and spots....*alternata*, p. 84
- Body whorl with two horizontal stripes.....*kochi*, p. 85

* ANGUISPIRA ALTERNATA (Say)

The common striped woodsnaail *Anguispira alternata*, previously known as *Pyramidula alternata*, has a shell less than an inch (20 mm.) in diameter which may be recognized easily by its



open umbilicus and by the irregular dashes and spots of brown color arranged almost vertically on the light yellow background. The sculpture of the shell, when magnified, appears coarse and rib-like.

Anguispira alternata alternata (Say). Fig. A. The typical variety has a shell with a rounded periphery and a relatively high spire.

This variety is perhaps the state's most abundant land snail.

It occurs under many conditions, in wet or dry habitats, in forests, on limestone ledges, on floodplains and on railway embankments. It is characteristic of the started or loose bark habitat. Specimens have been found 15 feet from the ground, beneath the loose bark of dead trees.

The animal is of large size compared with its shell. Usually the head and eye peduncles are light slate color, the back is brown, the rest of the body is a brownish-orange and the base of the foot is whitish. It is subject to some variation in color, some animals being almost wholly brown in color, while others have a dark brown back and a foot with a soiled white base.

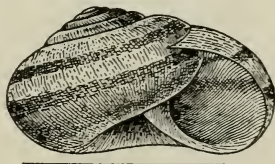
Anguispira alternata carinata (Pilsbry & Rhoads). Fig. B. In Union, Pope, White, Hardin and Gallatin counties, a form of *Anguispira alternata* occurs which has a carinated periphery and a low spire. This form, *carinata*, is found near the Ohio and Mississippi rivers, in the hills and on the limestone bluffs. It is not so abundant as the typical form. In the southern part of Illinois there is a tendency for the shell of *alternata* to become carinated on the periphery, even when the spire is high.



ANGUISPIRA KOCHI (Pfeiffer)✓

The banded snail *Anguispira kochi* is easily recognized by the two stripes of dark brown which encircle the yellowish shell near the periphery. The shell, measuring an inch or more (25-28 mm.) in diameter, has a wide and deep umbilicus. The surface sculpture is not so coarse as that of *Anguispira alternata*.

Shells of young *Polygyra profunda* might be confused with those of *Anguispira kochi*, except that the *Polygyra* shells have only one wide color band above the periphery and several very narrow stripes below. The adult of *Polygyra profunda* has a turned-over lip, while *Anguispira kochi* has a lip that is sharp and thin.



Anguispira kochi, distributed over the greater part of Illinois, appears to be absent from far northern counties. The most northern Illinois record is from southwestern Cook County. From this locality southward it is found in scattered places, in some habitats abundantly, in others sparingly.

The natural habitat of this species is the more heavily wooded ravines of river tributaries or the banks and bluffs of the large rivers. It is associated with oak, elm, hickory, locust, cherry and even pine. Like other land snails, it is largely nocturnal in habit and is active only at night and on dark days.

This species was formerly known as *Pyramidula solitaria* (Say), but the designation was changed because the name *kochi* was published at an earlier date.

A common land snail of the Mississippi and Ohio valleys, *Anguispira kochi* ranges from central Michigan to Arkansas.

Genus DISCUS Fitzinger

The genus *Discus* embraces a group of small land snails of a brownish or coppery color. In shells of this genus, the spire is depressed, the height of the shell being about one-half the diameter. The umbilicus is wide and deep, and the surface is sculptured with distinct, sharp ribs arranged diagonally on the shell. Two species of this group live in Illinois.

Key to Species

Shell with 4 whorls; umbilicus narrow. . . . *cronkhitei anthonyi*, p. 86
 Shell with 6 whorls; umbilicus wide. *patulus*, p. 87

DISCUS CRONKHITEI ANTHONYI (Pilsbry)

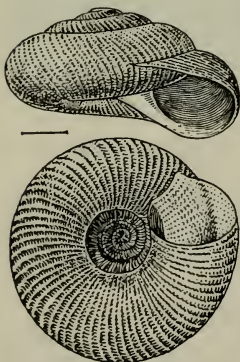
The shell of *Discus cronkhitei anthonyi* is about one-fourth inch (6 mm.) in diameter. It has 4 whorls and a deep umbilicus that exhibits all of the whorls from the base to the apex. The color is brownish horn, often coppery.

The animal has a blackish body and a whitish foot.

This variety appears to be confined to the northern half of Illinois, no specimens having been seen from regions south of Fulton County. Its habitats are largely in the river valleys on floodplains, where it is found under started bark, forest debris and stones. Maple, oak and elm appear to be the predominant vegetation in these habitats frequented by *anthonyi*.

Through all of its range *anthonyi* evidences little variation. The typical form of *cronkhitei*, of which species *anthonyi* is a race or variety, lives in the Rocky Mountain region west to California and southward to Arizona.

Discus cronkhitei anthonyi is a characteristic land snail widely distributed over most of North America, the extreme ranges of distribution including Ontario and Manitoba, in Canada, and the state of Arizona, in the southern part of the United States.



DISCUS PATULUS (Deshayes)

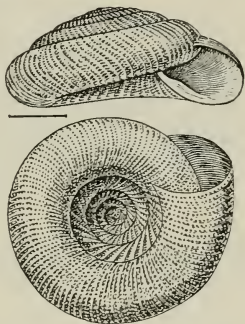
The shell of *Discus patulus* is similar to that of *Discus cronkhitei anthonyi*. However, *patulus* has 6 rather than 4 whorls and a wider umbilicus. The brown shell is larger than that of *cronkhitei anthonyi*, measuring about five-sixteenths inch (8 mm.) in diameter. Its height is less than half its diameter. The surface of the shell is ribbed as in *cronkhitei anthonyi*.

Discus patulus is peculiar in having a small white denticle or ridge on the columella located within the aperture. The whole base of the shell in this region is thickened by the presence of this callosity.

The distribution of *patulus* in Illinois is different from that of *cronkhitei anthonyi*. It appears to be most abundant in the southern part of the state. The northern ranges, as far as known, are Rock Island, Fulton and Vermilion counties. The habitat of this species is woodlands and wooded valleys of oak, elm, hickory, sycamore and sometimes pine. It is most abundant in rotting logs where the bark has started enough to be loose but is still attached to the old log. In such places, specimens of *patulus* may often be found by the dozen attached to the rotting wood or to the loose bark. It has been found on floodplains, ravine hillsides, limestone cliffs and in isolated woodlands.

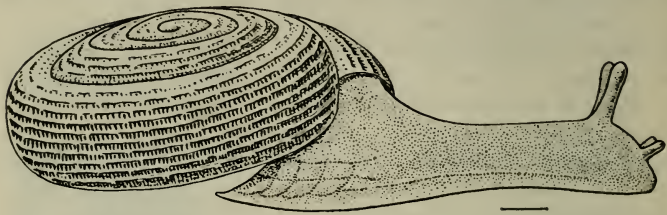
Discus patulus is not so widely distributed throughout North America as is *Discus cronkhitei anthonyi*. It is known from Minnesota south to Texas but does not live in Canada or New England and the Middle Atlantic states. *Discus patulus* is such a characteristic snail that no races have been discovered.

This snail was previously known as *perspectiva*, an appropriate name given by Thomas Say more than a hundred years ago. In older American works on natural history it is listed as *Pyramidula perspectiva* (Say) or *Helix perspectiva* Say. But it was found that the name *perspectiva* had been used at an earlier date for another snail of the same genus, and it became necessary to use Deshayes' later name, *patulus*.



Genus **HELICODISCUS** Morse

The small snails of this genus may be distinguished by their flattened and discoidal shells. The umbilicus is very wide and shallow and shows all of the whorls. The genus is North



American in distribution. The figure above pictures a specimen of a member of this genus, *Helicodiscus parallelus*.

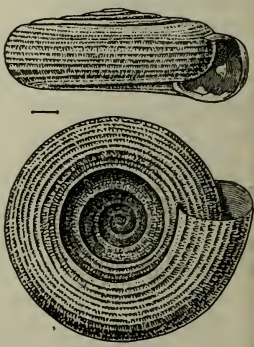
Key to Species

- Whorls of shell encircled by parallel spiral ridges; aperture with 1 to 3 minute denticles.....*parallelus*, p. 88
- Whorls of shell without ridges; aperture without denticles....
.....*singleyanus inermis*, p. 89

HELICODISCUS PARALLELUS (Say)

The flat, greenish shell of *Helicodiscus parallelus* measures about one-eighth inch (3.5 mm.) in diameter. It differs from all other Illinois shells in having a number of parallel, spiral ridges encircling the whorls. The 4 whorls are equally coiled above and below, so widely coiled below that no true umbilicus is present. Inside the outer wall of the aperture, *parallelus* has from 1 to 3 minute conical white denticles.

The animal is almost white except for small dark blotches. The fore part of the body is long, the posterior part short. The eye peduncles are rather short. When the animal is crawling, the shell lies flat on the short posterior part of the



body, the whole animal being in front of the shell, the rather short eye peduncles standing almost vertical and the tentacles pointing almost straight ahead.

This species is distributed throughout Illinois. Its natural habitat is in river valleys wooded with oak, walnut, elm, basswood and sassafras, or in floodplain areas wooded with oak, elm and hickory. It is a woodsnailed and it lives only rarely in more exposed places. Near Quincy it has been found in grass, an unusual habitat. Occasionally it has been collected from cut-over lands among trees of second growth oak, walnut and hickory.

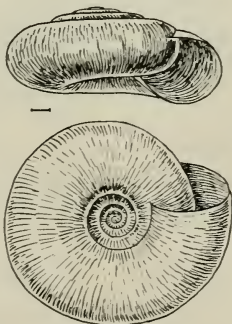
HELICODISCUS SINGLEYANUS INERMIS

H. B. Baker

The recently described snail *Helicodiscus singleyanus inermis* is very small, its waxy, yellowish shell about one-sixteenth inch (2.25 mm.) in diameter. Only one species of snail, *Hawaiia minuscula*, is known from Illinois with which it might be confused. Of about the same size, *singleyanus inermis* differs from *minuscula* in having a broader, shallower umbilicus. The base of the *singleyanus inermis* shell is more nearly flat, and the surface is smooth like paraffin and without the fine sculpture of *minuscula*, which renders that shell silky in appearance; *singleyanus inermis* has no spiral lines.

Helicodiscus singleyanus inermis is widely distributed throughout Illinois, but the records are somewhat scattered. Its small size has doubtless caused it to be overlooked. In some collections it has probably been confused with *Hawaiia minuscula*, and it may have been reported under that name. *Helicodiscus singleyanus inermis* appears to be most common in the northern and eastern parts of the state, where it may be found in forest debris, under leaves and in old piles of washed material. It is rarely found living in old logs and under loose bark.

Helicodiscus singleyanus singleyanus, the typical race of the species, has not been reported from Illinois.

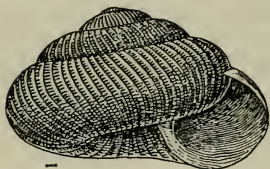


Genus PUNCTUM Morse

The genus *Punctum* is composed of minute snails with strong vertical and longitudinal lines of growth. Several species live in the United States but only one of these species occurs in Illinois. This genus was founded by Professor E. S. Morse in 1868, his type species being the *Helix pygmaea* of Draparnaud, which he showed to be the same species as the *Helix minutissima* of Dr. Isaac Lea, who was a noted specialist in the study of river mussels or Unionidae.

PUNCTUM PYGMAEUM (Draparnaud)

Except *Striatura milium*, a species of the family Zonitidae, *Punctum pygmaeum* is the smallest species of land snail inhabiting Illinois. Its reddish, horn-colored shell, less than one-six-



teenth inch (1.5 mm.) in diameter, is globose. This shell has 4 convex whorls which are finely striated with growth lines crossed by spiral lines so fine that a microscope must be used to see them. It has a wide and deep umbilicus. The tiny shell of *Punctum pygmaeum* may be dis-

tinguished from that of *Striatura milium* by its more globose form, narrower umbilicus and particularly by the absence of the conspicuous riblike folds which mark the surface of the shell of *milium*.

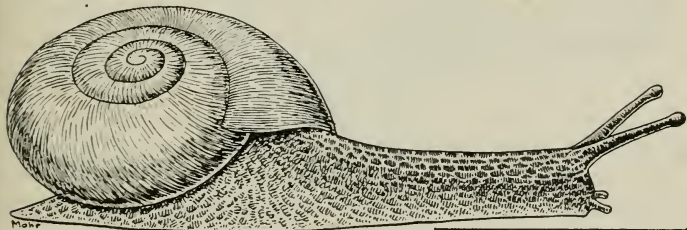
The small *pygmaeum* snail, which is apparently rare in Illinois, has been recorded from only five counties: McHenry, Cook, Will, Washington and Jackson. These localities cover a large part of the state from north to south, indicating that the species is widely distributed in Illinois.

The very small size of *Punctum pygmaeum* has caused students and collectors to overlook it. They may search for it beneath the bark of fallen tree trunks, on small limbs and twigs of fallen timber, in forest debris and in similar places. It is a forest snail living with other forest-loving species, such as *Helicodiscus parallelus*, *Zonitoides arboreus* and *Discus patulus*. It lives in both North America and Europe, and is very widely distributed in the two continents.

Family HAPLOTREMATIDAE

Shells of the family Haplotrematidae resemble those of some of the Zonitidae, but they are much flatter and more discoidal, and they have a wider umbilicus than is to be found in any of the large species of the latter family.

The animal has a long, narrow body and long, slender eye peduncles. The upper surface of the body is gray, and the



tentacles and eye peduncles are bluish. The mantle collar at the edge of the shell is reddish orange. The same color tinges the posterior part of the animal. The base of the foot is dusky white. The shell is carried near the posterior extremity of the body. It is but slightly tilted to one side and stands almost vertical when the animal is in motion.

In habits the animal is carnivorous, its long, slender body enabling it to crawl within the shell of its hapless victims, which in many cases are the larger snails, *Polygyra*, *Anguispira* or *Mesomphix*. The teeth on the lingual ribbon or radula are fanglike, indicating carnivorous habits (see page 7).

Genus HAPLOTREMA Ancey

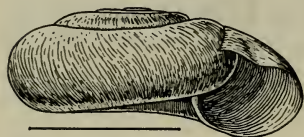
The family Haplotrematidae contains but one genus, *Haplotrema*, but nearly a dozen subgenera and sections have been proposed. The family is purely American. The majority of species live in the United States, although a few inhabit northern South America, Mexico, Cuba, Porto Rico and other West Indian islands.

The only Illinois species, *Haplotrema concavum*, shown in the figure, is known from Quebec, Canada, west to Minnesota and southward to Alabama and Arkansas. This is the only species found in the United States east of the Rocky Mountains.



HAPLOTREMA CONCAVUM (Say) .

No other land snail in Illinois can be confused with the carnivorous *Haplotrema concavum*, which might be called the tiger of the molluscan world. The shell is about three-fourths inch (16-22 mm.) in diameter.



The spire is flattened, and the 5 whorls are coiled almost in the same plane. The expanded and shallow umbilicus shows all of the whorls clear to the apex.

The aperture is almost round or a trifle elliptical, and the lip in most mature specimens is slightly thickened and turned back or reflected at the base near the umbilicus. The top of the aperture is peculiarly flattened and bent downward. When the snail is young, the greenish-white shell is almost transparent.

Haplotrema concavum is a forest snail found throughout Illinois in river valleys which are well wooded with oak, elm, hickory, basswood, walnut and pine. It is a rather solitary snail, and few individuals are found together, possibly because of its carnivorous habits. It lives under forest debris, old logs, leaves or any other material which affords concealment and shelter from the sun's rays. It is most abundant in moist woods and is common on floodplains of river valleys.

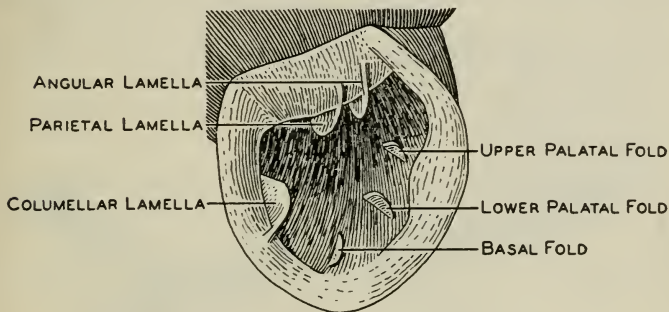
This species is found as far north as Quebec, Canada, and as far south as Arkansas.

A size variation is to be noted in this snail; those specimens from the northern part of Illinois are smaller than those from the southern part. The largest specimen collected from Jo Daviess County measures but five-eighths inch (16 mm.) in diameter, while specimens from Pope County, on the Ohio River, measure seven-eighths inch (22 mm.). The larger size of the southern specimens may be a result of their habitat, which is on limestone bluffs where material for the making of shells is plentiful.

This snail has suffered from the work of the taxonomist, and its name has been changed several times. It has been placed in the following genera: *Macrocyclis*, *Selenites*, *Circinaria* and *Haplotrema*. In earlier works it will be found under one of the first three of these names.

Family PUPILLIDAE

The elongated oval shells of snails belonging to the family Pupillidae are small, none exceeding one-fourth inch (5.5 mm.) in height. The outer lip or peristome of the turreted shell is



usually, though not always, provided with projections called folds, lamellae or denticles. Some species of this family have few folds, lamellae or denticles; others have many.

These projections have been called teeth, but this term is incorrect, since the folds are in no way teeth. The animal bites or chews food by means of the lingual ribbon (see page 7). The obstructions in the aperture should always be called folds, lamellae or denticles in order to differentiate them from this organ. As the projections have been given definite names and as they always occur in the same position in the different species, they form very valuable means of identification. The positions of the principal folds and their names are shown in the figure above. The accessory, smaller folds have been omitted to avoid confusion. The principal lamellae are the angular, the parietal and the columellar. The principal folds are the upper palatal, the lower palatal and the basal.

The animals of the Pupillidae are small. The body of each is bluntly rounded before and tapered behind. The eye peduncles are long, and the tentacles short and thick. The animals vary in coloration. In each species, the body of the animal when extended from the shell is about as long as the shell itself. The animal and shell of a member of this family, *Gastrocopta contracta*, are pictured on the next page.

Gastrocoptas, when found in the field, are usually covered with dirt and mucus, and the shells must be thoroughly washed before the true characteristics of the different species can be seen, especially since identification is possible only through a study of variation in the proportion and shape of the shells, and in the manner of denticulation. In shells of the genus *Gastrocopta* the peristome, or outer lip, is rounded, and most of the shells of this genus, with the single exception of the species *procera*, are whitish in color and waxy in texture.

Key to Species

1. Shell whitish in color and waxy.....2
 Shell brownish in color.....*procera*, p. 102
2. Denticulations of aperture on both parietal wall and peristome, p. 96.....3
 Denticulations of aperture on parietal wall only.....*corticaria*, p. 101
3. Parietal denticulation very large, partly filling aperture; other denticulations placed directly on lip, p. 99.....4
 Parietal denticulation small, tubercular; all other denticulations placed on a callus or ridge bordering lip, p. 100.....6
4. Shell with 6 or 7 whorls.....*armifera*, p. 95
 Shell with 5 whorls, p. 97.....5
5. Shell ovate, diameter one-half of height; outer lip with 1 large denticle.....*contracta*, p. 97
 Shell cylindroid, diameter one-fourth of height; outer lip with 2 denticles.....*holzingeri*, p. 99
6. Shell conic, wide across body whorl; three-fifths as wide as high.....*tappaniana*, p. 101
 Shell cylindroid, narrow across body whorl; two-fifths as wide as high.....*pentodon*, p. 100

GASTROCOPTA ARMIFERA (Say)

The species *Gastrocopta armifera* is one of the largest of the pupoid snails having folds within the aperture. Measuring about one-eighth inch (3.5-4.5 mm.) in height, the shell may be recognized by its cylindrical shape, its 6 or 7 convex whorls, its white color, often resembling paraffin, and the arrangement of the lamellae and folds in the aperture.

This is one of the characteristic snails of the prairie region; it occurs abundantly in almost every Illinois county. One of the most versatile of all Illinois snails in its ability to adapt itself to a wide variety of habitats, it appears to prefer those of a dry

nature. On the bluffs of the Mississippi and Ohio rivers, it is often found beneath blocks of limestone. Singularly enough, one of the favorite habitats is railway embankments, where it may be found either in the cinders and debris of the sides of the embankment or among the grass and weeds bordering the roadbed.

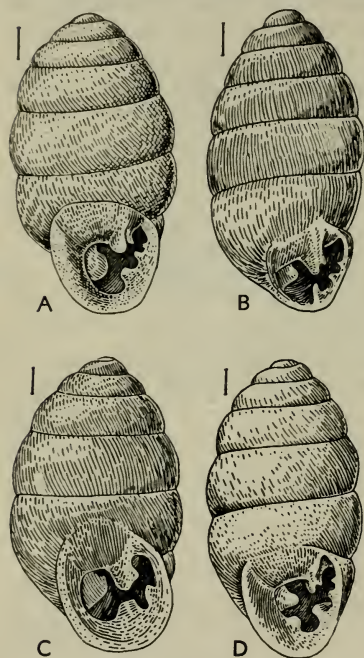
In the past, *Gastrocopta armifera* has been placed in several genera and will be located under the names *Pupa* and *Bifidaria* in some older works. Three varieties besides the typical have been found in Illinois.

Gastrocopta armifera armifera (Say). Fig. A. The typical variety may be known by its size and its swollen whorls. The shell, measuring over one-eighth of an inch (4.0-4.5 mm.) in height, has a large lamella composed of the angular and the parietal lamellae combined, a large columellar lamella and two palatal folds, the lower one being larger than the upper one. The

shell of this variety has usually a third small palatal fold.

Gastrocopta armifera similis (Sterki). Fig. B. This variety differs from the typical principally in having a narrower and more nearly cylindrical shell. The peristome is not continuous, and the columellar lamella and the lower palatal fold are not so heavy. This form is less widely distributed than the typical.

Gastrocopta armifera affinis (Sterki). Fig. C. Shorter than that of the typical form, the shell of *affinis* measures only about one-eighth inch (3.5 mm.) in height. The peristome is not continuous. The merger of the angular and parietal lamellae is more nearly complete and continuous. The columellar lamella is thinner than in the typical *armifera*.



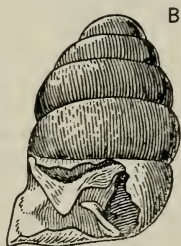
Gastrocopta armifera abbreviata (Sterki). Fig. D. The *abbreviata* shell, about one-eighth inch (3.5-4.0 mm.) in height, may be known by the short, pointed form of the columellar lamella and by a distinct basal fold which is entirely absent or only feebly developed in *armifera armifera*. The variety *abbreviata* is rare in Illinois and has been found in only two counties, Winnebago and Jackson.

The variations in this species are not racial in the sense characteristic of variations in some other snails, because they occur anywhere within the range of the species and are not confined to any particular geographic regions.

GASTROCOPTA CONTRACTA (Say)

A smaller species than *Gastrocopta armifera*, *contracta* has a shell that measures much less than one-eighth inch (2.5 mm.) in height. It may readily be recognized by its conic form and by the large lamella, a composite of the parietal and angular lamellae, which nearly fills the aperture. The waxy white shell has 5 rounded whorls with deep sutures, and a conspicuous rounded ridge behind the peristome. The aperture, somewhat triangular in form, has 2 palatal folds, the upper one small and the lower one large; both are rounded and rather deeply set in the aperture. It has a large, rounded and deep-seated columellar lamella, in front of which is a large vertical callus on the inner lip.

Fairly common over Illinois, and in some localities abundant, *Gastrocopta contracta* lives under a variety of conditions: on river and creek floodplains where there is plenty of moisture, in forests of sycamore, oak and elm; on hillsides in forests of oak, elm, hickory, basswood and pine; on bluffs of limestone; and even on dry railway embankments, although it is scarce in the last habitat. It is common in isolated woodlands of oak, elm and hickory. Two races of this species have been distinguished in Illinois.



Gastrocopta contracta contracta (Say). Figs. *A* and *B*. The shell of the typical *Gastrocopta contracta* is wide and conic, and the upper lamella, which in this species is a combination of the parietal and angular lamellae, is shaped somewhat like the letter L with a tail. This can be seen only by breaking away the outer lip so that the whole of the lamella is exposed. The large, rounded columellar lamella and lower palatal fold are situated far within the aperture.

Gastrocopta contracta climeana Vanatta. Figs. *C* and *D*. The race of *Gastrocopta contracta* known as *climeana* is separated from the typical form by a difference in the upper composite, L-shaped lamella. In *climeana* the L lacks the appendage or tail which is present in *contracta contracta*. The lip must be broken away to make this lamella clearly visible.

Only one Illinois locality is known for this race, Dubois, Washington County. *Gastrocopta contracta climeana* has been considered southern in distribution, its previously recorded northern limit being Arkansas and Mississippi.

In a record of the Mollusca found in the vicinity of Dubois, A. A. Hinkley (*Nautilus*, Volume 33, page 14, 1919) lists a variety, *Gastrocopta contracta abrupta*, stating that Dr. Victor Sterki had proposed the name. This appears to be a nude name, Hinkley's use of the name being the only one known. The original shells from Dubois are in the Museum of Natural History of the University of Illinois (no. Z25091). They do not

differ materially from the varieties *contracta* or *climeana* and appear to be the same as other material from Dubois.

All of the specimens in the Hinkley collection labeled *abrupta* upon examination proved to be of the variety *climeana*, having the characteristic L shape of the parietal lamella. It appears that the name *abrupta* is a synonym of *climeana*; the latter variety was first diagnosed in 1911, whereas *abrupta* was first listed in 1919.

It would be of great interest to ascertain whether the *climeana* variety might not be found in southern Indiana or Ohio.



Few conchologists take the trouble to cut open the shells of small species, which is the only method by which these two forms of *contracta* described here can be distinguished.

GASTROCOPTA HOLZINGERI (Sterki)

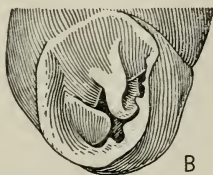
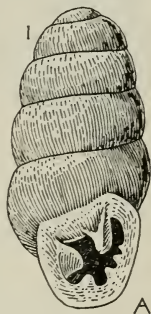
The snail familiarly known as Holzinger's *Gastrocopta* has a white glassy shell which is little more than one-sixteenth inch (1.7 mm.) in height. Cylindric in shape, the shell has 5 rounded whorls, regularly decreasing in size as they approach the apex, fig. A. The shape of the aperture is round, not triangular as that in *Gastrocopta contracta*. The lamellae and folds of *holzingeri* differ very markedly from those of *contracta*. The parietal lamella, which is forked in front, somewhat resembles the letter Y, fig. B. The basal fold is large, and the lower palatal fold is pyramidal rather than rounded in shape. The columellar lamella is larger and more conspicuous in *holzingeri* than the same lamella in *contracta*.

Gastrocopta holzingeri apparently is a rare species in Illinois. Records of it are at present known from only four counties in the state: Will and La Salle in the northern part, Hancock in the central area and Jackson in the southern zone.

The habitat of this snail, similar to that of *Gastrocopta contracta*, is on wooded floodplains where moisture is abundant; in forests and woodlands of sycamore, elm, oak, basswood and hickory; and on limestone bluffs.

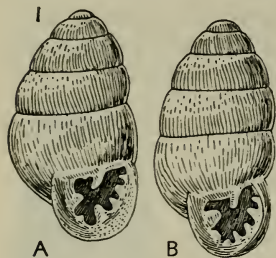
The young conchologist often wonders about the person whose name follows a specific designation. Dr. Victor Sterki, who is the author of *Gastrocopta holzingeri*, was a practicing physician living in New Philadelphia, Ohio. Unlike the many naturalists who prefer to study the large species, Dr. Sterki was drawn to the study of the minute forms of mollusks.

The tiny pupoids first attracted his attention, and he made a careful study of the American species, finding several which had been overlooked by other conchologists.



GASTROCOPTA PENTODON (Say)

Shells of the species *pentodon* and *tappaniana* are distinguished from other species of the genus *Gastrocopta* found in Illinois in size and form. The shells measure about one-sixteenth inch (1.5-2.0 mm.) in height and are of an opaque white color, like paraffin or spermaceti. They have a simple parietal lamella and palatal folds that are arranged on a white, rimlike callus.



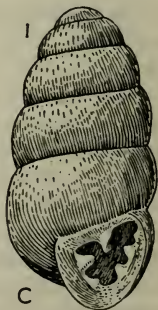
The shell of *Gastrocopta pentodon* has 5 rounded whorls separated by distinct sutures. In shape it is usually ovoid, sometimes cylindroid.

The palatal folds vary in number from 2 to 5, the additional folds being intermediate in size between the primary upper and lower palatal folds. The shell has a large rounded columellar lamella and a small basal fold. It has a rather distinct crest or swelling behind the outer lip, resembling that found in *contracta*. The parietal lamella and the lower palatal fold are slightly curved.

This species is distributed throughout Illinois, but the records are widely scattered. It is found in a variety of habitats; on wooded hillsides in forests of oak, cherry, ironwood and basswood, under leaves and debris and also in grass in open places. It is seldom found in wet places.

Gastrocopta pentodon pentodon (Say). Figs. A and B. The typical *Gastrocopta pentodon* is only about one-sixteenth inch (1.50-1.75 mm.) in height. It has usually 5 palatal folds. Variations in individual shells of the typical variety are illustrated in figs. A and B.

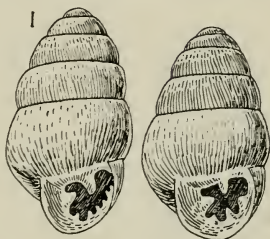
Gastrocopta pentodon gracilis (Sterki). Fig. C. The shell of *pentodon gracilis* is more elongated than that of the typical *pentodon*, and more nearly cylindrical. It has usually only 5 folds and lamellae. On the outer lip, only the upper and lower palatal folds are present. This variety, rare in Illinois, is at present known only from Jackson, Union and Lawrence counties.



GASTROCOPTA TAPPANIANA (C. B. Adams)

Larger and more sharply conic than that of *Gastrocopta pentodon*, the opaque white shell of *Gastrocopta tappaniana* measures over one-sixteenth inch (2 mm.) in height. The spire has an obtuse apex, the parietal lamella is straight and the lower palatal fold is usually not so long as is that in *pentodon*. There are usually 6 (sometimes as few as 2) folds on the outer lip. The figures show variations in individual shells.

Gastrocopta tappaniana is found beneath pieces of wood, logs and damp debris in wet places such as floodplains, moist woodlands and swamp edges, while *Gastrocopta pentodon* prefers drier situations. It is distributed throughout Illinois in about the same scattered manner as *Gastrocopta pentodon*.



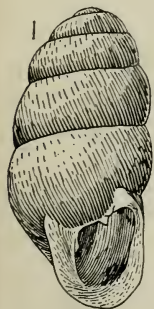
GASTROCOPTA CORTICARIA (Say)

Measuring less than one-eighth inch (2.5 mm.) in height, the shell of *Gastrocopta corticaria* usually has but 2 lamellae, a parietal lamella and a columellar lamella. Occasionally it has another lamella, the angular, developed and united with the parietal lamella. In rare individuals the aperture is without lamellae. The shell has no folds on the outer lip, and no fold at the base of the aperture.

Gastrocopta corticaria is unique among the species of this genus in having the folds and lamellae very few in number. No other *Gastrocopta* is comparable to it.

This tree-inhabiting *Gastrocopta* is distributed throughout Illinois in a scattered manner. Its habitat is on hillsides, river bluffs and woodlands where oak, elm, basswood and hickory are

the usual forest trees. The species *corticaria*, the "bark inhabitant," is often observed as high as 2 feet from the ground on the trunk of a tree.



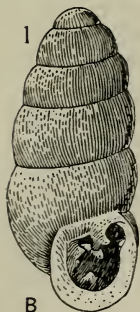
GASTROCOPTA PROCERA (Gould)

Pupoids of the species *procera*, which is mostly southern in distribution, are rare in Illinois. The shells of this species are usually cinnamon-brown in color, somewhat glossy in texture and marked by lightly impressed lines of growth. They have 5 or 6 convex whorls with sutures that are noticeably deep.



A

Gastrocopta procera procera (Gould). Fig. A. In the shell of the typical variety, less than one-eighth inch (2.5 mm.) in height, the body whorl has a perceptible crest behind the outer lip. The rounded aperture has 5 folds and lamellae: a bifid parietal lamella representing the combined parietal and angular lamellae, a columellar lamella, a small upper palatal fold, a large lower palatal fold placed far within the aperture and directly under the parietal lamella, a small basal fold placed well within the aperture. The wide peristome is rolled outward.



B

This variety is abundant in Illinois only near Albion, Edwards County, but it is reported from eight other counties, of which Du Page is the most northern and Union the most southern. Its habitat is under leaves and about old logs and sticks.

Gastrocopta procera mcclungi (Hanna & Johnson). Fig. B. This variety, less than one-eighth inch (2.2 mm.) in height, is somewhat smaller than the typical form. The thickened peristome of *mcclungi* is more convex, so that the greatest thickness of the lip callus is at the edge of the aperture, and not within the aperture as in *procera procera*. The parietal lamella is bifid and forked in front, and the columellar lamella has a nodule at the base which gives it the appearance of being duplicated.

Only a very few specimens of this rare variety have been collected in Illinois. It has been found on a railway embankment in Effingham County, on a Mississippi River bluff in Monroe County and on the isolated hill bordering the Mississippi River at Grand Tower in Jackson County.

Genus VERTIGO Draparnaud

The small pupoids of the genus *Vertigo* differ from most snails of the genus *Gastrocopta* in having brown shells. Of the Illinois *Gastrocopta* snails only *Gastrocopta procera* has a brown or cinnamon-colored shell.

The outer lip of the usual *Vertigo* shell has an indentation in the middle, the shell is usually more globose in form than that of the *gastrocoptas* and the parietal and angular lamellae are more often separated to form distinct denticles.

The animal lacks the tentacles of other pupoids. The eye peduncles are long and pointed. The body of the animal is short, blunt before and tapering behind.

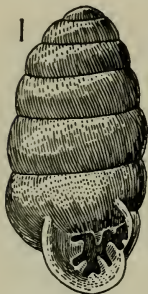
Several species of *Vertigo* are found in Illinois. Special search should be carried on by Illinois conchologists for members of this genus, of which species other than those listed in this handbook may be found living in the state. *Vertigo gouldii* Binney has been reported by Hinkley from Rockford, Winnebago County, and by Marsh from Will County, but these reports have not been verified. No specimens have recently been seen from Illinois which could be referred to this species. However, it has been authentically reported by Daniels from Indiana and may possibly be found in the northern part of Illinois.

Key to Species

1. Palatal folds very long and extending far back into aperture *miliun*, p. 107
 Palatal folds tubercular and placed near edge of peristome, p. 104.....2
2. Aperture with 2 denticles on parietal wall and 2 columellar denticles, p. 104.....3
 Aperture with only 1 denticle on parietal wall and 1 columellar denticle, p. 106.....4
3. Shell cylindroid; whorls $6\frac{1}{2}$ *morsei*, p. 104
 Shell ovoid or ventricose; whorls 5..... *ovata*, p. 105
4. Aperture with but 1 palatal denticle and with no basal denticle..... *tridentata*, p. 106
 Aperture with 2 palatal denticles and a conspicuous basal denticle, p. 105 at bottom.....5
5. Shell cylindroid; whorls 5; palatal denticles on a callus bordering aperture..... *elattior*, p. 106
 Shell ventricose or ovoid; whorls 4; palatal folds or denticles not on a callus..... *ventricosa*, p. 105

VERTIGO MORSEI Sterki

The largest species of the genus *Vertigo* found in Illinois is *morsei*, the dark brown shell of which measures nearly one-eighth inch (2.5-3.0 mm.) in height. This shell is cylindroid in shape and has 6½ well rounded whorls with deep sutures. The whorls increase regularly in height from apex to base. The aperture is rounded, and the middle of the outer lip is deeply indented.



Vertigo morsei usually has 7 or 8 folds and lamellae in the aperture: a large parietal lamella, a smaller angular lamella and a large columellar lamella with a smaller lamella below it, a very small basal fold, and an upper and lower palatal fold with sometimes a third fold above the upper fold. The size of the

shell and the 2 or 3 lamellae on the parietal wall easily distinguish this species from others of the genus.

This species is known in the recent fauna of Illinois only from near Joliet, Will County. As a Pleistocene fossil it has been found in a number of places. Geologically it is one of the oldest living species in Illinois.

The geographical distribution of *Vertigo morsei* is very peculiar. It has been found only in New Jersey, Michigan, Ohio, Indiana and Illinois. In Ohio it has been reported from two localities, one a marl deposit. In Indiana, where it appears to be abundant in the living fauna, there are records from three counties.

Its habitat appears to be most often near the shores of lakes.

The name given this species is in honor of Dr. Edward S. Morse, one of the early students of land shells, who began his career in Maine. Dr. Morse was an excellent artist and made all of the figures for his conchological papers. It is noteworthy that he was also the artist for Dr. William G. Binney's works on American land and freshwater mollusks.



An inadvertent step may crunch the snail
That crawls at evening in the public path,
But he that has humanity, forewarned,
Will turn aside and let the reptile live.

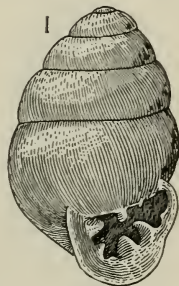
—WILLIAM COWPER, *The Task*

VERTIGO OVATA Say

Although the shell of *Vertigo morsei* resembles that of *Vertigo ovata* in the form and position of the folds and lamellae of the aperture, the two may be distinguished by a difference in size and in the number and shape of the spire whorls. The shell of *ovata* measures somewhat more than one-sixteenth inch (2 mm.) in height. It has 5 whorls, which are proportionately wider than those in *morsei* and increase in height more rapidly from apex to base. The ventricose form of the last or body whorl is also different. *Vertigo ovata* is somewhat amber colored.

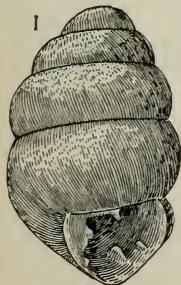
The habitat of the snail *Vertigo ovata* is in moist places under sticks and debris. It is most abundant on stream floodplains, but it has been found also in forests on the bluffs that border rivers.

This species, scatteringly distributed over Illinois, has been reported from Fulton, McHenry, Cook, Menard, Winnebago, Washington, Edwards, Jackson and White counties. However, it is common only from the vicinity of Rockford, in Winnebago County, and of Albion, in Edwards County. Winnebago County is its most northern Illinois locality, Jackson its most southern.



VERTIGO VENTRICOSA (Say)

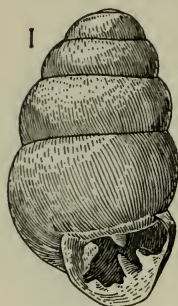
The shell of *Vertigo ventricosa* differs from that of *Vertigo ovata* in size and shape. It is a trifle smaller, measuring about one-sixteenth inch (1.75 mm.) in height. The glossy, light brown or auburn-colored shell of 4 whorls is often translucent. It has a lamella on the columella, a basal fold and an upper and a lower palatal fold. It has one parietal lamella. These characteristics distinguish it from the shell of *ovata*.



At present only one Illinois locality is known where *ventricosa* may be found. Specimens are known from near Rockford, Winnebago County, but even in that locality this species is rare.

VERTIGO ELATIOR Sterki

The *elator* species of *Vertigo* is larger than *Vertigo ventricosa*. The brown shell of *elator*, measuring over one-sixteenth inch (2.25 mm.) in height, has 5 whorls, one more than is present in *ventricosa*. It is more elongated and more nearly cylindrical. The folds and lamellae in the aperture are the same in number, 5, as in *ventricosa*, but the basal fold is larger, and the palatal folds are placed on and merge into a strong callus or thickening within the outer lip.



Curiously, in Illinois *Vertigo elator* is known only from Rockford, Winnebago County, where *Vertigo ovata* is found. It is rare in the living fauna, but as a Pleistocene fossil, under the name of *Vertigo loesensis* F. C. Baker, it is very abundant and widely distributed in Illinois and other parts of the Middle West.

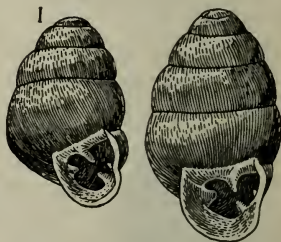
VERTIGO TRIDENTATA Wolf

The small amber-colored shell of *Vertigo tridentata* is little more than one-sixteenth inch (2 mm.) in height. It has 5 smooth whorls. The small number of folds and lamellae distinguishes this species from the other vertigos of Illinois. The two figures illustrate some of the individual variations within the species.

The habitat of *Vertigo tridentata* is in grass or weeds. It has been observed clinging to stalks of weeds as high as 3 feet from the ground.

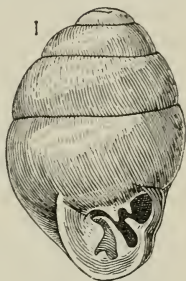
Vertigo tridentata has been collected in Will, La Salle, Champaign and Fulton counties. Its first known habitat was in Fulton County, where it was discovered by an Illinoisian, John Wolf, about 1870.

The vertical line beside the smaller figure indicates the height of the specimen represented. The shell represented by the figure at the right is proportionately larger.



VERTIGO MILIUM (Gould)

Smallest of Illinois vertigos, *milium* has a shell that measures about one-sixteenth inch (1.50-1.75 mm.) in height. In color the shell is dark amber or chestnut. It has 4 to 5 rounded whorls, and its general shape is globose. The aperture has 6 folds and lamellae: a parietal, an angular and a columellar lamella, a basal fold, and an upper and a lower palatal fold. The palatal folds differ from those of other species found in Illinois. They are very long and extend far backward into the aperture. The small size of the shell, the shape of the palatal folds and the downward ending of the columellar lamella distinguish the species *Vertigo milium* from all other pupoids.



This minute pupoid is well distributed over Illinois, but the records are scattered. Its small size has doubtless caused it to be overlooked. Its habitat is under sticks and debris in moist floodplain areas and in woods on bluffs bordering the large rivers of the state.

Vertigo milium is so peculiar in its apertural folds and lamellae that Dr. Victor Sterki placed it in a subgenus which he christened *Angustula*. In this group the columellar lamella is crescentic in shape and its inner end curves downward, instead of upward, as in other species of *Vertigo*. Only two species are known to belong to this subgenus: *milium*, the distribution of which is from Maine to Florida, west to South Dakota and Colorado and south to Arizona, Tampico, Mexico, and Jamaica; and *bermudensis* Pilsbry, which is found only on the Island of Bermuda.

It is noteworthy that a species having such a wide geographical distribution should not show some varietal changes somewhere in its range, but this species is remarkably uniform in its general characteristics wherever found. The consistency of *milium* over a large area leads to a consideration of one of the mysteries of animal life. Why one species should be uniform over a wide territory and another develop a number of races or varieties, as is the case in several species of *Gastrocopta*, is at present concealed from human knowledge.

Genus PUPOIDES Pfeiffer

Most species of the family Pupillidae found in Illinois have folds or lamellae in the shell aperture. However, two species, one of which belongs to the genus *Pupoides* and the other to the genus *Columella*, lack these formations. In the two other Illinois genera of this family, *Gastrocopta* and *Vertigo*, the folds and lamellae which are present serve as valuable distinguishing characteristics. A distinguishing mark of the genus *Pupoides* is the reflected lip or peristome of the shell, which forms a thick, wide margin to the aperture.

PUPOIDES MARGINATUS (Say)

The shell of the species known as *Pupoides marginatus* has a rounded aperture with a peristome that is broadly reflected. The aperture is entirely without lamellae or folds. The brown shell of this species is about one-fourth inch (5.5 mm.) in height. It has 6 whorls and a very small umbilical perforation. The shell of *Pupoides marginatus* is elongated and tapers regularly to a point. No other land snail of Illinois resembles this species, which is the only species of its genus found in the state.



The animal of the species *marginatus* has long and slender eye peduncles and very short tentacles. The color of the neck, head and eye peduncles is black; the posterior portion of the animal is lighter.

Pupoides marginatus is widely distributed over Illinois. It has been recorded from numerous counties. It is particularly abundant in the counties of McHenry, Madison, Randolph, Jackson, Adams and Calhoun. Its most common habitat is on wooded bluffs and hillsides of rivers and streams, where oak, elm, basswood, hickory and sometimes pine are present. Occasionally this species is found in grass and on railway embankments.



Every day I used to ride out alone along the seashore, where I dismounted, and filled my pockets with all sorts of pebbles, snail shells, and sea shells of great rarity and beauty.

—BENVENUTO CELLINI, *Autobiography*

Genus COLUMELLA Westerlund

As in the genus *Pupoides*, the aperture of the shell in *Columella* is devoid of folds or lamellae. The shape of the *Columella* shell suggests an immature *Gastrocopta*. The lip or peristome in *Columella* is never reflected, as in *Pupoides*, but always thin and sharp. Only one species of this genus is recorded from Illinois.

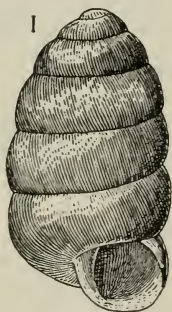
COLUMELLA EDENTULA (Draparnaud)

One of the two species of Illinois Pupillidae without folds or lamellae within the aperture, *Columella edentula* has a brown shell one-sixteenth inch (1.5-2.5 mm.) in length. The 5 to 6 whorls are rounded, the aperture is almost circular, the peristome is sharp and thin and the parietal wall is turned over in such a way as partly to conceal the small umbilicus. This shell differs from that of *Pupoides marginatus* in its smaller size, blunter spire whorls, more nearly cylindrical shape and sharply edged outer lip.

Apparently *Columella edentula*, a northern species, is not common in Illinois. It has been recorded from only three counties, McHenry, Fulton and Washington, in the northern, central and southern parts of the state. The Illinois habitats are under leaves in damp woods of floodplain areas. Unlike most of the other small snails of Illinois, this species does not occur in colonies; usually only a single specimen is found in a place.

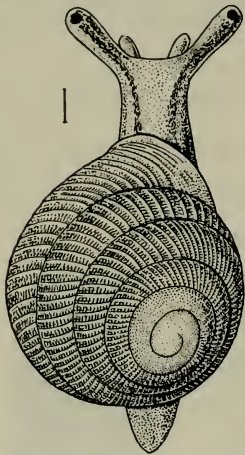
Columella edentula has been known under several names. It is listed in other manuals as *Pupa simplex*, *Pupa edentula*, *Vertigo simplex* and *Sphyradium edentulum*.

Although the species *Columella edentula* is now rare in Illinois, a related species, *Columella alticola* (Ingersoll), was widely distributed throughout Illinois during the Pleistocene geological period. *Columella alticola* is abundant in fossil deposits known as loess, and its distribution extended as far east as central Illinois. It is found living at the present time in the higher regions of Colorado and other western states.



Family STROBILOPSIDAE

The family Strobilopsidae is a group of small snails having dome-shaped shells sculptured with oblique ribs. The shells have $4\frac{1}{2}$ to 6 slowly enlarging whorls and a distinctly open umbilicus. The aperture is provided with 2 or 3 parietal lamellae and several long, narrow basal folds which are deeply seated.



This family is unlike all others in the possession of peculiar basal folds, which form a means of differentiation between species. Each fold has a definite position and name as indicated in the figure of the aperture at the bottom of this page.

The animal of the Strobilopsidae is very small for the size of the shell. The head end of the body is black, the posterior end is grayish and the foot white. The tentacles are thick, bulbous and rather short, and the eye peduncles are short and thick, as is evident in the figure on this page of *Strobilops labyrinthica*, showing a dorsal view of an animal of the Strobilopsidae.

The Strobilopsidae may be found on decaying wood, under



loose bark and in similar situations. In North America, species of this family have not been reported west of Nebraska and Kansas, but east of this area they are abundant.

Genus STROBILOPS Pilsbry

The only genus of the family Strobilopsidae found in Illinois is *Strobilops*. In early works on land snails, this genus is found under the name *Strobila*. The change in nomenclature was made because the name *Strobila* had already been used. Most species of the genus *Strobilops* are found in Illinois.

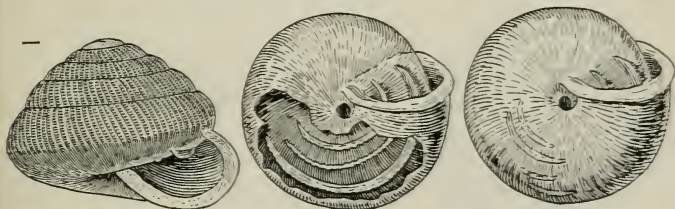
Key to Species

1. Parietal lamella broadened and slightly reflected near emerging end..... *aenea*, p. 114
- Parietal lamella not broadened and not reflected near emerging end, pp. 111, 113..... 2
2. Parietal and infraparietal lamellae emerging from aperture..... *labyrinthica*, p. 111
- Only parietal lamella emerging from aperture.... *affinis*, p. 113

STROBILOPS LABYRINTHICA (Say)

The commonest *Strobilops* in Illinois, and the first one to be discovered and named by an American scientist, is *labyrinthica*. The shell is less than one-eighth inch (2.30 mm.) in diameter and about one-sixteenth inch (1.75 mm.) in height. The umbilicus is small.

Strobilops labyrinthica labyrinthica (Say). In the typical form, two of the lamellae, the parietal and the infraparietal,

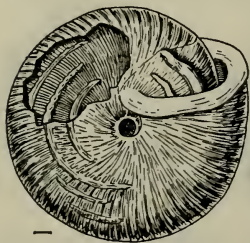


are visible from the front or base of the aperture, but the third, or interparietal, lying between these two, cannot be seen until the shell is broken open. The parts of these lamellae that emerge from the aperture are smooth, but within the chestnut-brown shell they are sawlike on the edge. The lamellae extend only half a turn within the whorl. Four of the 5 or 6 basal folds show through the base of the shell. These form a curving series toward the aperture.

This *Strobilops* snail is found generally distributed over Illinois. Its habitat is in river valleys, on large river bluffs, in woodland areas and less often in second growth woods and on cut-over lands. Oak, elm, hickory, basswood, walnut and in places pine are its natural cover. It has been found in all of the state parks of Illinois, most often in second growth of oak and hickory, and in the White Pines Forest State Park, Ogle County, it has been found among pines. It is not common in floodplain areas of Illinois.

Strobilops labyrinthica virgo Pilsbry. A color form or albino race of *Strobilops labyrinthica*, *virgo* differs from the typical in having a whitish or slightly greenish shell with white lip and lamellae. In *virgo* the parietal lamellae emerge a little farther than in the brown typical form, and the umbilicus is often a trifle smaller. The arrangement of the lamellae and folds is about the same in both forms. The shell is usually somewhat larger than that of *labyrinthica labyrinthica* and is more striking in appearance. In Illinois, it has been seen from only four counties: McHenry, Washington, Williamson and Saline. In McHenry County it occurs with the brown typical form. It was first discovered near Sebec, Maine. Its distribution extends from Maine to Minnesota.

Strobilops labyrinthica parietalis Pilsbry. In this variety or form, the parietal lamellae penetrate more deeply into the shell aperture than in the typical variety, reaching as far back as two-thirds or three-quarters of the last or body whorl. In other respects, this brown shell is similar to that of *labyrinthica labyrinthica*.



In Illinois this variety has been found in three counties only: Washington and Marion in the southern part of the state, and La Salle in the northern part, where it is very rare.

The recently described variety *parietalis* may be found to be more abundant in Illinois than the records indicate. Its distribution is said by Dr. Henry A. Pilsbry to be sporadic, the known records being well scattered over the southeastern and southern parts of the United States. Careful preparation of the shell is needed for the determination of the variations of *Strobilops*.

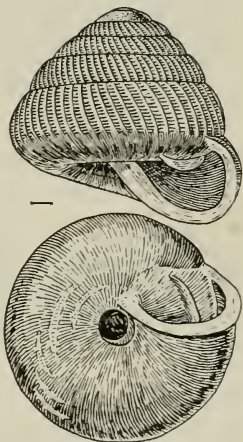
STROBILOPS AFFINIS Pilsbry

The shell of *Strobilops affinis* differs from that of *Strobilops labyrinthica* in being larger. The glossy brown shell of *affinis* measures nearly one-eighth inch (2.50-2.75 mm.) in diameter. Shells of the two species differ also in that *affinis* has a wider umbilicus and coarser ribs on the surface. In *affinis* only the large parietal lamella emerges from the shell, whereas in *labyrinthica* two lamellae are visible at the aperture. The shell of *affinis* is more nearly conical in form than that of *labyrinthica*.

The basal folds of *affinis* are 8 in number, 5 of which are distinctly visible through the translucent base of the shell. These basal folds are much shorter than are those in *labyrinthica* and form a radial series toward the aperture. The parietal lamellae penetrate more deeply than do those of *labyrinthica labyrinthica* but not so far as in the form that is known as *labyrinthica parietalis*.

This comparatively large *Strobilops* is known only from northeastern Illinois in the counties of Lake, McHenry, Kane and Cook. It is a forest snail found in moist woodlands under loose bark and on old decaying wood.

A few years ago little was known concerning the species of the genus *Strobilops*, but thanks to the work of Dr. H. A. Pilsbry, Curator of Mollusca in the Academy of Natural Sciences of Philadelphia, the group has been carefully studied and a number of new species and races have been discovered. Of the nine species and varieties found in the United States and Canada, seven are known from Illinois. Recognition of specific variations has come about as a result of the method Dr. Pilsbry used of opening the shell for the examination of the lamellae and folds. The family Strobilopsidae has been well discussed and the species beautifully illustrated in Volume 28 of the *Manual of Conchology*, published by the Academy of Natural Sciences of Philadelphia in 1927.

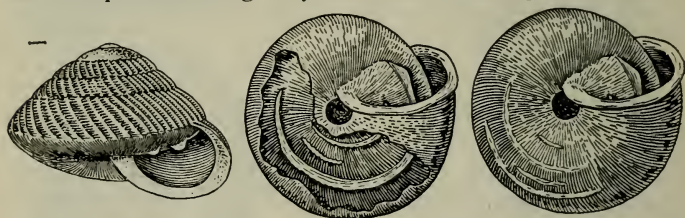


STROBILOPS AENEA Pilsbry

A recently recognized species of *Strobilops*, *aenea* may be known by its depressed spire and bluntly angular periphery. The base of the shell is more flattened than that in any other species of this genus.

Strobilops aenea aenea Pilsbry. The shell of the typical variety, which measures about one-eighth inch (2.00-2.75 mm.) in diameter, is dark brown with a peculiar golden gleam, unlike the coloration of any other shell of the genus.

The typical *Strobilops aenea* has 2 emerging parietal lamellae, the infraparietal being very thin and extending but a short

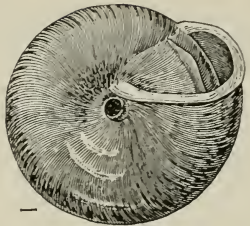


distance beyond the edge of the peristome. Internally, the parietal lamella is large and heavy, but the other lamellae are thin, and the interparietal lamella is very short. The lamellae are nodose or sawlike only far within the aperture. The 4 basal folds may be seen through the translucent base of the shell. They are peculiar in the fact that they alternate in size. The umbilicus is comparatively large.

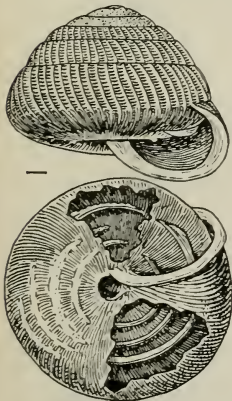
Like the typical *Strobilops labyrinthica*, the typical *Strobilops aenea* is distributed widely in Illinois. The northernmost county from which specimens of *aenea aenea* have been seen is La Salle, and from this locality southward it is the most common *Strobilops*. It has erroneously been recorded as *labyrinthica*, from which it is markedly distinct.

The usual habitat of *Strobilops aenea aenea* is in the higher uplands, in forests of oak, elm, hickory, dogwood, walnut, sassafras and ironwood. Only rarely is it found in a floodplain valley and then only when the situation is dry. It is often abundant under loose or started bark, on the underside of old wood and on chips from forest cuttings. It occurs in old woods and in recent cut-overs wherever logs and decaying wood have accumulated.

Strobilops aenea micromphala Pilsbry. The *micromphala* variety of *Strobilops aenea* is distinguished by a narrower umbilicus than is found in many forms of the genus *Strobilops*. Only the parietal lamella emerges from the aperture, and but 2 or 3 basal folds may be seen through the translucent base of the shell. The form of *micromphala* is more convex than that of the typical *aenea*, and the color is cinnamon-brown without the golden tint of the typical species. The shell of *micromphala* is less than one-eighth inch (2.0-2.5 mm.) in diameter.



The variety *micromphala* is common to the lower Mississippi Valley and to the southwest in Arkansas and Louisiana. The present Illinois records, from White, Washington and Hardin counties, are the most northern known. The habitat of this form is in woodland areas similar to some of those inhabited by *Strobilops aenea aenea*.



Strobilops aenea spiralis Pilsbry. A very rare *Strobilops*, the variety *spiralis* may be known by its broad turban-shaped spire, its light brown color and particularly by its parietal lamella, which is very long and makes nearly or almost a full turn of a whorl. The other parietal lamellae are deep seated, also. The basal folds are placed deep within the whorl. The race *spiralis* is distinct in its shape and in the position of the parietal lamella. It is known in Illinois only from Union County, where it is found in the heavily wooded hill region at Alto Pass. The size is less than one-eighth inch (2.5 mm.) in diameter.

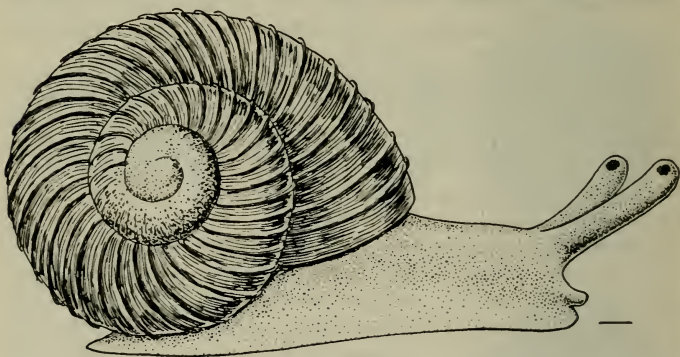
This snail was first observed in Logan County, Arkansas, and its previously published localities include only Wyandotte, Indiana, and two localities in Alabama. The Illinois record adds another state to the distribution list.

Family VALLONIIDAE

Snails belonging to the family Valloniidae are abundant in Illinois, although only one genus of this family, *Vallonia*, is found in the state.

Genus VALLONIA Risso

Shells of the genus *Vallonia* are small in size; none of them exceeds one-eighth inch (2.75 mm.) in diameter, and several are smaller (2.0 mm.). In color most of the shells are waxy



white, although some are reddish or brownish. Shells in some species are dull; in others they are shiny or glassy in appearance. Shells in this genus are flattened or only slightly elevated, and in most species the $3\frac{1}{2}$ or 4 whorls seem to be coiled in the same plane. This structure, which allows all of the whorls to be seen from the underside, forms a very broad umbilicus. The aperture varies in shape, being either round or oval. The peristome is reflected, as in the large *Polygyra* snails. The Valloniidae have no folds or lamellae within the aperture. In some species the surface of the shell is covered with thin, membranous ribs which are evenly spaced and stand erect from the surface of the whorls. In other species the surface is marked only by rounded ribs formed by the growth lines.

The animal is small in size and yellowish white in color. The cylindrical eye peduncles are not enlarged at the end as in *Strobilops*; the tentacles are short. When the animal is

crawling the edge of the foot is somewhat wavy or crenulated. The figure pictures *Vallonia costata*.

The tiny *Vallonia* snails found in Illinois live in many diverse habitats, from dry railroad embankments to wet flood-plain areas. They are found in civilization more often than any other Illinois snail and are observed in cellars, in yards of residences and other similar places. Frequently they are found under wet boards in shady places. They are more gregarious than any other Illinois snail, and sometimes hundreds of specimens are found in one place.

The genus *Vallonia* divides into two distinct groups. In one group are the species having a shell that is almost smooth and a sculpture consisting of fine lines of growth. In the second group are the species having a shell marked by many erect, more or less equally spaced membranous ribs. Of the species found in Illinois, *Vallonia pulchella* and *Vallonia excentrica* belong to the smooth group, and *Vallonia costata* and *Vallonia parvula* belong to the costate or ribbed group.

The family Valloniidae is an old one and its species are distributed well over the world, including North America, Asia, Europe and northern Africa. It has been introduced into Australia and the Island of Mauritius. Because of their small size, specimens of Valloniidae are often inadvertently transported on greenhouse plants.

Key to Species

1. Shell costate, provided with projecting membranous ribs,
pp. 116, 119.....2
Shell almost smooth, showing only fine growth lines, p.
118.....3
2. Umbilicus comparatively small; spire slightly elevated....
.....*costata*, p. 119
Umbilicus wide; spire not elevated.....*parvula*, p. 119
3. Shell straw colored; umbilicus ovate because of a rapid ex-
pansion near latter half of body whorl.....*excentrica*, p. 118
Shell clear-glass colored; umbilicus round.....*pulchella*, p. 118



The beetle loves his unpretending track,
The snail the house he carries on his back;
The far-fetched worm with pleasure would disown
The bed we give him though of softest down;
A noble instinct; in all kinds the same,
All ranks!

—WILLIAM WORDSWORTH, *Liberty*

VALLONIA PULCHELLA (Müller)

The shell of the snail *Vallonia pulchella* is little more than one-sixteenth inch (2.0-2.5 mm.) in diameter. It is a glassy white in color and is almost transparent. The base of the shell and the umbilicus are round.

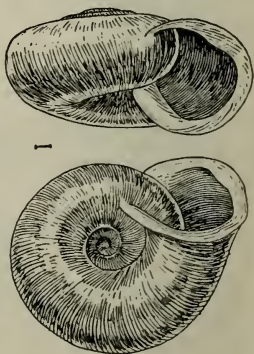
Apparently common in all parts of Illinois, *Vallonia pulchella* has a variety of habitats: floodplain areas of streams in woods of oak and elm; isolated woodlands of oak, elm, hickory, walnut and beech; and railroad embankments, among grass and bushes. In the woods it is found about debris and on wet logs. This snail has a wide distribution outside of North America, including Europe, Asia and northern Africa. It is distributed over most parts of the United States; however,

Vallonia pulchella is not found in territory bordering the Pacific Coast. It is said to occur with *Vallonia excentrica*.

VALLONIA EXCENTRICA Sterki

Slightly smaller than *Vallonia pulchella*, the shell of *Vallonia excentrica* is about one-sixteenth inch (2 mm.) in diameter. It may be recognized by the form of the umbilicus, which is much elongated and very sharply expanded near the last half of the body whorl. The translucent, straw-colored shell as seen from the base is not regularly circular, but is ovate. The name *excentrica* is given because of these peculiarities.

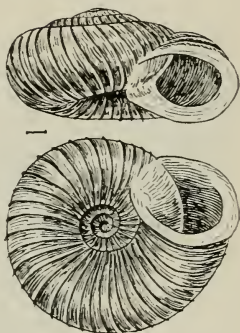
In Illinois, this snail, known as the eccentric *Vallonia*, has been reported only from Champaign County, on the south side of the University of Illinois campus and in the yard of Dr. H. J. Van Cleave, Urbana. It is known from Europe and parts of America.



VALLONIA COSTATA (Müller)

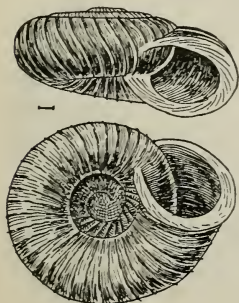
The snail *Vallonia costata*, about the size of *Vallonia pulchella*, may be recognized by the series of regularly spaced membranous ribs which mark the surface of the shell and are conspicuous on the body whorl. This whorl angles downward a trifle near the aperture. The shell of this species measures over one-sixteenth inch (2.5 mm.) in diameter. The spire is flattened, and all the whorls are visible in the rounded umbilicus. The aperture is rounded, and the white peristome is wide and flat. In color the shell is usually gray, but in some specimens it is reddish.

The costate *Vallonia* is apparently rare in Illinois and is known from only the northern half of the state. Its usual habitat appears to be on floodplains in river valleys, but specimens have been found on a railroad embankment near Champaign, representing a prairie habitat. Champaign County is the southernmost area from which specimens have been reported.



VALLONIA PARVULA Sterki

About one-sixteenth inch (1.5-2.0 mm.) in diameter, *Vallonia parvula* has an umbilicus proportionately larger than that of *Vallonia costata*. The spire is less elevated, and the last whorl does not angle downward so abruptly near the aperture as in *costata*. The color is a dull waxy white.



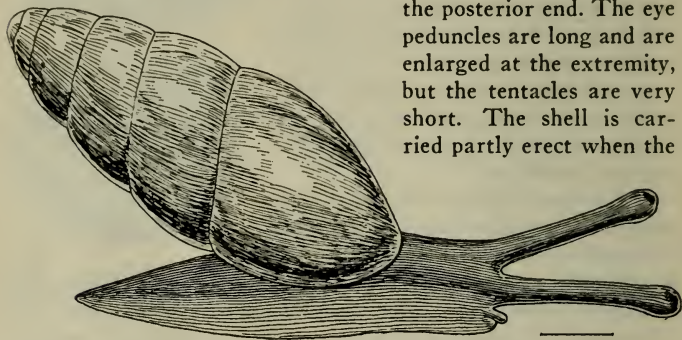
The Illinois habitats of *Vallonia parvula* vary from woodlands adjoining small lakes to bluffs of the Ohio and Mississippi rivers. Oak, elm and hickory are the forest trees most usually present in these localities. The species is found on small sticks and on the bark of logs. It has about the same distribution as *costata*.

Family COCHLICOPIDAE

Shells of the family Cochlicopidae are long, cylindrical, smooth and shining. They are without umbilical openings.

Genus COCHLICOPA (Ferussac) Risso

The animal of the genus *Cochlicopa* is blue-black in color, lighter on the foot, which is broad in front and tapering toward the posterior end. The eye peduncles are long and are enlarged at the extremity, but the tentacles are very short. The shell is carried partly erect when the



animal is in motion as in the above figure of *Cochlicopa lubrica*. One species and one variety of *Cochlicopa* live in North America.

COCHLICOPA LUBRICA (Müller)

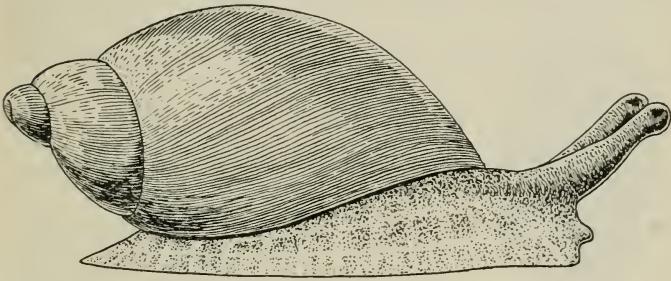
With a shell close to one-fourth inch (6 mm.) in length, *Cochlicopa lubrica* cannot be mistaken for any other species found in Illinois. Its almost cylindrical form, shining surface and bright horn color at once identify the shell, which has six whorls. The spire is considerably longer than the aperture.

This snail is not common in Illinois, and the records are widely scattered. In this state, its habitat is varied. It is found in ravines and isolated woodlands, usually under dead leaves and loose bark of logs. It is distributed throughout the northern part of the United States and also throughout Europe.



Family SUCCINEIDAE

The Succineidae, the amber snails, may be recognized by their thin, yellowish, oval shells with very large apertures and small spires. Pictured below is a specimen of *Succinea avara*.



The animal, which cannot retract completely within the shell, is bluntly rounded before, tapering at the posterior extremity. The eye peduncles are short and thick; the tentacles are very short. The body, which varies from yellowish to black, is mottled and streaked. The same animal may be dark colored in spring and yellowish in summer and fall.

Genus SUCCINEA Draparnaud

The Succineidae family contains but one genus, *Succinea*, represented in Illinois by five species and six races.

Key to Species

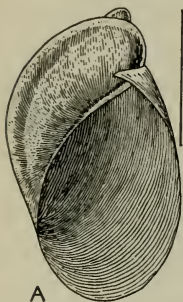
- 1. Aperture round, not much higher than wide, occupying three-fifths length of shell.....*avara*, p. 124
- Aperture ovate, occupying three-fourths to four-fifths length of shell, p. 122.....2
- 2. Shell ovoid, somewhat inflated; aperture ovate; spire broad, p. 122.....3
- Shell much elongated, narrow; aperture narrowly ovate; spire acute, p. 125.....4
- 3. Aperture regularly ovate; color greenish or yellowish.....*ovalis*, p. 122
- Aperture obliquely ovate, expanded at lower part; color amber.....*concordialis*, p. 123
- 4. Aperture occupying three-fourths length of shell, little expanded at lower part.....*retusa*, p. 125
- Aperture occupying four-fifths length of shell, notably expanded at lower part.....*salleana*, p. 127



SUCCINEA OVALIS Say -

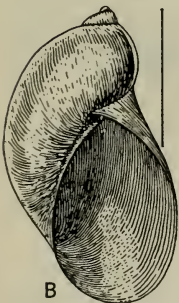
Largest of the Succineidae found in Illinois is *Succinea ovalis*. Snails of this species live under leaves and other forest debris that affords concealment during the day. However, in wet

weather *ovalis* snails may often be seen on tree trunks at a considerable height (12-15 feet) above the ground, and sometimes even in dry weather they may be found clinging to these high places, the animals having decided to await the next rainy period. Two forms of this species, *ovalis ovalis* and *ovalis optima*, are to be found in Illinois.



A

Succinea ovalis ovalis Say. Fig. A. The shell of the typical form, first studied by Thomas Say in Philadelphia, Pennsylvania, is small, not exceeding three-fourths inch (18 mm.) in height. It is wide and the spire is short. The width of the shell is about half the height.



B

The shell of *ovalis ovalis* may be recognized by its oval shape, by its very large aperture, which occupies the greater part of the length, and by the peculiar greenish-yellow color of the shell. The decidedly greenish tint upon the rather thin shell is one of the principal distinguishing characteristics of *ovalis ovalis*.

A rare snail in Illinois, *Succinea ovalis ovalis* apparently occurs only sporadically in the northern part of the state and is rare in the southern portion. Rock Island, Fulton and Brown counties are represented in Illinois collections.

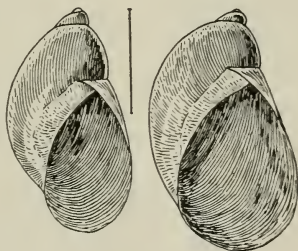
Succinea ovalis optima Pilsbry. Fig. B. The large variety *ovalis optima*, which frequently attains a height of almost 1 inch (22 mm.), is distinguished from the typical form by its somewhat longer spire and particularly by its yellow or amber color, which is very different from the greenish shade of *ovalis ovalis*. The shell is relatively thick, and the surface is marked by coarse sculpture. The long axis of the shell is usually oblique. This variety, the common large *Succinea* of Illinois, occurs

almost throughout the state. It is apparently more abundant in the northern than in the southern part of Illinois.

The habitat of this amber snail is more often on a floodplain of a river valley than in any other location. Of a dozen known localities in different parts of the state, 10 are in floodplain areas where the forest consists of elm, oak, hickory, willow, sycamore and maple. In a few places, *Succinea ovalis optima* occurs on upland areas in woodlands where there is abundant shade.

SUCCINEA CONCORDIALIS Gould

A southern species of *Succinea*, *concordialis* is about one-half inch (14 mm.) in height. The color of the shell is a rather deep amber; the apical whorls are somewhat reddish or orange colored. The shell is thin. The body whorl is flattened near the upper part and swollen or sac-like at the lower part. The aperture is obliquely ovate, and the columellar region is notably concave. This species may be differentiated from *retusa*, which it somewhat resembles, by the swollen form of the body whorl and by the reddish apex.



Succinea concordialis is known in Illinois from but one locality. A. A. Hinkley has collected it on the bank of the Little Muddy River near Dubois, Washington County, "north of the R. R. bridge on the west side of the embankment." This species is common in the south, in Louisiana, Alabama and Texas. It is known also from Des Moines, Iowa, where, Pilsbry records, "It lives on the moist earth immediately adjacent to the water's edge, and where found is usually abundant."

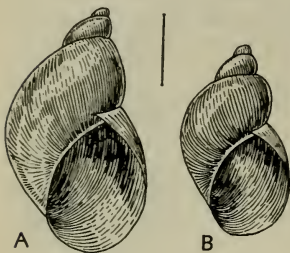
Pictured on this page are two individual variations which occur at Dubois. One is narrow, which is typical, and the other is slightly inflated.

The length of the vertical line is the height of the specimen represented by the figure at the left. The figure at the right, representing a specimen which is a variation from the typical shell of *Succinea concordialis*, is proportionately larger than that of the typical shell.

SUCCINEA AVARA Say

Two varieties of *Succinea avara* are found in Illinois: the typical *avara* and the smaller form called *avara wardiana*.

This species, containing the smallest of our *Succinea* snails, is distributed throughout Illinois wherever suitable localities are found. Varied habitats of these snails include oak, elm, walnut and ironwood in hillside regions; oak, elm, birch, beech and maple in floodplain localities; grass, weeds and low bushes on railroad embankments.



Succinea avara avara Say. Fig.

A. The shell of *Succinea avara*

avara sometimes approaches one-half inch (9-12 mm.) in height. Usually thin, it is yellow or somewhat greenish in color. It has 3 convex whorls separated by deep sutures. The body whorl is large, but not greatly expanded, and is ovoid in shape, broadly rounded below and somewhat acutely rounded above. The aperture is ovate. The spire and aperture are about equal in length. The young shell is usually covered with dirt that adheres to the rough surface. The vertical line represents actual size of the typical shell. The other shell is proportionally smaller.

Succinea vermeta of Thomas Say is considered an absolute synonym of *avara avara*. Say's description of *vermeta* was based apparently on an immature shell. In the type locality at New Harmony, Indiana, many variations may be found from one with an almost scalariform spire to one in which the whorls are flatly rounded.

In *A Catalogue of the Mollusca of Illinois* (page 114), *Succinea grosvenorii* Lea is listed from Canton, Fulton County, on the authority of Nason and Wolf, two Illinois collectors of mollusks. The shells responsible for this listing were incorrectly identified; they are in reality large specimens of *Succinea avara*.

Succinea avara wardiana Lea. Fig. B. This variety is smaller than the typical *avara*. The shell, not exceeding a quarter inch (6-7 mm.) in length, is narrower than that of *avara avara*, and the aperture is more nearly round than that of the typical form. It is found in the habitats indicated for the species.

SUCCINEA RETUSA Lea

Unlike most *Succinea* snails, two species, *retusa* and *salleana*, are inhabitants of wet and marshy places, living on partly submerged sticks, on water plants, such as cattails, or on wet mud near the margins of streams.

The shell of *Succinea retusa*, usually bright amber in color, has a short spire and a very large and long aperture. *Succinea concordialis* is the only Illinois species which might be confused with *retusa*, but *concordialis* usually has a wider shell, and its aperture is obliquely ovate.

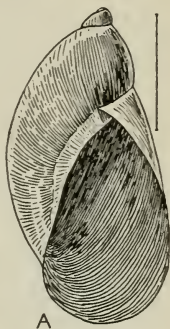
The animals of *Succinea retusa* vary in color from yellowish to black, and are more or less mottled or spotted. A curious change in color coincident with the season has been observed in this species, for the animal is dark colored or black in the spring and is of the same amber color as the shell in late summer and autumn.

Like many other Illinois land snails, *retusa* varies considerably in form, and several varieties have been named.

Succinea retusa retusa Lea. Fig. A. The shell of the typical form is about five-eighths to three-fourths inch (16-20 mm.) in height. It is very fragile, the shell substance being thin. The spire is short and pointed. The aperture, which is narrow and acutely angled above, is long and wide below. It extends about two-thirds the length of the entire shell. The edge of the lip is sharp and thin. The shell has 3 whorls, the first 2 small, the last or body whorl large and elongated. The columellar region is arched, and the parietal wall usually has a light wash of callus.

Found in various parts of the state, *Succinea retusa retusa* has been reported more often from the northern than from the southern half.

Succinea retusa magister Pilsbry. Fig. B. The variety *retusa magister* has a shell which measures about three-fourths inch (18-20 mm.) in height. It is slightly longer than that of *retusa retusa*. The spire is usually shorter and wider than in the typical form, and the aperture longer and wider. The color is usually lighter than that of *retusa retusa*, often grayish. At



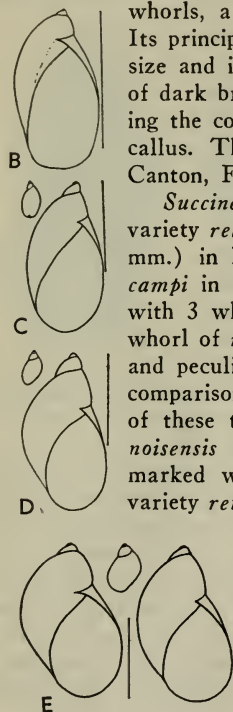
present *retusa magister* is known in Illinois only from Rock Island, Cook, Peoria and Fulton counties.

Succinea retusa decampi Tryon. Fig. C. The shell of *retusa decampi*, which is smaller than that of the typical *retusa*, measures about one-half inch (10-14 mm.) in height. It has 3 whorls, a short spire and a very large aperture. Its principal distinguishing features are its smaller size and its ash-colored shell, which has a margin of dark brown bordering the outer lip and ascending the columellar region as far as the columellar callus. This variety is known in Illinois only from Canton, Fulton County.

Succinea retusa illinoisensis Wolf. Fig. D. The variety *retusa illinoisensis*, about one-half inch (12 mm.) in height, differs from *Succinea retusa decampi* in having a longer and more pointed spire with 3 whorls and a shorter aperture. The body whorl of *retusa illinoisensis* is wider in the middle and peculiarly humped or angled, as is evident in comparison of the figures of back views of shells of these two varieties. The color of *retusa illinoisensis* is ashy, but the aperture edge is not marked with brown as in *retusa decampi*. The variety *retusa illinoisensis* is known in Illinois only from Fulton and White counties.

John Wolf, whose name is given as the author of this *Succinea*, did not publish a description of it, and its only record in molluscan literature is in *A Catalogue of the Mollusca of Illinois* (page 114), where it is listed as a species, *Succinea illinoisensis*. The specimens thought to represent Wolf's species are from the type locality, Canton, Fulton County, and the use in the present field-book of the name *Succinea retusa illinoisensis* for a variety which appears recognizable will remove it from the list of nude names.

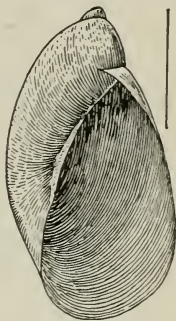
Succinea retusa peoriensis Wolf. Fig E. The amber shell of this small variety is about three-eighths inch (8-11 mm.) in height. Its ovoid shell has an obtuse spire, which is proportionally longer than that of most of the other varieties, and a more nearly circular aperture. This variety appears to be rare in



Illinois and is at present known from only four places; however, these represent almost the length of the state. Specimens have been seen from Will, Peoria, Tazewell and Washington counties.

SUCCINEA SALLEANA Pfeiffer

The shell of *Succinea salleana* may be distinguished from that of *Succinea retusa*, which it greatly resembles, by the former's shorter spire and its longer, wider aperture, which flares more in the lower part than does that of *retusa*. The columellar region is somewhat indented, and the small callus bends around into the upper part of the aperture in a different manner than does that of *retusa*. *Succinea salleana* occurs near water, and its handsome, gold-tinted, amber shell attracts immediate attention. Average shells are about five-eighths of an inch (16 mm.) in height.



The only specimens at present known from Illinois were collected by Leslie Hubricht from Pittsburg Lake, near East St. Louis, St. Clair County, and from Hill Lake, three miles northwest of Columbia, a town that is located in Monroe County.

Succinea salleana is a species common in Louisiana, and its presence in Illinois, more than 400 miles north, is one of the perplexing features of distribution. Its abundance at both of the recorded Illinois localities indicates that it has been in the state for a long time and that it has either been overlooked by previous students or else erroneously identified as one of the *retusa* group.



January, 1758: Does Mary cough in the night? Two or three snails boiled in her barley-water or tea-water, or whatever she drinks might be of great service to her; taken in time they have done *wonderful cures*. She must know nothing of it. They give no manner of taste. It would be best if nobody should know but yourself, and I should imagine *six* or *eight* boiled in a quart of water and strained off and put into a bottle, would be a good way, adding a spoonful or two of that to every liquid she takes. They must be fresh done every two or three days, otherwise they grow too thick.—MARY (GRANVILLE) PENDARES DELANEY, *Autobiography and Correspondence*

Family LIMACIDAE

The snails considered in the preceding pages have spiral shells which are large enough to retain all or nearly all of the contracted animal. However, several species of snails called slugs have little or no external shell. In one family found in Illinois, the Limacidae, a thin, shelly, non-spiral plate of calcareous matter acts as a partial protection to the lung.

A characteristic of all slugs is the ability of the animal to exude quantities of mucus when it is disturbed. This mucus is so tenacious that with it the animal may suspend itself from a bush or weed and even descend to the ground, much as some caterpillars do with their silken thread.

Most of the native slugs found in Illinois are small and inconspicuous, but in the states bordering the Pacific Ocean occur several species belonging to the family Arionidae which attain a length of nearly 6 inches. The largest species, *Ariolimax columbianus* (Gould), is of a greenish yellow color, sometimes with irregular purplish blotches. *Philomycus carolinianus*, which is very common in Illinois, is the nearest approach in size to this western giant among slugs.

In the Limacidae, the long and narrow body is somewhat humped toward the middle and front end, where a rounded projection called the mantle covers the lung region. The eye peduncles are long, rounded and tapering. The tentacles are very short. The body is covered with elongated tubercles separated by shallow furrows, which are often marked by color lines. The tail or posterior part of the animal tapers to a point; the upper side of the tail is carinated near the end. At the edge of the mantle, near the posterior end, animals of the family Limacidae have a small opening, which is the breathing pore or orifice.

The small Limacidae are vegetable feeders, eating decaying vegetation, as well as healthy plants.

Genus DEROCERAS Rafinesque

The genus *Deroceras* includes small Limacidae not exceeding 2 inches in length. In slugs of this genus, the mantle covers only a small portion of the long, narrow body.

Deroceras has long been known under the name *Agriolimax*,

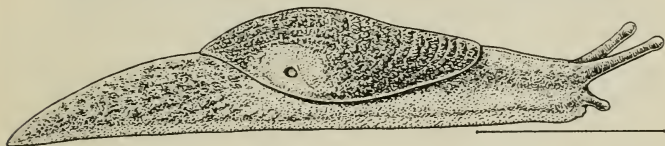
given by the German naturalist Mörch in 1865, but *Deroceras*, an earlier name for the same group, proposed by the French naturalist Rafinesque in 1820, must take precedence.

Key to Species

- Upper surface of body covered with flattened tubercles; breathing pore with a white border.....*agreste*, p. 130
 Upper surface of body covered with prominent tubercles; breathing pore not having a white border.....*gracile*, p. 129

DEROCERAS GRACILE Rafinesque

Smallest of Illinois slugs, *Deroceras gracile* is about an inch (25 mm.) in length when in motion. Although generally gray or yellowish in color, it is sometimes almost black. It is



without color spots or markings of any kind. The mantle, which is not much elevated above the general contour of the body, is oval in shape. Distinct, elongated tubercles cover the back of *gracile*. Its foot is narrow and whitish in color. The mucus of this species is thin and watery.

Deroceras gracile, which is widely distributed over Illinois, is the common small slug of forests, fields and cities. In the woods it may be found under loose or started bark, pieces of dead tree limbs, chips, stones and almost any other kind of forest debris. It appears to be solitary in habit, for usually only one specimen is found under one piece of wood, although almost every piece in a given area may contain one of these animals.

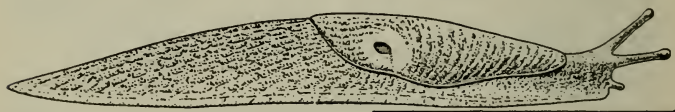
It is common in towns and cities; here slimy marks, frequently seen in the early morning hours, show that *gracile* has been on a nocturnal hunt for food. It may do considerable damage to truck gardens by eating the tender shoots of plants. It is very fond of lettuce and other succulent plants of this nature. If a garden is infested with these slugs, and they are doing damage, they may be exterminated by fine ashes placed about the plants. Contact with ashes causes the slugs to secrete

large quantities of mucus, which exhausts them and results in their death.

The specific name *campestris*, bestowed on this small slug by the American conchologist William G. Binney in 1841, must yield to the designation *gracile*, given by the French naturalist Rafinesque in 1820.

DEROCERAS AGRESTE (Linnaeus)

The slug *Deroceras agreste* is larger than *Deroceras gracile*, attaining a length of 2 inches (5 cm.), although most specimens are about 1½ inches (4 cm.) in length. The body of *agreste* is



thicker than that of its smaller relative, the mantle is more prominent, the breathing pore is surrounded by a whitish border and the rugose surface of the tubercles is edged with darker lines. The color of *agreste* is variable. Some specimens are a uniform gray; others are blackish, whitish, yellow, amber-colored or brown, usually spotted or blotched with irregular black markings. The foot is yellowish-white, and the copious mucus is milky.

The *agreste* slug is believed to have been introduced into the United States from Europe, where it is common. It was first noted in Boston, New York and Philadelphia in the early part of the last century and was then confined to the cities of the seacoast. It is now distributed over much of the eastern and central parts of the United States. In Illinois it has been recorded from Champaign, Clark, Douglas, Kankakee, McDonough, Mercer, Piatt, Stephenson and Vermilion counties, indicating a rather wide distribution. This slug may do considerable damage to garden vegetables if it is present in large numbers. It may be controlled in the same manner as its smaller relative, *gracile*.

A European writer, R. F. Scharff, states that the large slug *Limax maximus* is a less serious pest in the garden than the smaller slugs of the genus *Deroceras*, which appear to be especially fond of green plants.

Family PHILOMYCIDAE

The Philomycidae are a family of slugs in which the mantle usually covers three-fourths or more of the length of the body, instead of only the anterior part as in the family Limacidae. The short tentacles of the Philomycidae are placed immediately beneath the relatively short eye peduncles, which have a bulbous termination carrying the eye. The comparatively large breathing orifice is near the anterior extremity of the right side. Beneath the mantle and near the posterior extremity is a rudimentary shell that is connected with the outer surface of the inner membrane of the body, but not with the mantle. It is very small (0.5 mm.) in length, irregular in shape, of light horn color, thin and wrinkled.

Key to Genera

- Over 2 inches long; mantle covering entire body. *Philomycus*, p. 131
- Less than 1 inch long; mantle covering all but anterior one-sixth of body..... *Pallifera*, p. 132

Genus PHILOMYCUS Rafinesque

The genus *Philomycus* includes the larger slugs which have the entire body covered by the mantle. This mantle is usually marked with brown and black spots.

PHILOMYCUS CAROLINIANUS (Bosc)

The slug *Philomycus carolinianus* is usually 2 to 3 inches (5-8 cm.) in length, although specimens have been found measuring 4 inches (10 cm.). The body is subcylindrical and elongated.



It is flattened and narrowly rounded at the posterior end. The mantle is covered with rough protuberances arranged longitudinally. The back is yellow or whitish, variegated with brown and black spots. These spots form three rather ill-defined

longitudinal bands down the back and sides of the animal. The long, narrow, whitish foot extends slightly beyond the posterior end of the mantle.

Philomycus carolinianus has a wide distribution over Illinois. It is a forest-loving species usually found in moist woodlands under bark that is well started and that allows ample space for the fat body of this slug. A single large prostrate tree trunk may contain as many as 20 specimens of this species, often of many sizes and ages from young to mature.

A characteristic of this slug is its habit of excreting an unusual amount of extremely sticky mucus when handled or disturbed.

In nearly all books on Mollusca, this slug is known as *carolinensis*, but the name given to it by its describer is *carolinianus*.

Genus PALLIFERA Morse

The slugs belonging to the genus *Pallifera* measure less than an inch (20 mm.) in length. *Pallifera dorsalis* so much resembles *Deroceras gracile* that the two have no doubt been confused by many students. They are of about the same size, but in *Pallifera* the mantle covers the posterior three-fourths of the body, while in *Deroceras* the small mantle covers only the front part of the body above the respiratory organs.

Key to Species

- Body uniformly ashy or dark gray.....*dorsalis*, p. 132
 Body with dark spots on a whitish or flesh-colored ground.....
*fosteri*, p. 133

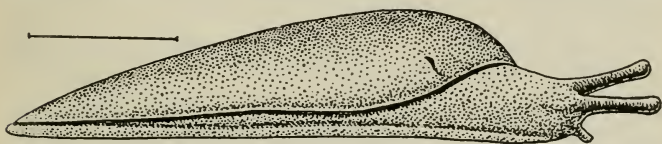
PALLIFERA DORSALIS (Binney)

In Illinois, *Pallifera dorsalis*, less than an inch in length (20 mm.), is ashy or dark gray without color markings. In some other states, however, this species has an interrupted black line extending down the center of the back. The upper surface is covered with rather indistinct furrows separating the glandular projections. The body, narrow and cylindrical, ends in a point.

The short eye peduncles are about as long as the neck, termi-

nating in a small enlargement bearing the eyes. The tentacles are very short.

This slug, found over northern and central Illinois, has not yet been recorded from the extreme southern end of the state.

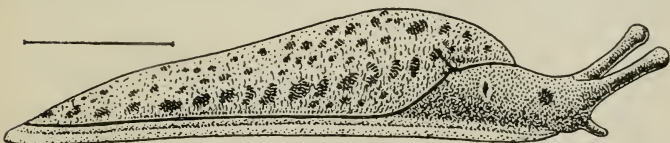


The principal counties represented are Lawrence, Clark, McLean and Carroll. Found in the same habitats as *Philomycus*, it is often associated with that species.

In most works on American Mollusca this species is placed in the genus *Tebennophorus* or *Philomycus*. However, in 1864, Professor E. S. Morse established the genus *Pallifera*, basing it on the peculiar characteristics of the animal's ribbed jaw. *Pallifera* is now a well established genus fully recognized by systematic conchologists.

PALLIFERA FOSTERI F. C. Baker, New Species

The slug *Pallifera fosteri* is less than an inch in length (20 mm.). It is of much the same form as *Pallifera dorsalis*, but it is more humped in front and slightly longer in head and



neck. It may be recognized by the blackish spots on a whitish or flesh-colored mantle. These spots or blotches may form interrupted, irregular longitudinal lines, especially near the base of the mantle, or irregularly spaced clusters of small dotlike spots scattered over the dorsal surface. In some specimens the black spots form coalescing blotches elongated in form.

This species appears to be confined to the southern and central parts of Illinois, Vermilion, Monroe and Wayne counties being represented.

Pallifera fosteri is often found associated with small specimens of *Philomycus carolinianus* under the same log or started bark, for both species live in the same kind of habitat of oak, maple, beech, elm and hickory. Neither of the *Pallifera* species described here is so abundant in individuals as is *Philomycus carolinianus*.

A definite method of identifying slugs is by an examination of the horny jaw in the upper part of the mouth. In *Philomycus*, the jaw is without ribs or plaits and has a strong central projection like a beak. In slugs of the genus *Pallifera* the jaw has several well-defined ribs or plaits. *Pallifera dorsalis* has 7 ribs arranged vertically. *Pallifera fosteri* has usually 4 or 5 ribs placed near the center of the jaw and slanting inwards. Rarely it may have 6 or 3 ribs on the jaw.

The genus *Pallifera* is badly in need of revision. A number of names were given by Rafinesque in 1820 to small slugs of this genus living in the Middle West. One of these names might refer to the species here called *fosteri*. Because a nameless species is out of place in a handbook and also because this species is common in Illinois, it seems necessary to give it a name, even though in a final revision this new species may fall into synonymy because of the discovery of its unity with one of Rafinesque's almost unidentifiable names. The types for this new species are from Oakwood, Champaign County: they consist of two specimens, no. 35082, Museum of Natural History, University of Illinois, and were collected by Dr. T. H. Frison and Dr. H. H. Ross.



The frugal snail, with fore-cast of repose,
Carries his house with him, where'er he goes;
Peeps out—and if there comes a shower of rain,
Retreats to his small domicile amain.
Touch but a tip of him, a horn—'tis well—
He curls up in his sanctuary shell.
He's his own landlord, his own tenant; stay
Long as he will, he dreads no Quarter Day.
Himself he boards and lodges; both invites
And feasts himself; sleeps with himself o' nights.
He spares the upholsterer trouble to procure
Chattels; himself is his own furniture,
And his sole riches. Wheresoe'er he roam
Knock when you will—he's sure to be at home.

—CHARLES LAMB, *The Housekeeper* (from VINCENT BOURNE)

Family ELLOBIIDAE

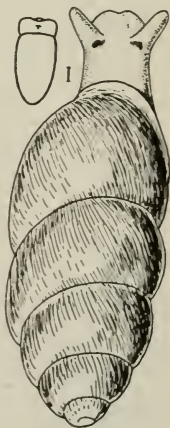
The family Ellobiidae belongs to the suborder Basommatophora of the order Pulmonata. Most of the members of this family are classed as marine shells. A few species, like the carychiums, common in Illinois, live far removed from the sea, under forest debris near water or in other moist places.

In snails of the family Ellobiidae, the shell is somewhat elongated, the spire long or short and the whorls flatly rounded. In most species the elongated aperture usually has one or more folds on the columella, and frequently it also has folds on the outer lip. Figures on the next page show *Carychium* shells broken to illustrate the position of lamellae within the shells.

Genus CARYCHIUM Müller

In the genus *Carychium*, which contains the only species of the family Ellobiidae present in Illinois, the white, almost translucent animal has on the head a protuberance somewhat resembling a snout. The eyes are located on the head at the base of and behind the cylindrical tentacles. The broad foot is blunt before and rounded behind. It is unequally divided into a short fore part and a longer hind part. The base of the foot may be seen by inducing the animal to crawl on a pane of glass. The under view of the animal is shown in the small figure. The large figure pictures an animal and shell of the species *Carychium exiguum*.

The tentacles in animals of this genus, as in other animals of this suborder, are contractile but not invertible as in the true land snails of the suborder Stylommatophora.

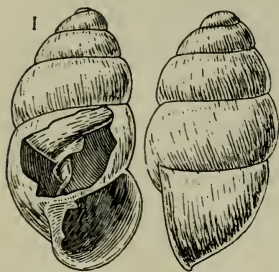


Key to Species

- Surface of shell almost smooth, showing only growth lines.
 *exiguum*, p. 136
 Surface of shell with vertical striations, as well as growth lines. .
 *exile*, p. 136

CARYCHIUM EXIGUUM (Say)

In the species *Carychium exiguum* the shell measures little more than one-sixteenth inch (1.7 mm.) in length. It is white in color and shining or waxy in texture. It has two lamellae,



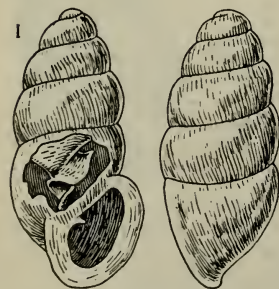
one large and the other small, which extend upward spirally along the columellar axis inside the shell as an evenly ascending shelf. The large lamella is conspicuous at the aperture. The smaller lamella, less conspicuous than the large one, revolves below it.

The shell of *Carychium exiguum* has $4\frac{1}{2}$ relatively inflated whorls. The obliquely oval aperture is approximately one-third of the total length. The peristome is thickened and expanded. The shell surface is almost smooth, but shows faintly the growth lines.

The records indicate that this species is more abundantly distributed in the northern than in the southern part of Illinois.

CARYCHIUM EXILE H. C. Lea

The waxy white shell of *Carychium exile* differs from that of *Carychium exiguum* in being more slender and elongated.



The smaller aperture of *exile* occupies a little less than one-third the length of its shell. *Carychium exile* may be distinguished from *Carychium exiguum* by the sculpture of its shell surface, which is noticeably striated vertically. The shell of *exile*, which measures close to one-sixteenth inch (1.6 mm.) in length, is also a trifle smaller than that of *exiguum*. The large upper lamella of the columella extends well into the cavity of the body

whorl, almost filling it. It is bent sharply downward.

Carychium exile is widely distributed over most of Illinois.

Land Snails
Introduced From Foreign Countries

LAND SNAILS

Introduced From Foreign Countries

In greenhouses and conservatories a few species of land Mollusca have been found which have accidentally been brought to the United States, usually with plants. In some instances these imported species have spread beyond the confines of greenhouses and may be found in yards, cellars and other places in cities.

For the sake of completeness, and because many of the imported species are sure to be found at one time or another by students of Illinois land Mollusca, they are described and figured in this fieldbook.

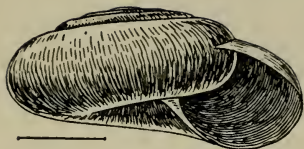
Both snails and slugs are numbered among the introduced species. Of the snails with shells the following species have been recorded: *Oxychilus cellarium*, *Oxychilus lucidum* and *Opeas mauritianum*. Of introduced slugs *Limax maximus*, *Limax flavus* and *Testacella europaea* have been recorded.

Species of foreign slugs other than those reported will probably be found in Illinois. A common European species, *Arion circumscriptus* Johnston, has recently been reported by A. La Rocque from several places in Canada, notably in Nova Scotia and in Quebec and Ontario, near Ottawa and Toronto. Some years ago it was recorded from near Niagara Falls, and there is no reason why it might not be found in the northern part of the United States. A careful examination of the greenhouses in public parks might bring to light a number of species, not only of slugs but of snails, introduced on imported plants.

OXYCHILUS CELLARIUM (Müller)

The shell of the European snail *Oxychilus cellarium* is less than one-half inch (11-12 mm.) in diameter; its height is about half this measurement. It is yellow in color and shining in texture, has a flattened spire showing usually 4 whorls and a rather wide umbilicus. The base is circular and almost flat. The aperture when viewed from the front is obliquely ovate.

The animal of this species is black or blue-black in color

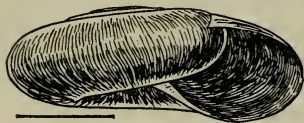


known only from greenhouses in Chicago and Rockford.

This species has been known previously as *Zonites cellaria* and *Vitrea cellaria*, as well as *Oxychilus cellarius*.

OXYCHILUS LUCIDUM (Draparnaud)

The introduced species *Oxychilus lucidum* is larger than *Oxychilus cellarium* and the spire is more nearly flat. The shell of most *lucidum* specimens measures about one-half inch (12.5 mm.) in diameter. The body



whorl is wide and expanded, which causes the aperture to be wider than high. The base of the shell is more nearly flat and the last whorl and the umbilicus

are wider than in *cellarium*. The shell is of the same yellowish color and shining texture as that of *cellarium*.

Both species of *Oxychilus* described here are common in Europe. The larger species is known in Illinois only from the greenhouses in Chicago parks.

OPEAS MAURITIANUM (Pfeiffer)

The small snail *Opeas mauritianum*, an emigrant from the Island of Mauritius, off the coast of Africa, may be known



by its long spire of 7 whorls, its small aperture and its yellowish color and shining texture. Specimens of this species vary in size, av-

eraging about one-half inch (11.0-12.5 mm.) in length.

In Illinois it has been found only in the greenhouses of Chicago parks.

LIMAX MAXIMUS Linnaeus

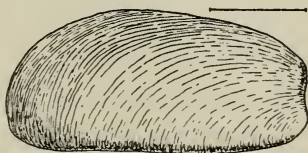
The slug *Limax maximus* was introduced from European countries. It is easily known by its large size, 6 inches (15 cm.) when fully extended.



The body is elongated and subcylindrical and it has a strong carina on the dorsal surface near the posterior end. The surface is covered with elongated tubercles arranged longitudinally. The middle of the back is ashy or light brown with stripes and blotches of black arranged in longitudinal pattern. The sides are lighter in color than the back, and the foot and under parts are dirty white.

The large, oval mantle, with tubercles arranged in an irregular concentric pattern, covers about a third of the body at the anterior end. A large respiratory opening is at the posterior margin of the mantle on the right side. The tentacles are short and blunt. The peduncles are rather long and slender, and the eyes are on swellings at the ends.

Limax maximus, has a small, silvery-white, rudimentary internal shell about one-half inch (13 mm.) long, shown in the small figure. This shell, which is located beneath the mantle over the respiratory cavity, protects the lung.



This large slug is common in many greenhouses in Chicago. At Neoga, Cumberland County, the slug was observed in a well of drinking water in the autumn of 1932. It no doubt has been introduced in other places in Illinois, but records are not known. It is abundant in other parts of the United States. At Rochester, New York, *Limax maximus* has spread over the city, and at present it may be found in many residence yards. It is common in cellars where there is considerable dampness. It is a voracious eater, and, although its principal food consists of fungi, when in cellars

it may do considerable damage by eating vegetables. Meat is often included in its diet, and it has been known to commit cannibalism when several slugs have been confined in a small place. Since it feeds mostly at night, it may be overlooked by the collector. The copious mucus of this slug is very sticky, and flies and other insects soon succumb when covered with the secretion.

LIMAX FLAVUS Linnaeus

The large European slug *Limax flavus* measures 3 to 4 inches (8-10 cm.) in length. It is smaller than *Limax maximus* and differs from it in being somewhat narrower and more



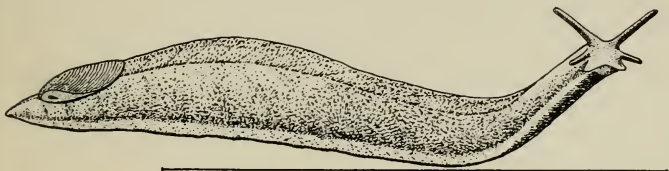
elongated. Its back is brown or yellowish-brown in color and has many oval or oblong spots of grayish color. The mantle is oval, placed near the anterior end, spotted with large rounded blotches and marked by fine, concentric striations. The eye peduncles are long and slender, blue in color and semitransparent. The long narrow foot is yellowish white in color. The sides of the body are without spots.

Limax flavus has been found in Illinois in the greenhouses of Lincoln Park, Chicago, in company with *Limax maximus*. Unlike its larger relative *maximus*, *flavus* appears to be confined to the greenhouses into which it has been introduced and has not ventured into the territory outside of this protecting habitat, although there is apparently no reason why it should not do so in favorable locations. It does not appear to be so hardy as its larger relative, and perhaps this fact accounts for its failure to spread into cellars and back yards, as *maximus* has done.

TESTACELLA EUROPAEA de Roissy

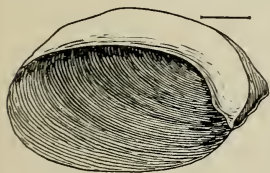
The peculiar sluglike mollusk *Testacella europaea* is the only member of the family Testacellidae to be recorded from Illinois. The animal, which measures 2 to 3 inches (5-8 cm.) in length,

bears a small ear-shaped shell near the posterior end of the body. The body is subcylindrical, broad and rounded at the



posterior end, tapering gradually toward the anterior end of the animal.

The surface of the body is roughened by small folds and furrows. The eye peduncles are rather long and tapering, and the eyes are located at the tip. The tentacles are very short. The mantle is very small and is covered by the shell. The back and sides of the animal are brownish or black, and the base and sides of the foot are light yellow in color. The small, chestnut-brown shell is approximately one-fourth inch (7 mm.)



in length, ear-shaped and, in part, spiral. The excavated columellar region of the shell is broad and flat. The surface is roughened by growth lines. The interior of the shell is pearly white.

This slug is rare in the United States, and in Illinois it has been recorded only from the greenhouses in Lincoln Park, Chicago, where a few specimens have been found. It is a truly predacious snail in its natural environment, feeding upon worms, other mollusks and even upon members of its own species. It will pursue an earthworm through its subterranean burrows with the persistency and ferocity of a tiger. During the day, *Testacella europaea* hides by burying itself in the ground, often to a considerable depth. It is a common species in the southern part of Europe.

It is incorrectly recorded in this country as *Testacella haliotoidea* or *Testacella haliotide* Ferussac; another form of the same name is applied in Europe to a much larger species, 3 to 5 inches (8-13 cm.) in length, known as *Testacella haliotoides* Lamarck.

Land Snails
Of Uncertain Presence in Illinois

LAND SNAILS

Of Uncertain Presence in Illinois

From certain places in Illinois have been recorded several species of land mollusks not found in collections made by the molluscan survey of 1931-1932 or in any other collections studied by the author of this fieldbook. Since the student may encounter these names in papers on Illinois mollusks, and particularly since they appear in *A Catalogue of the Mollusca of Illinois*, published in 1906, it has been deemed important that they be noted and commented upon. Page references below are to the *Catalogue*.

Bifidaria pentodon floridana Dall. Page 112.

Known in present literature as *Gastrocopta pentodon floridana* (Dall), this form is found in Florida. The shell upon which the Illinois record is based is believed to be only a slight variation of the typical *Gastrocopta pentodon*.

Pupilla muscorum (Linnaeus). Page 112.

This species is listed from Mercer County by Marsh. It has not been found in any collection examined by the author of this fieldbook, and its presence in Illinois is doubtful. It is rare in Michigan and is not recorded from Indiana.

Vertigo gouldii Binney. Page 112.

This small pupoid is recorded by Hinkley from Rockford, Winnebago County, and by Marsh from Will County. *Vertigo gouldii* is a northern species, common in Michigan and Minnesota, but its presence in Illinois is to be strongly doubted. It has not been found in Indiana.

Succinea nuttalliana Lea. Page 114.

Recorded from Rockford, Winnebago County, by Hinkley and from Fulton County by Wolf, this is a western species inhabiting Oregon and California; hence, its presence in Illinois is to be questioned. The record is without doubt founded on specimens of *Succinea retusa*, which greatly resemble *nuttalliana*.

Succinea higginsi Bland. Page 114.

Described from Put in Bay on Lake Erie, this species was recorded from Rock Island County by Marsh. It is possible that a form of *Succinea ovalis* might have been mistaken for this species.

Succinea aurea Lea. Page 114.

This species, recorded from Effingham County by Marsh, is known from Ohio and from Clark County, Indiana. No specimens have been seen from Illinois by the author of this fieldbook.

Succinea grosvenorii Lea. Page 114.

This species was recorded by Nason and Wolf from Canton, Fulton County. The specimens thought by these men to be *grosvenorii* are now known to be minor variations of *Succinea avara*.

Polygyra sayii (Binney), same as *Polygyra sayana* Pilsbry. Page 115.

Recorded from northern Illinois by Calkins and from Edgar County by Marsh, this very distinct species has not been seen in any Illinois collections examined by the author of the present work. It is about three-fourths inch in diameter, has a wide and deep umbilicus and a heavy denticle on the parietal wall. The records might have been founded on small specimens of the unicolored form of *Polygyra profunda*. *Polygyra sayana* has not been recorded from Indiana and in Michigan is known only from the northern part of the state. It is common in the eastern part of the United States.

Polygyra mitchelliana (Lea). Page 117.

This *Polygyra* has been recorded from three counties: from La Salle by Baker and Calkins, from Mercer by Marsh and from Fulton by Strode. No specimens of the true *mitchelliana* have been seen in any of the material examined by the author of this fieldbook. Several lots labeled under this name proved to be small specimens of *Polygyra pennsylvanica*. *Polygyra mitchelliana* may inhabit some part of Illinois not yet examined, for it occurs in Indiana and Michigan. It is a smaller species than *pennsylvanica*, which has a heavier shell, a much thicker reflected peristome, a sculpture that is coarse and a surface that

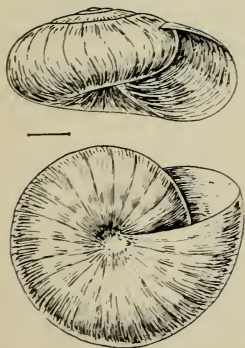
is dull, not shining. The aperture is rounded in *mittelliiana*, while it is transversely narrowed in *pennsylvanica*.

Omphalina inornata (Say). Page 119.

Now known as *Mesomphix inornatus*, this species has been recorded from La Salle County by Calkins. No specimens of this characteristic species have been seen from Illinois by the author of this fieldbook. It occurs in southeastern Indiana.

Retinella cryptomphala (Clapp).

Two records of this species have been published as from Illinois. Clapp, in *Nautilus* (Volume 29, page 26, 1915) lists Albion, Edwards County, in the distribution. Hinkley (*Nautilus*, Volume 33, page 15, 1919) lists it from Dubois, Washington County. Specimens from these two places are in the University of Illinois collection, which includes the Edwards County specimens upon which Clapp's record is based. These specimens have a closed umbilicus with a callus, as described by Clapp. There are 150 lots of *Retinella indentata* in the Illinois collection, embracing approximately a thousand specimens; among these a half dozen individuals have the completely closed umbilicus. In the writer's opinion, the specimens referred by Clapp and Hinkley to *cryptomphala* should be referred to *indentata* as pathologic specimens, unless the *cryptomphala* is simply an *indentata* with a closed umbilicus. Specimens of the supposed *cryptomphala* submitted to Dr. Henry A. Pilsbry were referred by him to *indentata*. No authentic specimens of *Retinella cryptomphala* have been seen from Illinois. It is common in Tennessee. A shell of the snail *Retinella cryptomphala* (Clapp),



selected from Tennessee specimens, is here figured for reference by Illinois collectors.

Vitrina limpida Gould. Page 119.

Recorded from La Salle County by Marsh, this is a northern species, living in Michigan and Minnesota. The reference in

Illinois literature undoubtedly resulted from a case of mistaken identity.

Gastrodonta intertexta (Binney). Page 121.

This species is reported from White County by Hinkley and from Vermilion County by Marsh. Curiously enough, all specimens labeled under this name have been found upon examination by the author of this fieldbook to belong to *Ventridens ligerus*. *Ventridens intertextus*, as *Gastrodonta intertexta* is now named, may possibly be found in Illinois, since it is common in Indiana.

Gastrodonta gularis (Say). Page 121.

Calkins recorded this species, now named *Ventridens gularis*, from northern Illinois. This record is very doubtful, and authentic material must be found before the species can be admitted to the Illinois fauna. This is a southern species, the only authenticated record north of the Ohio River being from near New Albany, Floyd County, Indiana.

Gastrodonta interna (Say). Page 121.

This species is recorded from Macoupin County by Marsh. The record is probably a case of mistaken identity. *Gastrodonta interna* occurs in southeastern Indiana, and its presence in Illinois is very doubtful.

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THE literature relating to the study of American land snails is scattered through the proceedings and transactions of many scientific societies and the journals devoted to the study of Mollusca. A few manuals and monographs have been published describing and illustrating species of land snails. Besides references to the more important works, which may supplement the descriptions contained in this fieldbook, mention is made of a few shorter papers. These may be found in some of the large libraries.

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The only journal in America for the study of the Mollusca is the *Nautilus*, published by Dr. H. A. Pilsbry and Dr. H. B. Baker, the Academy of Natural Sciences of Philadelphia. It begins with Volume 3, 1889, and has completed 52 volumes to 1939. Records and notes on many Illinois species of land snails have appeared in its pages; it is considered indispensable for the study of Illinois Mollusca.

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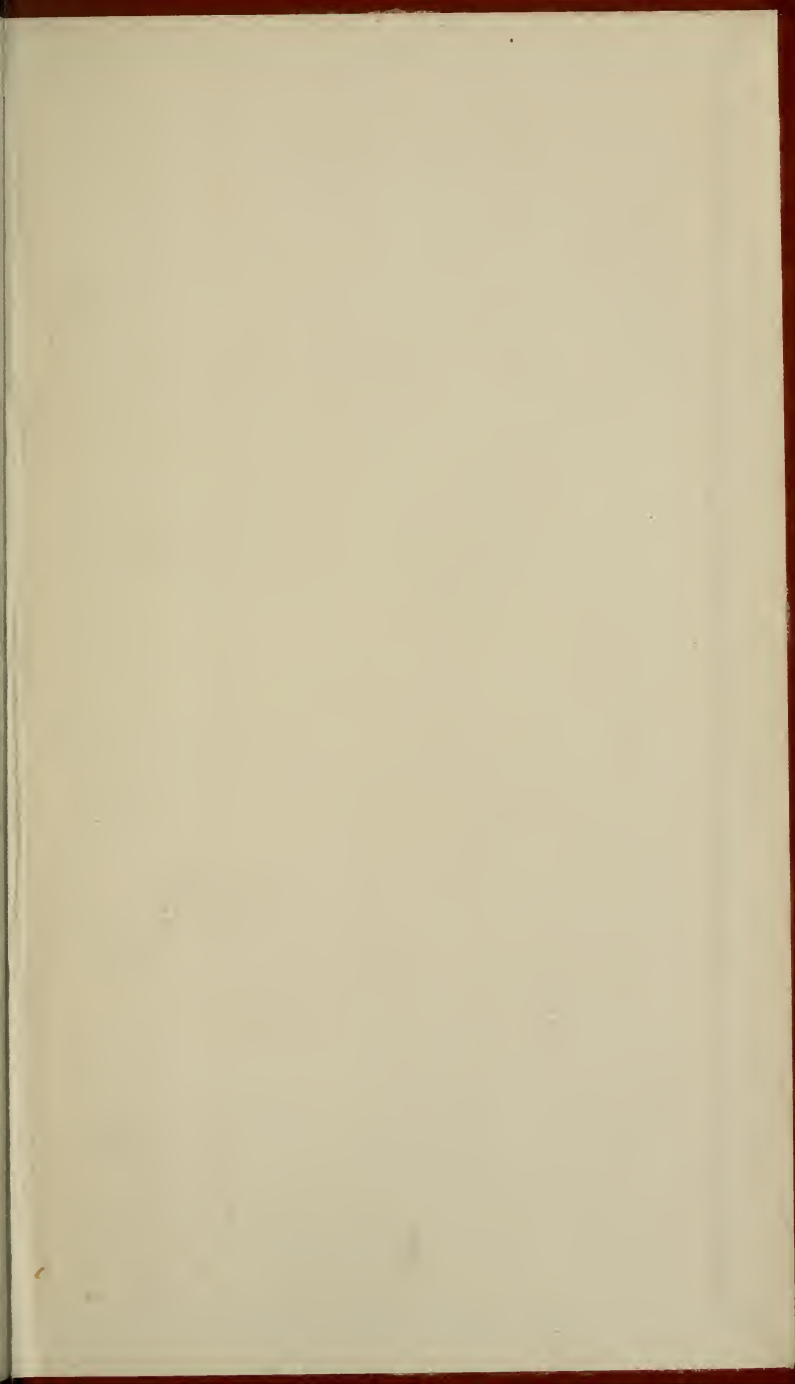
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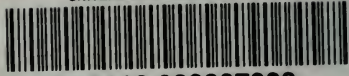
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