GEOLOGICAL SURVEY OF ALABAMA

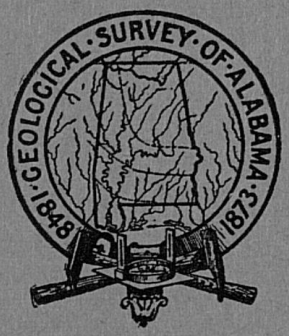
WALTER B. JONES, STATE GEOLOGIST

MUSEUM PAPER 28

LAND SNAILS OF THE GENUS STENOTREMA IN THE ALABAMA REGION

By

ALLAN F. ARCHER



UNIVERSITY, ALABAMA

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LETTER OF TRANSMITTAL

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December 11, 1948

Honorable James E. Folsom
Governor of Alabama
Montgomery, Alabama

Sir:

I have the honor to transmit herewith the manuscript of a report on "Land Snails of the Genus Stenotrema in the Alabama Region." It is requested that this be printed as Museum Paper 28 of the Geological Survey of Alabama.

Respectfully,

WALTER B. JONES,
State Geologist

TABLE OF CONTENTS

	Page
INTRODUCTION	7
Zoogeography and Distribution	8
Ecology	10
Economic Value	14
Abnormalities	14
SYSTEMATIC CATALOGUE	15
General Discussion	15
The Genus Stenotrema	16
Key to Stenotrema	16
Subgenus Stenotrema	17
Section Caracollatus	19
Section Stenostoma	27
Section Toxotrema	38
Section Cohutta	49
Section Maxillifer	51
Subgenus Euchemotrema	52
PLATES	61
INDEX	78

LAND SNAILS OF THE GENUS STENOTREMA IN THE ALABAMA REGION

By

Allan F. Archer

INTRODUCTION

This paper is the result of extensive field and laboratory work carried on by the author upon the land snails, **Stenotrema, (Polygyridae)** since 1931. The greatest part of the material was gathered in Alabama, Georgia, Tennessee, North Carolina, and Virginia, as well as in other states nearby, while an extensive collection was made also in Arkansas and southern Missouri during two different years. Material of comparative value was taken at odd times both in the central United States and in the Middle Atlantic States. The results contained in the present publication are obtained from a dissertation submitted by the author in 1936 in partial fulfillment of the requirements for the degree of doctor of philosophy in the University of Michigan, Ann Arbor, Michigan. Subsequent to the completion of the dissertation extensive revision and additional field work was carried on, especially in 1938.

I wish to acknowledge my indebtedness to the members of my doctorate committee, Mr. Calvin Goodrich, Drs. L. R. Dice, G. R. LaRue, L. Kellum, and L. C. Stuart for aid in the prosecution of this work. A great deal of the results would not have been possible without the very material aid and unfailing interest shown by Dr. Walter B. Jones and the Alabama Museum of Natural History. Dr. H. A. Pilsbry of the Academy of Natural Sciences of Philadelphia generously made a very large collection available for study, as did also Mr. William J. Clench of the Museum of Comparative Zoology, Cambridge, Massachusetts. I also want to thank the personnel of the University Museums, Ann Arbor, Michigan, as well as many friends and acquaintances for all sorts of helps and kindnesses.

This paper is intended as a useful manual of **Stenotrema** and as a revision of the genus. The reader is referred to two papers in particular containing a lot of valuable material on these snails; B. Walker, "The Terrestrial Shell-Bearing Mollusca of Alabama," Ala. Mus. Nat. Hist., Museum Paper No. 8, (1928);

45-57; H. A. Pilsbry, "The Land Mollusca of North America," Acad. Nat. Sci. Phila., Mon. No. 3, (1940): 639-688. Pilsbry has brought all bibliography, descriptions, citations of type localities up to date, and his monograph is very useful, although not always readily available. He took the genus **Stenotrema** out of the all-inclusive genus **Polygyra,** and defined it on the basis of shell characters and on the soft anatomy. He figured the shells of the species of **Stenotrema** beautifully and from more angles than is possible in the present work. By agreement between Pilsbry and the author information, notes, and manuscript were furnished by the latter, but much of the classification and arrangement found in the paper just cited were the result of decisions arrived at by the writer of that paper.

In considering the differences between the present paper and previous publications such as Pilsbry's it should be realized that the information to be presented is the most complete now available. It has been arrived at as result of a very close contact with **Stenotrema.** It seems as though an extensive use of anatomy in order determine specific differences is as useful in malacology (study of mollusks) as in entomology. Soft anatomy has already been used by specialists to arrive at family and generic differences in mollusks. It is apparent from the results of this study that genitalia can serve as additional evidence for supporting the use of any available shell characters in classification of species. However, this does not imply that all genera of all families of land snails possess tangible specific characters in the genitalia.

Zoogeography and distribution. Although this paper is designed to serve as a useful manual for the ecology and morphology of **Stenotrema,** the main emphasis will be laid upon the Alabama Region. In order to go beyond the limits of Walker's paper on Alabama land snails, the Alabama Region by definition will not only include Alabama but also those areas of neighboring states that are geographically and ecologically indistinguishable from it. The only physical features not found in Alabama are the middle and upper montane forests of the Great Smoky Mountains that have been the subject of much research by investigators of Appalachian faunas. The Alabama Museum of Natural History has had its part in the exploration of the Smokies from the time of H. H. Smith until the present day. In fact we would

be unable fully to understand our own local picture without the study of neighboring areas. The states to be included in the Alabama Region are Georgia, northern Florida, western North Carolina, eastern and middle Tennessee, and much of Mississippi.

Stenotrema occupies a huge area in North America from the boreal forests to northern Florida, much of the Gulf Coast, southwestward into Texas. westward across Oklahoma and Kansas as far as Colorado Springs, Colorado. The two great centers of the development of species are the area embracing the Appalachian Mountains together with the Great Smoky mountains in the Southeast and another center in the Ozark Mountains containing an abundance of species closely like those of the Alabama Region.

State and federal parks and preserves contain much of our best wildlife areas, and the lists of localities given below are samples of what occur in them. Actually practically all of our Southeastern species will be found somewhere in the lists, and demonstrate the value of parks and forests as preserves for our fauna. All parks in Alabama from which **Stenotrema** has been taken are listed here.

Bankhead National Forest, Lawrence and Walker Counties, Alabama.

Stenotrema barbigerum **S. stenotrema**
S. spinosum

Monte Sano State Park, Madison County, Alabama.

Stenotrema deceptum **S. spinosum**
S. exodon **S. stenotrema**
S. monodon aliciae

DeSoto State Park, DeKalb County, Alabama.

Stenotrema barbigerum **S. spinosum**
S. deceptum **S. stenotrema**
S. exodon turbinella

Oak Mountain State Park, Shelby County, Alabama.

Stenotrema barbigerum **S. hirsutum**
S. deceptum

Cheaha State Park, Cleburne and Talladega Counties, Alabama.

Stenotrema barbigerum **S. Stenotrema**
S. brevipila

Chewacla Creek State Park, Lee County, Alabama.

Stenotrema maxillatum **S. monodon aliciae**

TVA Area, Grassy Cove and Sequatchie Valley, Cumberland and Bledsoe Counties, Tennessee.

Stenotrema deceptum **S. hirsutum**
S. edgarianum **S. stenotrema**

Smoky Mountain National Park, east Tennessee and western North Carolina.

Stenotrema altispira **S. pilula**
S. altispira depilatum **S. stenotrema**
S. fraternum montanum **S. stenotrema voluminosum**

Cherokee National Forest, Polk County, Tennessee.

Stenotrema barbigerum **S. stenotrema**
S. cohuttense **S. stenotrema voluminosum**
S. magnifumosum

Nantahala National Forest, North Carolina.

Stenotrema altispira **S. magnifumosum**
S. barbigerum **S. pilula**
S. fasciatum **S. stenotrema voluminosum**
S. fraternum montanum

Ecology. Species of the genus **Stenotrema** not only inhabit the forests and woodlands but also the clearings and culture situations created by man in settling the country. However, the genus is not found universally present in coniferous forests on poor acid soils either in the Deep South or in the eastern section of North America. Moreover, these snails are not so frequent in open country and gardens, again on poor acid soil, as are the more tolerant species belonging to the polygyrid genera, **Mesodon and Triodopsis** for example, and are found only sporadically in urban gardens and waste places where other genera of snails are almost invariably present. Stenotrema with

few exceptions abhors poor infertile soils, although limestone is by no means necessary since some species don't occur in limestone regions at all. In general species of Stenotrema adapt themselves to clearing of forests, and are found in open country whenever such clearing occurs on terrain which these snails occupied under the original forest cover. Certain species inhabit natural prairies (on good soil), but this predilection is lacking insofar as the short grass prairies of the western plains go, for there **Stenotrema** is confined to stream valleys. In pine woods very few species (and these characteristic) occur. Instances of **S. fraternum** living in pine woods have come to my attention in Michigan and Pennsylvania and also of **S. hirsutum** doing the same thing in the latter state. The species listed under community 11 are pine forest species in the Southeast (and one of them in the Ozarks).

Under the treatment of the individual species mention will be made as to whether or not a given species is an obligatory rupicole (never found except on stony or rocky ground) or not.

About thirteen of the thirty-three species and subspecies known appear to belong definitely in this classification. Most of the rest of the species frequently inhabit stony or rocky ground, but are not bound to such terrain. Three of the most widely spread species and ones that also occupy the glaciated regions of North America, have only a minor link with rocky shelter (**S. barbatum, S. fraternum, S. monodon**).

Species of **Stenotrema** seem to appear in burned off localities along with other animals of the pyric (fire) succession. In fact individuals of burrowing species often survive fires, and some have been taken alive only a few inches from spots where the ground is still hot. After fires survivors crowd under rocks, logs, and other objects.

The ecological communities listed below are complete only for Alabama. In other regions the species will be assumed to occupy various types of forest cover, and will not be mentioned here. The names of states will be given by their abbreviations under most of the species mentioned, but only in cases actually observed.

HYGRIC COMMUNITIES

1. Alluvial woods (maples and associated hardwood species).

S. barbatum
S. monodon aliciae

MESIC COMMUNITIES

2. Hammock woods.

S. florida SE ALA, NW FLA

3. Sandy hammocks.

S. florida SE ALA

4. Beech-maple woods.

S. barbigerum ALA GA
S. florida E ALA GA
S. maxillatum ALA GA
S. monodon aliciae
S. spinosum ALA TENN
S. stenotrema

5. Chestnut oak-tulip poplar woods.

S. altispira NC
S. barbigerum NC TENN GA
S. cohuttense TENN GA
S. edgarianum TENN
S. edvardsi TENN
S. fasciatum NC
S. fraternum montanum NC TENN
S. magnifumosum NC TENN GA
S. pilula NC TENN
S. stenotrema NC TENN
S. stenotrema voluminosum NC

6. Beech-birch-maple-hemlock forests (middle montane areas).

S. altispira NC TENN
S. pilula NC TENN
S. stenotrema NC TENN

7. Balsam-fir-spruce forests (above 4500 feet elevation).

S. altispira NC TENN
S. altispira depilatum NC TENN

TRANSITIONAL FROM MESIC TO XERIC

8. Oak-hickory woods.

- S. barbigerum ALA NC TENN GA
- S. brevipila E ALA GA
- S. cohuttense TENN GA
- S. deceptum N ALA TENN
- S. edgarianum TENN
- S. edvardsi TENN
- S. exodon turbinella NE ALA TENN
- S. florida E ALA GA
- S. hirsutum NW-CENT ALA TENN
- S. magnifumosum NC GA
- S. maxillatum CENT ALA GA
- S. monodon aliciae
- S. pilula NC TENN
- S. spinosum ALA TENN
- S. stenotrema

XERIC COMMUNITIES

9. Red cedar-hardwoods.

- S. deceptum N ALA TENN
- S. exodon NE ALA
- S. exodon turbinella NE ALA TENN
- S. monodon aliciae
- S. spinosum ALA TENN
- S. stenotrema

10. Oak-pine forests.

- S. barbigerum ALA NC TENN GA
- S. brevipila NE ALA
- S. cohuttense TENN GA
- S. edgarianum TENN
- S. edvardsi TENN KY
- S. hirsutum NW ALA NE MISS TENN
- S. magnifumosum NC TENN
- S. stenotrema

11. Shortleaf pine woods.

- S. barbigerum ALA GA
- S. magnifumosum NC
- S. stenotrema

12. Oak barrens.

- S. hirsutum NW ALA
- S. monodon aliciae

14. Prairies.

- S. monodon aliciae
- S. stenotrema

ARTIFICIAL COMMUNITIES

15. Ruderal areas (open fields and roadsides).

S. barbigerum ALA NC GA
S. deceptum ALA
S. edgarianum TENN
S. edvardsi TENN KY
S. monodon aliciae
S. exodon turbinella ALA
S. florida GA
S. hirsutum ALA TENN
S. magnifumosum NC
S. stenotrema

16. Pastures (modification of 15).

S. barbigerum ALA NC
S. hirsutum TENN
S. magnifumosum NC
S. monodon aliciae
S. stenotrema

17. Farmyards.

S. monodon aliciae N ALA
S. stenotrema E TENN

18. Urban areas (gardens and vacant lots).

S. deceptum NE ALA
S. hirsutum TENN VA
S. magnifumosum NC
S. monodon aliciae ALA TENN

Economic value. Species of **Stenotrema** function in nature as soil makers and scavengers. They feed chiefly on dead leaves for the sake of the fungi that grow on them, and reduce the humus to nitrogenous material. It is likely that species that inhabit culture areas of farms and urban sections serve the same purpose. None of them are known to be garden pests.

Enemies of these snails are small rodents, beetles, chiefly **Evarthrus**, but not the famous snail-eating carabid **Cychrini**. As has been pointed out in recent years by different observers predatory snails of the genus **Haplotrema** attack these snails not by penetrating the narrow keyhole-shaped aperture of the shell but by boring through the wall of the shell and digesting out the soft tissues externally.

Abnormalities. The phenomenon of albinism is not a very striking deviation from the normal coloration, since the snail has ample pigment of the eyes in spite of the pale color of the shell. The following instances of albinism have been found: S.

edgarianum, Grassy Cove, Tenn.; **S. edvardsi,** Anderson, Sullivan Co., Tenn.; **S. magnifumosum,** Blount Co., Tenn. Murphy, N. C.; **S. hirsutum,** Grassy Cove, Tenn.; **S. pilula,** Sugarland Mt., Sevier Co., Tenn.; **S. deceptum,** Madison Co., Ala.; **S. maxillatum,** Randon's Creek, Monroe Co., Ala. A double parietal lamella was found in a specimen of **S. barbigerum,** Murphy, N. C. A topotype of **S. brevipila (q. v.)** was found to have the termination of the parietal lamella joined directly to the inner denticle of the basal peristome by a calcareous growth. Sinistral examples have been found so far only in northern states (**S. monodon,** Ann Arbor, Mich.; **S. fratenum,** Licking Co., Ohio).

SYSTEMATIC CATALOGUE

General discussion. The genus **Stenotrema** not only has excellent characters, first of all in the aperture of the shell, and then in the hairy appendages of the cuticle, but also in the pillar structure, that is to say, the pilaster pattern inside of the phallic chamber of the penial apparatus or penis. In using the pilasters as aids to classification it is important to realize that although individuals may be sexually mature as to female organs (protogynous), they may still be immature in the penial apparatus, and thus present a very attenuate pattern. Dissection of a few individuals will reveal a sufficient number of mature penes. Distortion resulting from preservation in strong alcohol or from boiling may produce convexities on the surface of the inner wall of the chamber, that are not part of the true pilaster pattern.

In using the shell characters of the genus for classification slightly immature individuals will be found to have such an attenuate apertural structure as to present a false picture. Fully adult and even gerontic individuals posses the apertural structures in full measure needed for determination. Pilsbry (Land Mollusca of North America, 1940, pp. 640-641, fig. 400E) outlines the nomenclature to be used for the structures of the aperture and for the sculpture of the shell. In this paper I will use some terminology that is a modification of that of Pilsbry, and also that modifies some terms used by myself in earlier publications (terms which needed improvement). In this paper the term "tooth" as used by Pilsbry will be called "denticle", except that "parietal tooth" (not even a denticle) will be more properly

designated as a "parietal lamella". The term "peristome" will be substituted for "lip" as used by Pilsbry. The reader is referred to Plate 5, figure 6 for a diagram of the apertural structures referred to in the keys.

Although the general shape of the shell is mentioned under different species the matter of obesity is omitted from the descriptions in the keys. Shells of various species become more obese (relative increase in width and decrease in the height of the spire) as we proceed from upland to lowland habitats. This holds true not only as between one species and another but also within a single species whenever it occurs equally on uplands and in stream valleys (e. g. **S. monodon aliciae).** The index of obesity has been computed for a number of species by dividing the height of the shell into the diameter, and by finding the mean of a given population. This index is called the H/D or height-diameter index.

Correlation between obesity and habitat stations has been done by many workers such as C. C. Adams on the freshwater snails, **Io,** and by Goodrich* on Pleuroceridae (axial height of the shell increasing proportionately from downstream to upstream habitats). A. E. Ortmann (Proc. Amer. Phil. Soc. 19 (1920): 269-312) has shown this to be true also in bivalves.

The genus Stenotrema. Pilsby (pp. 577, 640-641) amply defines the genus **Stenotrema** Rafinesque 1819. The shell is conic-globose, subglobose, or carinate (keeled) and lens-shaped (lenticular). The aperture is not only basal but also transverse. The genitalia are typically polygyrid, but the phallic structure (phallus) of the penial apparatus is differentiated from and thicker than the apically located epiphallus. The spermatheca has a slender duct. Genotype: **S. stenotrema** (Pfeiffer 1842).

Key to Stenotrema. The genus is divisible into two well defined subgenera (if not actually two distinct genera). Pilsby broke it down into a number of groups, but substitution of two subgenera seems desirable owing to the fact that there exist tangible differences in genitalia (but possibly not of generic

*References to these papers are: C. C. Adams, Mem. Nat. Acad. Sci., 1915, 12: 1-91; C. Goodrich, Occas. Pap. Mus. Zool., Univ. Mich., Nos. 286, 295, 300, 1934-1935.

rank), and field observers have noted puzzling differences in mating behavior as between the two. Actually there is no overlap between the subgenera in shell characters.

1. Outer denticle present on the peristome. Inner half of basal peristome (lip) adnate, or if free, then submedian notch present on inner rim of basal lip (but otherwise not necessarily so). Penis or Phallus slender, rather elongated, sausage-shaped; its length more than ½ the diameter of the shell..... S. gen. Stenotrema p. 17.

2. Outer denticle entirely lacking. Inner half of basal peristome free; notch never present on inner rim of basal peristome. Penis or phallus short, stout, club-shaped; less than, or at the most, its length ½ the diameter of the shell..... S. gen. Euchemotrema p. 52.

Subgenus **Stenotrema** Rafinesque, 1819.

Typical species: **Stenotrema stenotrema** (Pfeiffer 1842). Rafinesque's type was **S. convexa 1819,** but designated without a definition (Pilsbry, 655).

Both this subgenus and **Euchemotrema** can be divided into sections for the convenience of the key. These sections have some species that nearly overlap with neighboring sections in shell characters, and are equivalent to the groups into which Pilsbry has divided **Stenotrema.** There is support for this convenient arrangement not only on the basis of the shells but also on the basis of peculiarities of the pilasters of the penis or phallus. The arrangement used in this publication seems to be well justified, but does not jibe with Pilsbry's interpretation in some instances. In one case two species (**S. barbatum** and S. **hirsutum**) which Pilsbry regarded as belonging under the same species fall under different sections here.

1. Periphery of shell carinate or strongly angular ..... Sect. Caracollatus, p. 19.

1. Periphery rounded or at the most bluntly angular ..... (2)

2. Inner half of basal peristome free..... Sect. **Cohutta,** p. 49.

2. Inner half of basal peristome adnate. (3)

3. Basal peristome lacking a notch on inner rim; having a lamina within the aperture parallel to rim of basal peristome.....Sect. **Maxillifer**, p. 51.

3. Basal peristome having a submedian notch, and never double rimmed. (4)

4. Interdenticular sinus shallow and very widely curved. Outer denticle angular or weakly angular, never thickened or prominent, but instead widely diverging from the bottom of the interdenticular sinus .....Sect. **Stenostoma**, p. 27.

4. Interdenticular sinus more or less rounded, sometimes deeply so. Outer denticle stout, prominently angular, or at least strongly rounded, and not widely diverging from the bottom of the interdenticular sinus .....Sect. **Toxotrema**, p. 38.

In the following guide to the genitalia of the sections of the subgenus **Stenotrema** the sections are listed in their proper systematic order:

Caracollatus. Pilaster pattern more or less complex in the apical region, but never loop-like or biramous. Pilasters thickened in the apical region, sometimes very much so, and fused apically, or if not fused apically, then each pilaster of equal thickness, and one overlapping the other; without a commissure between the two main pilasters.

Stenostoma. Pilaster pattern loop-like at least in part, or else biramous. Pilasters slender and fused in the apical region, or else if one pilaster noticeably thicker than the other, then separated in the apical region; no commissure between the two main pilasters, but in one case, however, fused in the midzone.

Toxotrema. Pilaster pattern irregular, and at least not loop-like or biramous. Pilasters thick, at least one of the two, irregular and nodose or lobate; fused in the apical region, or else if not fused or if one pilaster overlapping the other, then one pilaster thicker than the other; commissures joining the two main pilasters in most cases.

Cohutta. Pilaster pattern simple, or vaguely loop-like in the apical half. Both pilasters very attenuated in the midzone;

fused or unfused in the midzone; fused or widely separated in the apical region.

Maxillifer. Pilaster pattern irregular, and with a double apex. One pilaster pendulous lobate, longitudinally grooved.

Section **Caracollatus,** new

Type species: **Stenotrema spinosum** (Lea 1830)

1. Submedian notch on inner rim of basal peristome present. (2)

2. Submedian notch a small V-shaped cut. Appalachian species. (3)

3. Periphery carinate. Aperture narrow. Parietal lamella high and more prominent than basal peristome, terminated by a hook. Butress present, joining the termination of upper peristome (lip) without a sulcus between. Upper denticle strongly angular ..... **S. edgarianum,** p. 23.

3. Periphery angulate. Aperture gaping. Parietal lamella shallow, less prominent than basal peristome; not terminated by a hook. Butress absent. Upper denticle weakly angular ..... **S. edvardsi,** p. 26.

2. Submedian notch U-shaped. Ozarkian species. (4)

4. Basal peristome and arc of peristome narrow. Body whorl having three rows of peristracal fringes..... **S. pilsbryi,** p. 24.

4. Basal peristome and arc of peristome wide. Body whorl lacking cutucular fringes; with or without short hairs on the angulate periphery ..... **S. labrosum,** p. 25.

1. Submedian notch on inner rim of basal peristome absent, or at most a weak, shallow bay. (5)

5. Periphery angular; shell conoid lens-shaped **S. edvardsi,** p. 26.

5. Periphery strongly carinate; shell lens-shaped but with a depressed spire. (6)

6. Parietal lamella more prominent than basal peristome. Outer half of edge of basal peristome adnate. Butress weak or ves-

tigial. Peripheral periostracal processes when present very short ..... **S. spinosum**, p. 21.

6. Parietal lamella less prominent than basal peristome. Outer half of edge of basal peristome free. Butress entirely absent. Peripheral periostracal processes forming a long fringe..... ..... **S. barbigerum**, p. 20.

1. **Stenotrema barbigerum** (Redfield) Plate II, figure 1, Plate IV, figure 9, Plate V, figure 8.

Helix barbigera Redfield Ann. Lyc. Nat. Hist. N. Y., 1856, 6: 171, pl. 9, figs. 4-7 (Type locality: Habersham County, Georgia) **Polygyra barbigera,** W. G. Mazyck, Catalog Moll. S. Car. (1913): 7. B. Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 47-48, fig. 56. **Stenotrema barbigerum,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940) : 645-646, fig. 403. Archer, Nautilus, 1942, 55: 8-9. Nautilus, 1943, 55: 94-97.

MORPHOLOGY. The shell as illustrated in Plate II, figure 1 and Plate IV, figure 9. Radial laminae above the periphery of the shell are characteristic in this species. **Living animal**: Head tan or brown; eyes black; eyestalks and ocular hands gray to black; foot fleshy brown to tan, occasionally tinged with gray; mantle edge gray tinged with fleshy brown or violet. **Genitalia**: Pilasters of phallic chamber as illustrated in Plate V, figure 8, Diameter of shell, 8.9-9.7 mm. Phallus and epiphallus, 8.5-9.0 mm. **Localities of dissected specimens:** Harrison, Hale County, Alabama; Murphy, Cherokee County, North Carolina, 1934. **Measurements of the shell:** Diameter, 8.7-10.0 mm.; height, 4.6-5.0 mm. A series of 30 specimens from Murphy, North Carolina yielded a height-diameter (H/D) index and standard error of 56.27±.33.

DISTRIBUTION. **S. barbigerum** inhabits much of North Alabama (except for the north-line counties east of Lauderdale County), part of central Alabama, and extends into the southeastern part of the state. It is a species of the southern part of the Blue Ridge Mountains of North and South Carolina, and is found in the Georgia Piedmont Province. **Additional records** (besides those of Walker and Pilsbry): ALABAMA. Butler: Fort Dale Cemetery, 1939. Chambers: Jones Creek, 1940. DeKalb: DeSoto State Park. Hale: 2.5 Miles south of Havana;

Harrison Church, 7 miles south of Havana. GEORGIA. Bartow: Spring Park, Nov. 1938. Troup: 6.2 miles southwest of LaGrange, Nov. 1938. Upson: Swift Creek, P. L. Marsh and Archer, 1939. SOUTH CAROLINA. Oconee: Walhalla, P. L. Marsh.

All records in this paper are taken by myself unless other collectors are named. **Errors:** Walker (48) records this species from Monte Sano, but the record is based on immature **S. spinosum** taken by H. E. Wheeler.

ECOLOGY. Not an obligatory rupicole. **S. barbigerum** ranges from 200 feet to 2500 feet elevation. Inhabiting the slopes of mountains, ridges, knobs, ravines, and river bluffs, but not on uplands; more frequently on noncalcareous soils than on calcareous soils. Living in hardwood cover (mesophytic and dry woods) as well as in oak-pine and pine cover on both rock-free and on rocky ground. This species burrows under logs, fallen bark, and rocks, and in hollows in leaf litter and pine straw. Also present in open fields and along roadsides, where it conceals itself under various kinds of objects (boards, fallen fence palings, and stones) and under vine mats covering the foundations of ruined house. When active this species, because of its color, is remarkably well concealed against the background of a log. It lays four to eight small pearly eggs in a clutch.

2. **Stenotrema spinosum** (Lea). Plate II, figure 2, Plate V, figure 9, Plate X, figure 6.

Caracolla spinosa Lea, Amer. Phil. Trans., 1830, 4: 104, pl. 15, fig. 35 (Type locality: Claiborne, Monroe County, Alabama). **Polygyra spinosa,** B. Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 45-46, fig. 53. **Stenotrema spinosum,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 643-644, fig. 401.

MORPHOLOGY. The shell as illustrated in Plate II, figure 2. There are radial laminae above the periphery of the shell, and periostracal hairs are sometimes found on the periphery, particularly in snails from northeast Alabama. **Living animal:** Head brownish sometimes tinged with gray; eyes, eyestalks, and ocular bands black; anterior tentacles grayish brown; foot brownish ivory; sole of foot dirty pale ivory or brown; mantle edge gray thickly flecked with whitish spots. **Genitalia.** Pilasters of phallic chamber as illustrated in Plate V, figure 9. Penis,

spermatheca and associated structures as shown in Plate X, figure 6. Diameter of shell, 13.8-14.9 mm. Phallus and epiphallus, 12.0-12.5 mm. **Localities of dissected specimens:** Newman's Ridge, Blackwater, Lee County, Virginia; Lock 14, Tuscaloosa County, Alabama, 1938. Measurments of the shell: Diameter, 11.4-14.8 mm.; height, 4.9-6.5 mm. Statistical treatment yields significant local differences in height-diameter indices:

	Number	H/D and S.E.
Salt Mountain, Clarke Co., Ala. (200 ft. elev.)	30	41.32±.47
Monte Sano, Madison Co., Ala. (1650 ft. elev.)	30	45.23±.39

DISTRIBUTION. **S. spinosum ranges from southwestern** Virginia through the Appalachian Valley and Ridge (geographic) Province of east Tennessee, and upon reaching Alabama deploys throughout the northern part of the state, finally extending into the southeast and again into the southwest as far as Mobile County. **Additional records:** ALABAMA. Lowndes: 4 miles east of Fort Deposit, 1939. GEORGIA. Dade: Rising Faun, 1938. **Errors:** Greene County, Georgia (Pilsbry 644) appears to be an error. This species scarcely intrudes into the Piedmont Province, even in Alabama. I have explored much of the Georgia Piedmont and the above record is quite distant from the nearest authentic locality.

ECOLOGY. An obligatory rupicole. **S. spinosum** has never been taken except on stony or rocky ground, although it hides (as do other rupicolous species) under other objects than stones or rocks. It is found from about 2000 feet down to 100 feet elevation. This snail is an inhabitant of river and stream valleys, preferring slope and bluff situations. On plateau summits it is confined to banks of small streams. **S. spinosum** is by preference a calcicole (inhabiting calcareous ground), but it is found on sandstone, shale, and even crystallines that produce some calcium in their break down. It is found in hardwood cover (mesic and xeric) as well as in red cedar areas. The snail burrows in humus under rocks and logs. Only once has it been found in cleared country, and then under a pile of bricks in an opening (Colbert Co., Alabama).

3. **Stenotrema edgarianum** (Lea). Plate II, figure 3, Plate VI, figure 1.

Caracolla edgariana Lea, Proc. Amer. Phil, Soc., 1841, 2: 31 (Type locality: Cumberland Mountains). **Polygyra edgariana,** B. Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 146-147, fig. 55. **Stenotrema edgarianum,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 644-645, fig. 402.

MORPHOLOGY. The shell as illustrated in Plate II, figure 3. Radial laminae are present above the periphery, and a very short cuticular fringe is present at the periphery (if not worn off). **Living animal:** Head deep gray spotted with white; eyes black; black ocular bands visible; anterior tentacles gray; foot gray spotted with white; caudal end of foot white; sole of foot dirty white; mantle edge gray densely spotted with white. **Genitalia:** Pilasters of phallic chamber as illustrated Plate VI, figure 1. Diameter of shell, 8.9-9.0 mm. Phallus and epiphallus, 9.5-10.0 mm. **Localities of dissected specimens:** Grassy Cove, Cumberland County, Tennessee, 1938.

Measurements of the shell: Diameter, 8.4-10.1 mm., height, 4.3-5.9 mm. A series of 30 specimens from Grassy Cove, Tennessee yielded an H/D index and standard error of 52.22±.36.

DISTRIBUTION. The species is apparently confined to the upper Sequatchie Valley and those parts of Walden's Ridge lying to the east and north, all in Tennessee. Records: TENNESSEE. Bledsoe, Cumberland and Scott Counties. Errors: S. **edgarianum** was assigned to Alabama by early workers, but Walker (47) rightfully questions the records. It is most definitely endemic to a small area in Tennessee beyond the Alabama boundary.

ECOLOGY. An obligatory rupicole, this species is never found except on stony or rocky ground. **S. edgarianum** ranges from about 2000 feet down to 1000 feet elevation, and inhabits the slopes of coves and valleys lying within plateau and mountainous country. It seems to be largely limited to outcrops of limestone or to sandstone just above the contact with limestone. On plateau summits it is found sparingly on banks of streams. The species inhabits hardwood cover, congregating in large numbers

under logs, stones, and rocks; in talus; under slabs in vertical fissures of ledges. The Alabama Museum Expedition (1938) found it common under slabs in two hog ranges, and also under rocks in open pastured fields.

4. **Stenotrema pilsbryi** (Ferriss). Plate II, figure 4, Plate VI, figure 2.

Polygyra pilsbryi Ferriss, Nautilus, 1900, **14:** 29-30 (Type locality: Rich Mountain, Polk County, Arkansas). Pilsbry, Proc. Acad. Nat. Sci. Phila. (1903): 201, pl. 9, figs. 1-3. **Stenotrema pilsbryi,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 650, fig. 406: 1-3.

MORPHOLOGY. The shell as illustrated in Plate II, figure 4. From the nuclear whorl onwards there are three to four rows of alternate radial laminae. The three rows of cuticular fringes on the body whorl are composed of thorn-like hairs surmounting radial, wrinkle-laminae. No other species of **Stenotrema** has more than one such fringe. A Cuban helicinid land snail parallels **pilsbryi** in this remarkable feature. Unlike **S. edgarianum** and **S. labrosum** the aperture of this species has a sulcus separating the butress from the upper termination of the peristome.

Living animal: Head gray; eyes black; eyestalks very dark gray; anterior tentacles dark gray; foot and sole of foot dirty white; mantle edge dirty white covered with white spots. **Genitalia:** Pilasters of phallic chamber as shown in Plate VI, figure 2. Diameter of shell, 8.9-9.0 mm. Phallus and epiphallus, 6.0-6.5 **mm. Localities of dissected specimens:** Rich Mountain, Polk County, Arkansas, 1935, 1938. **Measurements of the shell:** Diameter, 9.0-9.8 mm.; Height, 4.9-5.9 mm. A series of 30 specimens from Rich Mountain yields an H/D and standard error of 59.07±.56.

DISTRIBUTION. This species is known only from the following localities: ARKANSAS. Polk: Rich Mountain, J. H. Ferriss; Archer, 1935, 1938; H. E. Wheeler, 1938. OKLAHOMA. Leflore: Rich Mountain, Page, L. Hubricht.

ECOLOGY. An obligatory rupicole. **S. pilsbryi** occurs in a series of ravines on the north slope of a mature mountain (above 1500 feet elevation). The ravines have a moderately rich hard

wood growth (maple, lin, oaks, magnolia). The snails are found adhering to the under sides of rocks of a bouldery quartzite talus, rarely under rotten or charred wood. Underneath the talus flowing water is plainly audible after a rain. In wet weather snails can be obtained by quarrying. Over 200 were taken in one afternoon in April 1935.

5. **Stenotrema labrosum** (Bland). Plate II, figure 5, Plate VI, figure 3.

Helix labrosa T. Bland, Ann. N. Y. Lyc. Nat. Hist., 1862, 7: 430, pl. 4, fig. 19. **Polygyra labrosa,** Pilsbry, Proc. Acad. Nat. Sci. Phila. (1903): pl. 9, figs. 4-6 (Assigned type locality: Hot Springs, Garland County, Arkansas). B. Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 46, fig. 54. **Stenotrema labrosum,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 650-652, fig. 406: 4-6. **Polygyra labrosa fimbriata** G. H. Clapp, Nautilus, 1917, 30: 139.

MORPHOLOGY. The shell as illustrated in Plate II, figure 5. There is a tendency for the peripheral fringe on the angulate periphery of the shell to persist in adults at times (fimbriata Clapp). This condition occurs in related species (**S. spinosum**), and does not deserve a special name. In the aperture the surface of the interdenticular sinus is flattened and deeply entering. **Living animal:** Head tan to brown mottled with white spots and sometimes tinged with gray; eyes black; eye stalks and ocular bands dark gray; anterior tentacles gray; foot ivory yellow, tan, or brown spotted with white, dirty white on the edge and caudal end; sole of foot tan to ivory yellow; mantle edge tan densely spotted with white. **Genitalia:** Pilasters of the phallic chamber as shown in Plate VI, figure 3. Diameter of shell, 10.2-10.9 mm. Phallus and epiphallus, 7.0-8.0 mm. **Localities of dissected specimens:** Hot Springs, 1935, and Hot Springs Mountain, Garland County, Arkansas, 1938. **Measurements of the shell:** Diameter, 9.0-12.7 mm. Height, 5.8-7.2 mm. Thirty specimens from Hot Springs, Arkansas yielded an H/D and standard error of 58.65± .38.

DISTRIBUTION. This species inhabits the Ozark and Ouachita mountains of southern Missouri, Arkansas, and extreme eastern Oklahoma. It has also been found in the Coastal Plain Province of Arkansas (Clarke County) and in extreme northern

Louisiana (Union Parish). **Additional records:** ARKANSAS. Searcy: Rumley, 1938. MISSOURI. Taney: Branson; Between Walnut Shade and Rockaway Beach, 1938. **Errors:** Some authorities wrongly assigned this species to Alabama (Walker 46).

ECOLOGY. Not an obligatory rupicole. **S. labrosum** ranges from 2000 feet down to 200 feet elevation. It occupies mountain and ridge slopes, ravines, river bluffs, and valley bottoms. The species occurs on crystalline rocks, noncalcareous sedimentaries, and on limestone. Its plant cover is oak-hickory, oak-pine, dry ledge woods, oak savannas, and thinly wooded uplands. The snails burrow under stones, rocks, and logs, as well as under fallen bark. It lives in suburban walls, and in open pastures finds shelter under various objects.

6. **Stenotrema edvardsi** (Bland). Plate II, figure 6, Plate VI, figure 4.

Helix edvardsi T. Bland, Ann. N. Y. Lyc. Nat. Hist., 1856, 6: 277, pl. 9, figs. 14-16. **Stenotrema edvardsi,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940) : 646-647, fig. 404.

MORPHOLOGY. The shell as illustrated in Plate II, figure 6. The radial laminae above the angular periphery of the shell vary greatly in length. The periphery tends to have a very short cuticular fringe. **Living animal:** Head dirty white or gray with whitish spots; ocular bands black or dark gray; foot dirty white, gray tinged with faint ivory or spotted with white; sole of foot dirty white; mantle edge dirty white or pale ivory spotted with white. **Genitalia:** Pilasters of phallic chamber as shown in Plate VI, figure 4. Diameter of shell; 8.8 mm. Phallus and epiphallus, 4.0-4.5 mm. **Localities of dissected specimens:** Three miles west of Indian Springs, Sullivan County, Tennessee, 1938. **Measurements of the shell:** Diameter, 7.0-9.0 mm.; height, 4.8-5.6 mm.

DISTRIBUTION. **S. edvardsi** inhabits southwestern Pennsylvania, West Virginia, eastern Kentucky, southwestern Virginia, and eastern Tennessee, its distribution being centered in the Appalachian Plateau and adjacent parts of the Appalachian Valley. It is found as far south as Franklin County, Tennessee, apparently just barely missing residence in Alabama.

ECOLOGY. Not an obligatory rupicole. The species ranges between 2500 feet and 750 feet elevation. It occupies mature mountain ranges, river bluffs, valley slopes, and very low slopes. It occurs in oak-hickory and oak-pine woods, concentrating on the woodland borders. The snails burrow in leaf mold, and also under rotting limbs, fallen bark, logs, and abundantly among weeds and under wood in pastured fields and roadsides.

Section **Stenostoma** Rafinesque, 1831.

Type species: **Stenotrema stenotrema** (Pfeiffer 1819). **S. convexa**, designated type (Pilsbry 639), synonym of above species.

1. Buttress present, well developed. (2)

2. Shell quite devoid of periostracal hairs. Aperture constricted. ..... **S. stenotrema** form **nudum**, p. 35.

2. Shell more or less hirsute. Aperture various. (3)

3. Upper termination of peristome bordered by a sulcus. Edge of parietal callus not thickened nor continuous with the termination of the peristome. (4)

4. Basal peristome wide and interdenticular sinus deep. Parietal lamella high and more prominent than the ridge bordering the submedian notch on the inner rim of basal peristome. Periostracal hairs short. Nuclear whorl beaded ..... **S. stenotrema**, p. 35.

4. Basal peristome narrow and interdenticular sinus shallow. Parietal lamella low and less prominent than the ridge bordering the submedian notch on the inner rim of basal peristome. Periostracal hairs rather long. Nuclear whorl smooth, with radial striae and elongated pustules ..... **S. barbatum**, p. 30.

3. Upper termination of peristome not bordered by a sulcus, but continuous with the thickened, raised edge of the parietal callus ..... **S. magnifumosum**, p. 34.

1. Buttress either lacking or vestigial. (5)

5. Submedian notch on the basal peristome small and almost vestigial. (6)

6. Cuticular hairs numerous and dense. Upper part of outer peristome strongly rounded ..... **S. florida**, p. 29.

6. Cuticular hairs totally lacking (no hair scars). Spiral lines present. Upper part of outer peristome curved ..... **S. waldense**, p. 29.

5. Submedian notch on basal peristome U-shaped, well rounded. (7)

7. Edge of outer half of parietal callus raised and continuous with the upper termination of the outer peristome, no sulcus separating the two ..... **S. magnifumosum**, p. 34.

7. Edge of parietal callus not thickened. A sulcus always present, bordering the termination of the outer peristome. (8)

8. Surface of shell lacking hairs or cuticular appendages, quite smooth. Shell elevated globose-conic ..... **S. altispira depilatum**, p. 33.

8. Surface of shell hirsute. Shell various. (9)

9. Distal end of parietal lamella weakly descending into the aperture. Hairs stiff to the touch. Shell globose-conic ..... **S. altispira**, p. 32.

9. Distal end of parietal lamella strongly descending into the aperture. Hairs soft to the touch. Shell depressed globose. (10)

10. Interdenticular sinus a nearly straight arc from the base of the outer denticle. Submedian notch a slightly reduced U ..... **S. florida**, p. 29.

10. Interdenticular sinus widely curved, sometimes subangular at the bend of the curve. Submedian notch a large U. (11)

11. End of parietal lamella not forming a hook, but truncated. ..... **S. stenotrema voluminosum**, p. 37.

11. End of parietal lamella a down-curved hook ..... **S. stenotrema** (Piedmont-Appalachian valley form), p. 35.

7. **Stenotrema waldense** Archer. Plate V, figure 1.

Stenotrema waldense Archer, Nautilus, 1938, **51**: 54-55, fig. 1 (Type locality: Doak's Creek, Campbell County, Tennessee). Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 648-649, fig. 405.

MORPHOLOGY. The shell as illustrated in Plate V, figure 1. A freshly dead specimen shows that the brown cuticle is without hairs. This species may be related to **S. edvardsi** (Bland), but judging from the shell characters lies on this side of the line separating section **Stenostoma** from **Caracollatus.** The parietal lamella is arched and not straight as in **edvardsi. Genitalia:** No anatomy of this seemingly rare species is available. **Measurements of the shell::** Diameter, 7.8-8.2 mm.; height, 5.4-6.0mm.

DISTRIBUTION. The species is known only from the type locality, Doak's Creek, Campbell County, Tennessee, A. R. Cahn, 1937; Archer, November 1938.

ECOLOGY. An obligatory rupicole apparently. Originally discovered in drift. I traced this species to an area of low ledges thinly wooded by red cedar and oaks. Shell found under flat slabs on limestone benches overgrown by **Pellaea atropurpurea.**

8. **Stenotrema florida** Pilsbry. Plate V, figure 2, Plate VI, figure 5.

Stenotrema florida Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 655, fig. 408b (Type locality: Bluffs along Apalachicola River, Torreya State Park, Liberty County, Florida).

MORPHOLOGY. The shell as illustrated in Plate V, figure 2. Although the submedian notch on the basal peristome is very reduced in large specimens, it is proportionately less reduced in smaller specimens taken from mountains in the Piedmont Province (Pine Mountain, Georgia). Specimens found in the Piedmont of Alabama (Opelika) have been confused with **S. stenotrema** by earlier workers. **Living animal:** Head light gray; ocular bands gray; foot ivory yellow; mantle edge brown faintly flecked with white spots. **Genitalia:** Pilasters of phallic chamber as shown in Plate VI, figure 5. **Localities of dissected specimens:** Marianna, Jackson County, Florida, 1939. Big Creek, Houston County, Alabama, 1939. **Measurements of the shell:** Diameter, 8.9-12.9 mm.; height, 5.8-8.3 mm.

DISTRIBUTION. **S. florida** occurs not only in northwestern Florida (Pilsbry 655), but also in Alabama and Georgia, being limited to the Piedmont and Coastal Plain. **Additional records:** ALABAMA. Bullock: Peachburg, 1942. Clarke: Three miles

northeast of Grove Hill, 1935. Houston: Big Creek, 1940. Lee: Ravine 5.2 miles east of Opelika, 1939. GEORGIA. Dooly: 1.2 miles northwest of Vienna, 1941. Meriwether: Warm Springs, 1938, Pine Mountain, Manchester, 1938. Monroe: Creek 2.6 miles north of Culloden, 1940. Stewart: Frog Bottom Creek, 1941. Twiggs: Richland Creek, 1941. Upson: Swift Creek 8.5 miles north of Thomaston. All except the Meriwether County records taken in company with P. L. Marsh.

ECOLOGY. Not an obligatory rupicole. This snail burrows in leaf litter derived from magnolia, beech leaves, and those of other hardwood species on the banks of streams or on ravine slopes. It also occurs in open fields under old logs.

9. **Stenotrema barbatum** (Clapp). Plate II, figures 7, 8, Plate VI, figure 6.

Stenotrema hirsutum Say, Binney, Terr. Moll., 1878, 5: 296 (in part). **Polygyra (Stenotrema) barbata** Clapp, Nautilus, 1904, 18: 85 (Type locality: Five miles southeast of Wetumpka, Elmore County, Alabama). **Polygyra hirsuta,** Walker, Terr. Moll. Michigan, 1906: 470. **Polygyra barbata,** Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 50-51, fig. 59 (Type locality: 5 miles southeast of Wetumpka, Elmore County, Alabama) **Polygyra hirsuta yarmouthensis** F. C. Baker, Nautilus, 1927, 40: 115-116.

MORPHOLOGY. The shell as illustrated in Plate II, figures 7 and 8. This widely spread and important species has long been considered as identical with or at least a "larger lowland form" of **Stenotrema hirsutum** (Say). It is unfortunate that this error has not been corrected up until now. The shell characters of the two species in question are very different even in the nuclear whorl, and have scarcely a point in common. The genitalia of **S. barbatum** are very distinct from those of **hirsutum.** Both the shell and the anatomy seem to indicate that the two are not even in the same section of the genus. Pilsbry (665-666) basing **barbatum** on the original type lot, restricts it as a subspecies of **hirsutum** and limits it to Alabama. Large, stout specimens can be found in other parts of the country besides Wetumpka, Alabama, and there is no structural difference between the large and small specimens. Large individuals have been taken in Maryland and Indiana, but as a whole the size seems to strike an

average between the very large and the very small, that is found pretty much over the country.

The striking shell characters of **S. barbatum** are: 1. Buttress present, whereas in **hirsutum** it is missing. 2. Edge of the parietal callus sinuous instead of being oblique as in hirsutum. 3. Nuclear whorl smooth and striated instead of being beaded as in **hirsutum.** **Living animal:** Head slaty gray to nearly black; anterior tentacles deep gray; foot and sole of foot brown; mantle edge brown or gray. **Genitalia:** Pilasters of phallic chamber as shown in Plate VI, figure 5. Right pilaster divided apically from left pilaster, but both pilasters fused basally forming a single ridge. In **S. hirsutum** the basal extension is paired, the pilasters are joined apically, and the whole structure is more complicated than that of **barbatum.** Diameter of the shell, 6.7-7.5 mm. Phallus and epiphallus, 5.0 mm. **Localities of dissected specimens:** ...**Florence,** Lauderdale County, Alabama. Ann Arbor, Washtenaw County, Michigan, 1933. George Reserve, Livingston County, Michigan, 1947. Oldtown, Green County, Ohio, 1934. Newark, Licking County, Ohio, 1934. **Measurments of the shell:** Diameter, 6.3-11.0 mm.; height, 3.0-7.0 mm. A series of 30 specimens from Cambridge, Dorchester County, Maryland (Ralph Jackson) yielded an H/D and standard error of 66.43±.32, while a like series from Ann Arbor, Michigan gave an H/D and standard error of 62.73±.41.

DISTRIBUTION. **S. barbatum** ranges from central Alabama northward through the Appalachian regions of Tennessee and Kentucky, and throughout the central United States and southern Ontario, and as far as Iowa and eastern Kansas. In the Blue Ridge Province and mountainous regions it is lacking as far up as West Virginia, but from there occurs northeast to Massachusetts and again southeast to coastal North Carolina. In the Pleistocene loess it occurs in Mississippi, apparently south of its present range. Very small snails are found in some localities in Michigan, while low-spired shells occur in Iowa and Kansas. **Additional records:** TENNESSEE. Hardin. Spring Branch Creek, Cahn, 1938.

ECOLOGY. Not an obligatory rupicole. In the southern states this species is very nearly confined to low mesic or hygric woods in stream valleys. Further north it occurs not only in

valleys but also on bluffs and hills flanking rivers and in marshes. It lives in hardwood cover, burrowing under logs, rocks, and in leaf litter, and is found at the roots of grasses and ground plants in open fields, along roadsides, and even in ornamental thickets of suburban gardens.

10. **Stenotrema altispira** (Pilsbry). Plate II, figure 9, Plate VII, figure 1.

Polygyra hirsuta altispira Pilsbry, Nautilus, 1894, 7: 141 (Type locality: Magnetic City, Mitchell County, North Carolina). **Stenotrema altispira** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 652-654, fig. 407 a-b.

MORPHOLOGY. The shell as illustrated in Plate II, figure 9. The shell is globose-conic or trochiform. **Living animal**: Head very pale ivory; ocular bands black; anterior tentacles dark gray; foot and sole of foot dirty white; mantle edge dirty white. **Genitalia**: Pilasters of phallic chamber as shown in Plate VII, figure 1. Diameter of shell, 7.6-8.7 mm. Phallus and epiphallus, 10.5-15.7 mm. **Localities of dissected specimens**: Smokemont, Swain County, North Carolina, 1938. New Found Gap, Swain County, North Carolina. **Measurements of the shell**: Diameter, 6.8-11.2 mm.; height, 4.9-7.2 mm. There is a dwarfish stock found at lower elevations. A series of 30 specimens from Mount Mitchell, Yancey County, North Carolina yields an H/D index and standard error of 74.85±.58.

DISTRIBUTION. This species is confined to the Blue Ridge Province of western North Carolina and eastern Tennessee. At the southwest end of its range it meets the geographical race, **depilatum** (q. v.). The Alabama Museum Expedition of 1938 took it in considerable numbers in two localities. Its known range in North Carolina is: Avery, Buncombe, Haywood, Jackson, Mitchell, Swain, and Yancey counties. **Errors**: Pilsbry (654) cites an early error of mine (Archer, Nautilus, 1935, 48: 79, 81). It was stated that **S. altispira** was found at Asheville and on Sunset Mountain nearby. The species involved was **S. stenotrema voluminosum** which differs from **altispira** in apertural characters and in the nature of the hairs on the shell.

ECOLOGY. Not an obligatory rupicole. This mountain dwelling species ranges from over 6700 feet on the summits to

2500 feet elevation. It lives not only on mountains but also on knobs, and, occasionally, on low slopes, always in noncalcareous country (granite, quartzite, slate). It inhabits coniferous-hardwood cover, as well as lin-buckeye, and oak-hickory communities. The snail occupies coarse soil, and burrows in leaf mold, moss, and under logs; at the roots of grass, and under stones in fields and on railroad embankments.

11. **Stenotrema altispira depilatum** (Pilsbry). Plate II, figure 10, Plate VI, figure 7.

Polygyra stenotrema depilata Pilsbry, Nautilus, 1895, 9: 16 (Type locality: Thunderhead Mountain, Blount County, Tennessee). **Stenotrema depilatum** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 654, fig. 407 c-d.

MORPHOLOGY. The shell as illustrated in Plate II, figure 10. The globose-conic shell is devoid of any traces of hair, and as Pilsbry states it, has a "silky sheen". Pilsbry regards **depilatum** as being a species separate from **altispira** on the argument that even when the two occur together in the same locality there are no intermediates between the hirsute snails and those lacking cuticular hairs. In view of the fact that **S. stenotrema** has intermediates between the hirsute and hairless forms this contention would be reasonable, if not contradicted by other facts. Even where the **nudum** form of **S. stenotrema** occurs, the intermediates do not coexist in the same locality. The question of pilosity does not appear to be important in indicating specific differences in **Stenotrema**, since such differences are always accompanied by differences in apertural structures and in genitalia. In the last two items **depilatum** does not show any tangible differences from **altispira**, and in fact is very nearly identical. The greater width between the parietal lamella and the basal peristome, as mentioned by Pilsbry, is almost a trivial character, since the aperture of high mountain snails tends to gape, anyhow. **Living animal:** Head ivory or tan; ocular bands dark gray; foot, sole of foot, and mantle edge dirty white. **Genitalia:** Pilasters of the phallic chamber as shown in Plate VI, figure 7. The structure is specifically that of **altispira.** Diameter of shell, 9.7-9.9 mm. Phallus and epiphallus, 10.0-14.5 mm. **Localities of dissected specimens:** New Found Gap, Swain County, North Carolina, 1938. Clingman's Dome, Blount County, Tennessee,

1938. **Measurements of the shell:** Diameter, 8.8-11.0 mm.; height, 7.8-8.9 mm. The H/D index of this subspecies is higher than that of **altispira.**

DISTRIBUTION. **S. altispira depilatum** ranges in a southwesterly direction from Mount LeConte along the crest of the Great Smoky Mountains and Unaka Mountains to the Little Tennessee River. Snails were taken in large numbers from the top of Clingman's Dome by the 1938 Alabama Museum Expedition.

ECOLOGY. Not an obligatory rupicole. This subspecies occupies montane forests between 3500 and 6700 feet elevation. Its habitats are like those of **S. altispira.** At high elevations it is found in moss, and under fir logs and slabs of fallen bark.

12. **Stenotrema magnifumosum** (Pilsbry). Plate II, figure 11, Plate VII, figure 2.

Polygyra edvardsi magnifumosa Pilsbry, Proc. Acad. Nat. Sci. Phila., 1900: 55 (Type locality: Cheoah River, near junction of Yellow Creek, Graham County, North Carolina). **Stenotrema magnifumosum** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 660-661, fig. 410.

MORPHOLOGY. The shell as illustrated in Plate II, figure 11. The conoid or trochiform shell has radial laminae above the periphery and short hairs (if any) on the base. **Living animal:** Head very pale ivory, sometimes tinged with gray; eyestalks gray streaked with white; foot very pale gray densely spotted with white; sole of foot dirty white; mantle edge greyish brown spotted with white. **Genitalia:** Pilasters of phallic chamber as shown in Plate VII, figure 2. Diameter of shell, 6.9-7.0 mm. Phallus and epiphallus, 6.0-8.7 mm. **Localities of dissected specimens:** Greasy Creek, Polk County, Tennessee, 1938. Ocoee Gorge, Polk County, Tennessee, 1938. Murphy, Cherokee County, North Carolina, 1937. **Measurements of the shell:** Diameter, 6.4 9.0 m m.; height, 4.7-7.2 mm. A series of 30 specimens from Murphy, North Carolina yielded an H/D index and standard error of 69.77±.58.

DISTRIBUTION. This species is confined to the southern Appalachian Mountains of southwestern North Carolina, northwestern South Carolina, northern Georgia, and southeastern

Tennessee. **Additional records:** TENNESSEE. Polk: Cherokee National Forest, Archer, 1937, Alabama Museum Expedition, 1938. SOUTH CAROLINA. Oconee: Jocassie Valley, H. E. Wheeler, 1937; Walhalla, P. L. Marsh, 1940. **Errors:** Pilsbry (661) cites Atlanta, Georgia as a locality for **magnifumosum** on my authority. This was an early error based on mislabeled specimens. The species does not occur in the Piedmont, and **S. maxillatum** and **S. stenotrema** are the only species so far recorded for Atlanta.

ECOLOGY. Not an obligatory rupicole. This species ranges between 1600 feet and 4500 feet elevation. It occupies mature mountains, ridges, knobs, low hills, river bluffs, and gently sloping valley lands. It is found both on noncalcareous soils and on marble in hardwood cover and hardwood-coniferous cover as well as in pure pine. It frequently inhabits recently fired woods, but is most abundant in pure oak that has been undisturbed. The snail burrows in hardwood leaf mold and pine straw, but in winter it congregates in large numbers under logs, fallen bark, stones, and rocks in woods and in open fields. Under fallen fence palings in pastures and in roadside vine mats. This snail lays eight eggs in a clutch.

13. **Stenotrema stenotrema** (Pfeiffer). Plate III, figures 1, 2, Plate IV, figure 10, Plate VII, figure 3.

Stenotrema convexa Rafinesque, Journ. Phys., Chim., d'Hist. Nat., 1819, 85: 425 (not defined). **Helix stenotrema** "A. E. Ferussac" Pfeiffer, Symbolae, 1842, 2: 39. **Polygyra stenotrema,** Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 48-49, fig. 57. **Stenotrema stenotrema,** Archer, Nautilus, 1940, 54: 19. Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 655-659, 409 a-e. Archer, Nautilus, 1941, 55: 9. Idem, Nautilus, 1942, 55: 96-97. **Polygyra stenotrema nuda** Pilsbry, Proc. Acad. Nat. Sci. Phila., 1900: 129 (Type locality: Belleview, Davidson County, Tennessee). **Polygyra stenotrema seminuda** Clapp, Nautilus, 1904, 18: 86 (Type locality: Bangor, Blount County, Alabama).

MORPHOLOGY. The shell as illustrated in Plate III, figure 1. Pilsbry (657) has pointed out that Pfeiffer's specimen was so large that it must have come from one of the Southern States rather than from Indiana (given as the type locality). At any rate this species is plastic and variable in shell characters. For

example, the rounded periphery is replaced by a bluntly angular one in shells from river bluffs in Kentucky, southern Indiana, Arkansas, and Louisiana. The submedian notch is either U-shaped or V-shaped, and sometimes both in the same lot (Tuscaloosa County, Alabama). The snails from east Tennessee and southwestern Virginia tend to have a U-shaped notch, while in the Smoky Mountains outside of the habitat of **S. stenotrema voluminosum** it is V-shaped. The aperture of the shell is usually constricted, but in some lots from mountains in the Piedmont and Appalachian Valley and Ridge Province it gapes more than usual (also true in Ohio and central Indiana). However, the shells from Crowder's Mountain on the North Carolina Piedmont have a very stout parietal lamella and constricted aperture. Although the buttress is usually very stout in **S. stenotrema** there are cases in which it is very vestigial in snails taken from certain mountains and ridges in Alabama and Georgia (Pine Mountain, Georgia, Plate III, figure 2. Shade's Mountain, Alabama. Altoona, Alabama). In localities in Alabama there is a form in which the hairs on the shell are widely spaced (Walker 49—seminuda). In form **nudum** Pilsbry hairs are totally lacking from the shell (Tennessee, north Alabama). **Living animal:** Head slaty gray, brown, tan, or ivory; ocular bands black or gray; anterior tentacles brownish gray or faint gray; foot and sole of foot gray, light gray, brownish, dirty ivory, or pale ivory; mantle edge fleshy brown to ivory spotted with white. **Genitalia:** Pilasters of phallic chamber as shown in Plate VII, figure 3. Diameter of shell, 10.0-10.7 mm. Phallus and epiphallus, 11.0-12.0 mm. **Localities of dissected specimens:** Two miles east of Mooresburg, Hawkins County, Tennessee, 1938. Lock 14, Tuscaloosa County, Alabama, 1938. Newman's Ridge, Lee County, Virginia, T. R. Brotherton. Wayne County, Kentucky, E. G. Berry, 1935. **Measurements of the shell:** Diameter, 7.7-12.0 mm.; height, 5.1-8.0 mm. In this species there is no apparent correlation between obesity and highland or lowland habitats.

	Number	H/D and S.E.
Rio, Hart Co., Kentucky (river bluff habitat)	30	61.93±.58
Birmingham, Jefferson Co., Alabama (highland habitat)	30	68.60±.47
University, Tuscaloosa Co., Alabama (river bank habitat)	30	72.25±.38

DISTRIBUTION. **S. stenotrema** occupies most of Alabama except for the extreme south and southeast. It occurs in scattered patches in Mississippi and Georgia (Coastal Plain and Piedmont). Its center of distribution is the southern Appalachian Plateau, and is prevalent therefore in Tennessee and Kentucky. This species is found in western North Carolina and scatteringly in South Carolina, Virginia, West Virginia, Arkansas, southern Missouri, eastern Oklahoma, and also in the midwestern States north of the Ohio River. **Additional records:** GEORGIA. Hart: Hartwell, 1938. LOUISIANA. Grant: Montgomery.

ECOLOGY. Not an obligatory rupicole. **S. stenotrema** ranges between 3500 feet and 100 feet elevation. It lives on mountains, knobs, ridges, hills, river bluffs, in ravines and flood plains, and on upland summits. It inhabits pine woods, hardwood-coniferous cover, and hardwood areas. The snail burrows in pine straw, hardwood leaf litter, rock talus, and under rocks and logs. In open fields it may be found at the roots of grasses and in thickets, as well as in rock piles, vine mats in gullies and on roadsides.

14. **Stenotrema stenotrema voluminosum** (Clench and Banks). Plate V, figure 3, Plate VII, figure 4.

Polygyra (Stenotrema) voluminosa Clench and Banks, Nautilus 1932, **46**: 16-17, pl. 2, figs. 6-7 (Type locality: Blowing Springs, Nantahala Gorge, Swain County, North Carolina). Polygyra altispira, Archer, Nautilus, 1935, 48: 79, 81.

MORPHOLOGY. The shell as illustrated in Plate V, figure 3. Pilsbry (658-659) did not admit **voluminosum** as a subspecies, because it was based on size. Although size is a weak criterion in **Stenotrema** for erecting a name, the unusual stature of some lots of **voluminosum** indicates some basic difference, and this difference is shown in peculiar structure of the aperture (the genitalia may indicate some departure from the straight species). The distal end of the parietal lamella appears to be truncated, thus forming a blunt angle, instead of being a more or less down curved hook as in **S. stenotrema.** The blunt angle on the arc of the hook rarely appears in the typical species. The parietal lamella appears to be slightly oblique, while the buttress, if present is broad and low, not joining the lamella as a ridge

(as in **S. stenotrema**). Even those specimens of the typical species from the Appalachian Valley, in which the buttress is vestigial or suppressed all possess the down curved hook on the lamella. **Genitalia:** Pilasters of the phallic chamber as shown in Plate VII, figure 4. Only the apical half of the section is shown, and if there is any difference between the genitalia of **voluminosum** and those of **stenotrema,** it appears that the apicad branch of the left pilaster begins rather high up in the chamber. **Localities of dissected specimens:** Blowing Springs, Swain County, North Carolina, 1934. Smokemont, Swain County, North Carolina ,1938. **Measurements of the shell:** Diameter, 10.5-13.9 mm. height, 7.0-9.5 mm. A series of 30 specimens from Asheville, North Carolina yielded an H/D index and standard error of 66.95±.52.

DISTRIBUTION. **S. stenotrema voluminosum** appears to be a valid geographical race. It is almost confined to the Great Smoky Mountain Region of eastern Tennessee and western North Carolina. It overlaps with **S. stenotrema** in peripheral localities (Gatlinburg, Tennessee). Distribution: TENNESSEE. Sevier: Gatlinburg, Clench and Archer, 1934, H. E. Wheeler and Archer, 1937. Monroe: (Pilsbry 658). Polk: Cherokee National Forest, Alabama Museum Expedition, 1938. NORTH CAROLINA. Buncombe: Asheville, 1934. Swain: Blowing Springs, Harvard University expeditions, 1930, 1931, Archer, 1934. Smokemont, Alabama Museum Expedition, 1938.

ECOLOGY. This race burrows in leaf mold, usually among shrubs including Rhododendron. It inhabits not only the mesic hardwood forests but also culture areas around houses in humid situations. It burrows in vine mats in back yards and in old gullies shaded by locust, and is frequent in crevices of rock walls.

Section **Toxotrema** Rafinesque, 1819

Type species: **Stenotrema hirsutum** (Say 1817). Designated type (Pilsbry 639).

1. Ridge around submedian notch on inner rim of basal peristome less prominent than outer edge of basal peristome (in profile). (2)

2. Termination of parietal lamella more or less curved upwards, not forming a strongly down curved hook. Buttress vestigial or absent. ..... **S. hirsutum**, p. 40.

2. Termination of parietal lamella (distal end) a strongly down curved hook. Buttress strongly developed. (3)

3. Interdenticular sinus narrowly rounded and with surface flattened, dished ..... **S. deceptum**, p. 45.

3. Interdenticular sinus widely rounded and with surface strongly convex. (4)

4. Shell depressed, very obese, buffy olivaceous ..... **S. exodon**, p. 43.

4. Shell elevated subglobose, less obese, brown or cinnamon ..... **S. exodon turbinella**, p. 44.

1. Ridge around submedian notch on inner rim of basal peristome as prominent as or more prominent than outer edge of basal peristome (in profile). (5)

5. Termination (distal end) of parietal lamella and up curved hook. Appalachian species. (6)

6. Interdenticular sinus widely rounded, weakly entering the aperture. Ridge around submedian notch rounded off. Hairs having rounded bases ..... **S. hirsutum**, p. 40.

6. Interdenticular sinus strongly rounded, deeply entering the aperture. Ridge around submedian notch raised and prominent. Subperipheral hairs having spiral laminae as bases; area above periphery having short radial laminae ..... **S. pilula**, p. 42.

5. Termination of parietal lamella a down-curved hook, or a transverse ridge (T-shaped), or an outwardly recurved hook. Ozarkian species. (7)

7. Surface of shell smooth, without hairs. Parietal lamella a down-curved hook ..... **S. blandianum** p. 46.

7. Surface of shell hirsute. Parietal lamella terminated in a transverse ridge, detached or concrescent, or an outwardly recurved hook (Pilsbry 642). (8)

8. Surface of interdenticular sinus high and convex ..... **S. unciferum**, p. 48.

8. Surface of interdenticular sinus dished and flattened.....
.....**S. caddoense**, p. 47.

15. **Stenotrema hirsutum** (Say). Plate III, figure 4, Plate V, figure 4, Plate VII, figure 6.

Helix hirsuta Say, Journ. Phila. Acad. Sci., 1817, 1: 17. **Polygyra hirsuta,** Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 53-54, fig. 52 (in part). Archer, Nautilus, 1937, 50: 120 (partly **S. barbatum**). **Stenotrema hirsutum,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 662-665, fig. 412 a, d (b, c, e are **barbatum**). Both species are covered in the last citation under **hirsutum.**

MORPHOLOGY. The shell as illustrated in Plate V, figure 4 as well as the profile view, Plate III, figure 4. There are some variations in size and obesity in this species. **Living animal:** Head dark gray or gray tinged with tan, and sometimes spotted with white anteriorly; ocular bands black or nearly so; anterior tentacles gray or dark gray, pale at the tips; foot gray sometimes tinged with ivory; sole of foot gray, light gray or tinged with ivory; mantle edge fleshy brown spotted with dirty white, gray spotted with white, or pure white. **Genitalia:** Pilasters of phallic chamber as shown in Plate VII, figure 6. Diameter of shell, 6.4-6.5. Phallus and epiphallus, 5.0-6.0. **Localities of dissected specimens:** South Mountain, Adams County, Pennsylvania, 1938. White Deer, Union County, Pennsylvania, H. Vander Schalie, 1934. Grassy Cove, Cumberland County, Tennessee, 1934, 1938.

Measurements of the shell: Diameter, 6.0-8.0 mm., height, 4.0-5.7 mm.

	Number	H/D and S.E.
The Dismals, Franklin Co., Ala.	25	70.89±.43
7 miles southeast of Lewisburg, Union Co., Penna.	30	67.26±.47
Grassy Cove, Cumberland Co., Tenn.	25	66.80±.36

In dealing with this species statistically in contrast with **S. barbatum** it will be seen that the latter is more obese of the two. For example, the lot of **hirsutum** from Lewisburg is 4.52±.60 per cent greater as to the H/D index than is the lot from Ann Arbor,

Michigan. However, the Grassy Cove lot, the greatest extreme for the species, is not significantly different in obesity from the lot of **barbatum** from Cambridge, Maryland (q. v.).

DISTRIBUTION. **S. hirsutum** ranges from northeastern Mississippi and central Alabama northward scatteringly through the Appalachian Plateau of Tennessee to northern Kentucky central Ohio and as far as southern Indiana and Illinois. It is not found west of the Mississippi, nor again is it found in the southern part of the Blue Ridge Province (south of the Virginia boundary) where **S. pilula** replaces it. It also skips much of the Piedmont, especially in Georgia (proof is lacking for the records), and is weakly present in the Carolinas. In the Atlantic Coastal Plain as a whole it is not present, unless on limestone. It is the prevalent **Stenotrema** over the western two-thirds of Virginia where it is common, and occurs over much of West Virginia, Pennsylvania, and the southern or at least the highland section of New York and New Jersey just barely appearing in southwestern New England. Wherever present it is quite predominant in the Middle Atlantic States. All other regions on record actually contain **S. barbatum,** and in the regions common to both the two often exist together in the same locality. **Additional records:** ALABAMA. Jefferson: Graysville, 1938. Shelby: Oak Mountain State Park, 1939. Walker: Sumiton, 1938. MISSISSIPPI. Itawamba: Nine miles northeast of Smithville, 1938. VIRGINIA. Albemarle: Charlottesville, 1945. Observatory Mountain, 1945. Monticello, 1945. **Errors:** Walker (53) records Bibb County, Etowah County (Keener), Jackson County (five localities), Madison County (four localities), and Montevallo, all in Alabama as localities for **S. hirsutum.** All specimens that I have been able to examine prove to be either some other species or an erroneous label. Most of these lots are **S. deceptum,** and H. E. Wheeler (Walker 54) was right in stating that the Monte Sano specimens differed constantly from true **hirsutum,** for they are the former species.

ECOLOGY. Not an obligatory rupicole. **S. hirsutum** ranges from 3000 feet on mountains to low elevations on ridges, hills, river bluffs, ravines, and level uplands; below these situations it is likely to be replaced by **S. barbatum.** It occurs on both calcareous soils and noncalcareous soils, but avoids Coastal Plain and glaciated areas. It inhabits hardwood cover (mesic and xeric),

hardwood-coniferous, pine, and pine-barren woods. The snails are sometimes found adhering to the under sides of rocks, but they frequently burrow under logs and in runways in leaf litter. The species also occurs in open country and culture areas where it inhabits vine mats on roadsides, the under surfaces of stones and planks, and at the roots of grasses in open fields and road sides. It occurs in brick piles in vacant lots, and in weeds in urban areas.

16. **Stenotrema pilula** (Pilsbry). Plate III, figure 3, Plate VIII, figure 1.

Polygyra hirsuta pilula Pilsbry, Proc. Acad. Nat. Sci. Phila. (1900): 132-133 (Type locality: Thunderhead Mountain, Blount County, Tennessee). **Polygyra pilula,** Walker and Pilsbry, Proc. Acad. Nat. Sci. Phila. (1902): 417, 420, 428. Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 55, fig. 64. **Stenotrema pilula,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 661-662, fig. 411.

MORPHOLOGY. The shell as illustrated in Plate III, figure 3. The spirally laminated hairs on the base of the shell are a conspicuous feature. **Living animal:** Head gray; eyes black; eyestalks and ocular bands black or deep gray; anterior tentacles gray; foot light gray; sole of foot tan or dirty white; mantel gray densely spotted with white. **Genitalia:** Pilasters of phallic chamber as shown in Plate VIII, figure 1. Diameter of shell, 5.7-6.5 mm. Phallus and epiphallus, 4.5-6.0 mm. **Localities of dissected specimens:** Cade's Cove, Blount County, Tennessee, 1934. Rich Mountain, Blount County, Tennessee, 1934. Sugarland Mountain, Sevier County, Tennessee, 1938. **Measurements of the shell:** Diameter, 5.5-6.9 mm.; height, 3.9-4.9 mm.

DISTRIBUTION. This species is limited to the southern part of the Blue Ridge province in southeast Tennessee, western North Carolina, and extreme northern South Carolina. Aside from the localities listed in Pilsbry (661-662) the following record is worthy of note: Jocassie, Oconee County, South Carolina, H. E. Wheeler. **Errors:** Walker (55) records this species from Madison County, Alabama, but such a distribution is distant from the furthest boundaries of distribution. All specimens upon which this record is based are actually **S. deceptum.**

W. G. Mazyck records **S. hirsutum** from Oconee County, South Carolina, but this was a misidentification of what proves to be **S. pilula.**

ECOLOGY. **S. pilula,** an obligatory rupicole, is confined to mountainous country, and ranges from 1600 feet to 3500 feet elevation. It inhabits knobs, valley slopes, mountain ravines, and stream banks, and seems to be confined to noncalcareous soils. It is present in hardwood cover, but extends into coniferous hardwood cover. It burrows in leaf litter on the ground and on tops of ledges, and is also found under rocks, stones, and logs, concentrating in rhododendron, doghobble, and maidenhair fern.

17. **Stenotrema exodon** (Pilsbry). Plate III, figure 5, Plate VIII, figure 2, Plate IX, figure 6.

Helix stenotrema subglobosa Pilsbry, Man. Conchology, 1892, Ser. 2, 8: 152, Pl. 50, figs. 26-27 (not **H. subglobosa** Binney). **Polygyra stenotrema subglobosa,** Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 50, fig. 58. **Polygyra stenotrema exodon** Pilsbry, Proc. Acad. Nat. Sci. Phila., (1900): 129. **Stenotrema exodon,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3, (1940); 666-668, fig. 414, a-d (Type locality: Woodville, Jackson County, Alabama).

MORPHOLOGY. the shell as illustrated in Plate III, figure 5. The shell is quite flattened and pale or light brown. **Living animal:** Head gray or pale ivory yellow; eyes black; eyestalks and ocular bands gray or black; anterior tentacles gray; foot white or ivory spotted with white; sole of foot pale ivory or ivory yellow; mantle edge white or ivory yellow densely spotted with white. **Genitalia:** Pilasters of phallic chamber as shown in Plate VIII, figure 2. Diameter of shell 9.9 mm. Phallus and epiphallus 7.8 mm. **Localities of dissected specimens:** Woodville, Jackson County, Alabama, 1938. **Measurements of the shell:** Diameter, 7.8-10.6 mm.; height, 4.8-6.3 mm.

	Number	H/D and S.E.
Madkin Mountain, Madison Co., Alabama	30	63.80±.48
Woodville, Jackson Co., Alabama	30	60.20±.28

DISTRIBUTION. The range of this species lies within the mountainous part of northeast Alabama. It is found between Madkin Mountain to the west of Monte Sano and the Tennessee River on the east. It is recorded from Gurley and Molder, Madison County, and from Woodville, Limrock, Scottsboro, Princeton, Bass, and Stevenson, Jackson County. The other localities recorded by Pilsbry (667) are based on old errors communicated by myself, and are based on the subspecies **turbinella.**

ECOLOGY. An obligatory rupicole. **S. exodon** occurs mostly between 700 feet and 1000 feet elevation. It lives on the lower slopes of flat-topped mountains and knobs. Its habitats are entirely on limestone ledges covered with oak-hickory woods or red cedar-hardwood cover. It only slightly overlaps the habitudinal range of **S. exodon turbinella.** The snail burrows in leaf debris or under rocks in undercuts of ledges, in ledge fissures, rarely on tops of ledges, and under stones in open fields.

18. **Stenotrema exodon turbinella** (Clench and Archer), Plate III, figure 6, Plate VIII, figure 3.

Polygyra stenotrema turbinella Clench and Archer, Nautilus, 1933, 46: 89-91, Pl. 7, figs. 1-3 (Type locality: 2 to 4 miles east of Woodville, Jackson County, Alabama). **Polygyra stenotrema,** Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 48-49 (in part). **Stenotrema exodon turbinella,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 668, fig. 414, e-g.

MORPHOLOGY. The shell as illustrated in Plate III, figure 6. It is more elevated, than that of **S. exodon,** and its color is decidedly brown. **Living animal:** Head gray or pale gray; eyestalks and ocular bands gray; foot light gray or dirty white tinged with ivory; mantle edge same as foot. **Genitalia:** Pilasters of phallic chamber as shown in Plate VIII, figure 3 are essentially the same as those of exodon in structure. Diameter of shell, 8.0 mm. Phallus and epiphallus, 12.8 mm. **Localities of dissected specimens:** Manitou Cave, Fort Payne, Alabama, 1937. **Measurements of the shell:** Diameter, 7.1-9.9 mm.; height, 4.9-6.9 mm.

	Number	H/D and S.E.
E. of Woodville, Jackson Co., Alabama	30	67.98±.45

Thirty specimens from Paint Rock, Jackson County, Alabama had a mean diameter of 8.04±.51 mm. in contrast with the same number of specimens of **exodon** from Woodville, which were 10.78±.55 mm., a difference of 2.74±.7 %.

DISTRIBUTION. **S. exodon turbinella** occupies a much wider territory than does **S. exodon.** It is present not only in extreme northeast Alabama but also in Blount, DeKalb, Etowah, and Marshall counties, as well as in Walker County, Georgia, and Franklin and Madison Counties, Tennessee.

ECOLOGY. An obligatory rupicole, **S. exodon turbinella** ranges between 700 feet and 1400 feet elevation. It inhabits the slopes of flat-topped mountains, ridges, and knobs, and is sometimes present on isolated rock masses in valleys. It occupies hardwood cover, red cedar-hardwood and oak-pine cover. The snail burrows in leaf mold on tops of ledges, under logs, in rock talus, and in vine mats on open roadsides.

19. **Stenotrema deceptum** (Clapp), Plate III, figure 7, plate VIII, figure 4.

Polygyra decepta Clapp, Nautilus, 1905, **19**: 25, text figure (Type locality: Blount Springs, Blount County, Alabama): Walker Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 54 (in part), figure 63. **Stenotrema deceptum,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 668-669, figure 415.

MORPHOLOGY. The shell as illustrated in Plate III, figure 7. This species has been confused with **S. exodon turbinella** and **S. pilula** as well as **S. hirsutum,** but the differences in the aperture alone, the deeply incised interdenticular sinus, serves to differentiate this species from all others. **Living animal:** Head ivory tinged with fain gray or brown tinged with light gray; eyestalks and ocular bands very light gray; foot dirty white or grayish white; sole of foot ivory; mantle edge dirty white. **Genitalia:** Pilasters of phallic chamber as shown in Plate VIII, figure 4 demonstrate differences between this species and the related ones. Diameter of shell, 7.6-7.9 mm. Phallus and epiphallus, 4.5-5.2 mm. **Localities of dissected specimens:** Huntsville, Madison County, Alabama. **Measurements of the shell:** Diameter, 6.0-8.0 mm.; height, 4.3-5.6 mm. A series of 30

specimens from Woodville, Jackson County, Alabama, yields an H/D index and standard error of 68.12±.47.

DISTRIBUTION. **S. deceptum** is present in the Cumberland Plateau of Alabama and immediately adjacent parts of Tennessee, and localities are also known from the Appalachian Valley (the Cahaba Ridges).

ECOLOGY. An obligatory rupicole, **S. deceptum** ranges between 250 feet and 1700 feet elevation. It inhabits the slopes of flat-topped mountains, ridges, knobs, ravines, and valleys, and is present both on calcareous and noncalcareous soils (derived from sedimentary rocks). It is present in hardwood and hardwood-coniferous cover. This is one of the most abundant species of **Stenotrema.** The snail burrows in leaf litter, under rocks, fallen bark, rocks, and in vine mats in open fields. In the city of Huntsville, Alabama, it lives in the crevices of rock walls and burrows in weeds along the walls.

20. **Stenotrema blandianum** (Pilsbry), Plate III, figure 8, Plate IX, figure 1.

Polygyra blandiana Pilsbry, Proc. Acad. Nat. Sci. Phila. (1903) : 203, Pl. 9, figs. 11-13 (Type locality: Springfield, Greene County, Missouri). **Stenotrema blandianum** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940) : 669-670, figure 416.

MORPHOLOGY. The shell as illustrated in Plate III, figure 8. The shell completely lacks hairs and hair scars. **Living animal:** Head gray; eyestalks and ocular bands deep gray; foot white tinged with gray; sole of foot dirty white; mantle edge densely spotted with white over buff or brown. **Genitalia:** Pilasters of phallic chamber as shown in Plate IX, figure 1. Diameter of shell 7.9 mm. Phallus and epiphallus, 4.5-4.8. **Localities of dissected specimens:** Ozark, Christian County, Missouri. **Measurements of the shell:** Diameter, 7.5-8.7 mm.: height, 4.2-5.0 mm.

DISTRIBUTION. **S. blandianum** is probably confined to the Ozark Highlands of southwestern Missouri.

ECOLOGY. An obligatory rupicole. This species is recorded from an elevation of about 1100 feet. Field observations

made by myself in May 1938 at Ozark, Missouri, showed that S. **blandianum** is apparently confined to river bluffs (Finley River at the above locality) of juvenile topography. In this one locality the bluffs consist of limestone ledges and clayey slopes and have a mere fringe of hardwood trees; the area in back of the bluffs has been cleared of trees. The snails live in undercuts of ledges, in fissures, under rocks, stones, and wood, and at the roots of ground plants, as well as in grass on the cleared summits.

21. **Stenotrema caddoense** (Archer), Plate V, figure 5, Plate VIII, figure 5.

Polygyra caddoensis Archer, Nautilus, 1935, **49**: 20, text figure (Type locality: Caddo Gap, Montgomery County, Arkansas). **Stenotrema unciferum caddoense,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 671-672, figure 417.

MORPHOLOGY. The shell as illustrated in Plate V, figure 5. Pilsbry (671) regards this as a subspecies of **S. unciferum.** This is an erroneous interpretation, since there are consistent differences in the aperture and in the genitalia despite the fact that the two are closely related species. At Caddo Gap, Arkansas where the two overlap geographically there is no subspecific relationship, since the two do not intergrade in shell characters. The striking difference lies in the aperture where the interdenticular sinus is broadly curved in **caddoense** and with a flattened surface as well, while in **unciferum** the interdenticular sinus is deeply curved or deeply angular and with a raised surface. In the latter species the submedian notch is subtended by a high, raised ridge, while in **caddoense** this ridge is blunt, and the basal denticle is not separated from this ridge by an indentation (found in the case of **unciferum**). **Living animal:** Head brown; eyestalks black; foot dirty white or ivory spotted with white; caudal end of foot bluish white; sole of foot pale ivory; mantle edge dirty white. **Genitalia:** Pilasters of phallic chamber as shown in Plate VIII, figure V. They are joined basally, whereas those of **unciferum** are separated basally. Diameter of shell, 7.0-7.8 mm. Phallus and epiphallus, 5.0-7.5 mm. **Localities of dissected specimens:** Cold Springs, Bismarck, Hot Springs County, Arkansas. Caddo Gap, Montgomery County, Arkansas. **Measurements of the shell:** Diameter, 4.8-5.3mm.; height, 7.1-8.0 mm.

A series of 30 specimens from the type locality have an H/D and standard error of 64.35±.42.

DISTRIBUTION. Besides the series taken from the type locality taken by H. E. Wheeler and myself, 1935 and 1938, the following locality is worthy of note: Cold Springs, Hot Springs County, Arkansas, Wheeler and Archer, 1938.

ECOLOGY. An obligatory rupicole, this species ranges between 750 feet and 1250 feet elevation, and inhabits mountain slopes from base to summit. It is present both in oak-hickory and oak-pine cover on very stony or rocky ground. The snail burrows under rocks and in talus (quartzite and shale), three inches to half a foot beneath the surface; also under charred wood, fallen bark, and dried hog dung.

22. **Stenotrema unciferum** (Pilsbry), Plate III, figure 9, Plate VIII, figure 6.

Polygyra hirsuta uncifera Pilsbry, Proc. Acad. Nat. Sci. Phila. (1900): 435 (Type locality: Mena Mountain, Polk County Arkansas); Pilsbry and Ferriss, Ibid. 1903: 202; Pl. 9, figs. 7-10. **Stenotrema unciferum** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940); 670-671, fig. 406, 7-10.

MORPHOLOGY. The shell as illustrated in Plate III, figure 9. **Living animal:** Head gray or light gray tinged with brown; eyestalks and ocular bands dark gray; foot dirty white or light gray bordered with white along the margin; sole of foot dirty white; mantle edge dirty white. **Genitalia:** Pilasters of phallic chamber as shown in Plate VIII, figure 6. Diameter of shell 6.8-8.0 mm. Phallus and epiphallus, 5.0-7.5 mm. **Localities of dissected specimens:** Rich Mountain, Polk County, Arkansas. Caddo Gap, Montgomery County, Arkansas. **Measurements of the shell:** Diameter, 4.8-5.3 mm.; height, 7.1-8.0 mm. A series from Rich Mountain has a mean diameter and standard error of 7.9±.75 mm.; a series from Caddo Gap 7.0±.27 (30 specimens each). This difference is significant. The H/D and standard error for the two localities is 70.80±.45 and 70.93±.48 respectively.

DISTRIBUTION. **S. unciferum** is confined to the Ouachita Mountains in western Arkansas.

ECOLOGY. An obligatory rupicole, this species ranges between 750 feet and 1600 feet elevation. It is present in ravines and on the slopes of higher mountains and up to the summits of the lower mountains. It is found in hardwood and hardwood-coniferous cover, always on rocky (noncalcareous) ground. The snails burrow under rocks and in talus, and occasionally under logs.

Section **Cohutta,** new

Type species: **Stenotrema cohuttense** (Clapp 1914).

1. Submedian notch of basal peristome with sides very widely diverging; inner denticle slightly differentiated from rim bordering the notch, and thicker than it ..... **S. brevipila,** p. 49.

1. Submedian notch of basal peristome represented by a widely curved bay; inner denticle replaced entirely by rim bordering the notch. ..... **S. cohuttense,** p. 50.

23. **Stenotrema brevipila** (Clapp), Plate III, figure 10, Plate IX, figure 3, Plate X, figure 5.

Polygyra brevipila Clapp, Nautilus, 1907, **20:** 110, Pl. 5, figs. 1-4 (Type locality; "Horseblock Mountain, Talladega County, Alabama", an erroneous designation): Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 51-52, fig. 60. **Polygyra brevipila cherokeensis** Clapp, Nautilus, 1916, **30:** 3; Walker, Alabama Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 52-53. **Stenotrema brevipila,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 672-673, fig. 418.

MORPHOLOGY. The shell as illustrated in Plate III, figure 10. **Living animal:** Head very pale ivory yellow, faintly tinged with gray, and having scattered patches of white spots; eye-stalks and ocular bands gray or very light gray; foot very pale ivory yellow or buff slightly tinged with gray, and having scattered patches of white, especially along the edge; caudal end of foot opaque white; sole of foot dirty white or buff; mantle edge dirty white or buff densely spotted with white. **Genitalia:** Pilasters of phallic chamber as shown in Plate IX, figure 3. Diameter of shell, 7.8-8.1 mm. Phallus and epiphallus, 5.5-7.5 mm. **Localities of dissected specimens:** Indian Mountain, Cherokee County, Alabama. Mount Cheaha, Cleburne County, Ala-

bama. **Measurements of the shell:** Diameter, 6.3-9.0 mm.; height, 4.8-6.0 mm. The form **cherokeense** is based on small specimens.

DISTRIBUTION. This species occurs in the Talladega Range, extending from about the area of Cheaha State Park northeastward into Georgia where the Etowah River Valley divides it from the related species, **S. cohuttense.** H. H. Smith, who first collected the species, gave the type locality as "Horseblock Mountain," a name rarely used to designate Mount Cheaha. In fact the name, Horseblock, is apt to be confused with another Horseblock Mountain in the same county, where **S. brevipila** has never been found, and in any event the county designation is wrong. The following localities are recorded for this species: The west slope of Mount Cheaha, Cleburne County, Alabama, Alabama Museum Expedition of 1940; A. F. Archer, 1947. This is the true **type locality.** Indian Mountain, Cherokee County, Alabama, abundant (170 specimens), Archer, 1938. Pleasant Gap, Cherokee County, Alabama, and Floyd County, Georgia are also recorded (Pilsbry 673).

ECOLOGY. An obligatory rupicole, this species ranges between 1000 and 2000 feet elevation. It inhabits the rock slopes of mature mountains, particularly congregating in shallow ravines in oak-hickory and oak-pine cover and even in pure pine on west-facing slopes. The snails burrow deeply in quartzite talus, under rocks, in leaf mold on rocky ground, and in pine-straw carpet.

24. **Stenotrema cohuttense** (Clapp), Plate III, figure 11, Plate IX, figure 4.

Polygyra cohuttensis Clapp, Nautilus, 1914, 28: text figure (Type locality: Fort Mountain, Cohutta Mountains, Murray County, Georgia). **Stenotrema cohuttense,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 673-674, fig. 419.

MORPHOLOGY. The shell as illustrated in Plate III, figure 11. **Living animal:** Head pale ivory yellow or buff spotted with white; eyestalks and ocular bands gray to dark gray; foot tan, pale ivory yellow, or dirty white; sole of foot dirty white; mantle edge light gray or dirty white spotted with white. **Genitalia:** Pilasters of phallic chamber as shown in Plate IX, figure 4.

Diameter of shell, 7.0-7.2 mm. Phallus and epiphallus, 6.0-6.2 mm. **Localities of dissected specimens:** Greasy Creek, Polk County, Tennessee. **Measurements of the shell:** Diameter, 6.0-7.2 mm.; height, 4.0-5.1 mm. A series of 30 specimens from Sugarloaf Mountain, Polk County, Tennessee yields an H/D and standard error of 72.62±.34.

DISTRIBUTION. **S. cohuttense** is confined to the southwestern part of the Blue Ridge Province lying north of the Etowah River. Pilsbry records it from the mountainous sections of Gilmer, Fannin, and Murray counties, Georgia. The Alabama Museum Expedition of 1938 took locality records in Polk County, Tennessee.

ECOLOGY. An obligatory rupicole. This species ranges between 1000 feet and 1200 feet elevation. It is found in hardwood and oak-pine cover on areas of ancient noncalcareous rocks. It burrows under rocks, stones, and rotten logs.

Section **Maxillifer** Pilsbry, 1940.

Type species: **Stenotrema maxillatum** (Gould 1848).

25. **Stenotrema maxillatum** (Gould) Plate III, figure 12, Plate VII, figure 5, Plate IX, figure 2.

Helix maxillata Gould, Proc. Boston Soc. Nat. Hist., 1848, 3: 37. **Polygyra maxillata,** Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 55-56, fig. 65. **Stenotrema maxillatum,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 674-675, fig. 420.

MORPHOLOGY. The shell as illustrated in Plate III, figure 12. This unique species differs from all others by the double basal peristome. **Living animal:** Head ivory yellow or pale grayish white; eyestalks gray; ocular bands gray, fading out 2/3 of the distance back; foot white, pale grayish white, or ivory yellow; sole of foot dirty white or pale ivory; mantle edge buffy brown or gray spotted with white. **Genitalia:** Pilasters of phallic chamber as shown in Plate IX, figure 2. Diameter of shell, 7.0-7.2 mm. Phallus and epiphallus, 7.0-11.0 mm. **Localities of dissected specimens:** Chewacla Creek State Park, Lee County, Alabama. Harrison, Hale County, Alabama. **Measurements of the shell:** Diameter, 6.1-7.5 mm.; height, 4.2-5.5 mm.

A series of 25 specimens from Uniontown, Perry County, Alabama yielded an H/D and standard error of 70.98±.34.

DISTRIBUTION. **S. maxillatum** occurs both in the Piedmont Province and in the Coastal Plain. It is present in central and west-central Georgia, all through central Alabama, and southeastern and south-central Alabama. The designated type locality (Pilsbry 675) should be specifically as follows: Randal's Creek, 14.7 miles west of Columbus, Georgia. **Additional records:** ALABAMA. Bullock: Pinhook creek; Peachburg. Butler: Persimmon Creek. Lee: 5.2 miles east of Opelika. Lowndes: 4.1 miles east of Fort Deposit. Wilcox: Bear Creek; Turkey Creek. Most records by P. L. Marsh and A. F. Archer, 1938-1940. GEORGIA. Fulton: Fort McPherson; Black Rock Lake. Stewart: Frogbottom Creek, Marsh and Archer. **Errors:** Walker (56) recorded this species from Shelby County and Black Bluff, Choctaw County, but these localities are erroneous, and specimens from the latter are based on **S. monodon aliciae.**

ECOLOGY. Not an obligatory rupicole. This species ranges between 150 and 700 feet elevation. It occurs in mesophytic and subxeric hardwood cover, as well as in oak-pine woods on calcareous and noncalcareous soils. It inhabits bluffs of small rivers and slopes and bottoms of ravines fairly close to small streams. The snails burrow in talus, under rocks and logs, and in leaf litter on rocky and rock-free ground. They are also found in rock piles and under stones and wood in open fields.

Subgenus **Euchemotrema** Archer, 1939.

Typical species: **Stenotrema monodon** (Rackett 1821).

1. Shell keeled (as in **S. barbigerum**) but aperture typical of the subgenus ..... **S. hubrichti,** p. 60.

1. Shell angulated or with rounded periphery. (2)

2. Inner edge of outer arc of peristome (equivalent of interdenticular sinus) flattened or dished; termination of parietal lamella deeply or obliquely descending into aperture. Group of **S. monodon.** (3)

3. Shell widely umbilicate; inner rim of basal peristome not raised. (4)

4. Shell angulated, very flattened, lenticular, banded; pile dense; whorls more rapidly increasing (as in **S. fraternum**) ..... **S. fasciatum p. 56.**

4. Shell bluntly angulated or rounded; not lenticular; unbanded; hairs more widely spaced and whorls less rapidly increasing ..... **S. monodon**, p. 53.

3. Shell perforate or nearly imperforate; inner rim of basal peristome raised ..... **S. monodon aliciae**, p. 54.

2. Inner edge of outer arc of peristome convex and rounded; termination of parietal lamella not descending deeply or obliquely into the aperture. Group of **S. fraternum.** (5)

5. Shell very elevated, dome-shaped, imperforate. Ozarkian subspecies. ..... **S. fraternum imperforatum**, p. 58.

5. Shell not elevated or dome-shaped; perforate or umbilicate. (6)

6. Shell perforate ..... **S. fraternum**, p. 57.

6. Shell umbilicate. (7)

7. Shell having an angulated periphery (except the last ¼ whorl); banded. Southern Blue Ridge subspecies ..... **S. fraternum montanum**, p. 59.

7. Shell having a rounded periphery; unbanded. Northern North America ..... **S. fraternum cavum**, p. 59.

26. **Stenotrema monodon** (Rackett), Plate IV, figure 1, Plate X, figure1.

Helix monodon Rackett, Trans. Linn. Soc. London, 1882, **13**: 42, Pl. 5, fig. 2. **Stenotrema monodon,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940) : 676-679, figs. 421 a, b.

MORPHOLOGY. Shell as illustrated in Plate IV, figure 1, **Living animal:** Head black or deep gray; foot sooty or deep gray; sole of foot dark gray; mantle edge dark gray or gray. **Genitalia;** Pilasters of phallic chamber as shown in Plate X, figure 1. Both pilasters of this species and of the allied subspecies (**aliciae**) are equally developed, and cannot be confused with the structures to be found in **S. fraternum.** Diameter of shell, 7.2-8.0 mm. Phallus and epiphallus, 3.5-5.1 mm. **Localities of dissected specimens:**

Ann Arbor, Washtenaw, Michigan. Monroe County, Michigan. Ottawa County, Ohio. **Measurements of the shell:** Diameter, 6.2-9.0 mm.; height, 3.3-5.9 mm. A series of 30 specimens from Petersburg, Monroe County Michigan yields an H/D and standard error of 60.25±.54 which is eleven times the standard error of a lot of **S. monodon aliciae** from Margerum, Alabama (q. v.).

DISTRIBUTION. ...**S. monodon** occurs mostly within the Central Lowland Province from southwestern Ontario and central Ohio, southwestward to the Arkansas and Cimmarron rivers, even as far as Colorado Springs, Colorado. The area where it intergrades with the subspecies **aliciae** extends from southern Illinois to Oklahoma.

Although this species is of no direct concern to the fauna of the southeastern states, it is well to comment here on its type locality. Pilsbry (678-679) repeats the usual idea that the proper locality is Thunder Bay, Alpena County, Michigan, and makes some statements supporting this view. Calvin Goodrich, formerly of the University Museums, Ann Arbor, Michigan, has stated that the assigned locality is incorrect, and that it should be the Thunder Bay near Amherstburg, Essex County, Ontario. The describer received his species from an Edmund Sheppard of the Royal artillery of Canada. Since they were found in 1816, it is improbable that a British officer would have visited American territories so soon after the War of 1812. Elliott's Point at the above locality is a "beach formed entirely of shells" as stated by Shepherd, and all who have collected at Thunder Bay, Michigan knew that the beach there is neither formed of shells nor are local factors present that would form such a beach.

ECOLOGY. **S. monodon** lives in marshes and wooded swamps, along the banks of streams, river floodplains and shores of lakes, and in ravines adjacent to rivers. It is also present in tall-grass prairies, in open fields and on railroad embankments, all in lowland areas.

27. **Stenotrema monodon aliciae** (Pilsbry), Plate IV, figures 2, 3, Plate X, figures 2, 3.

Helix monodon aliciae Pilsbry, Man. Conchology, 1894, Ser. 2, 9: 78, Pl. 31, figs. 22-24 (Type locality: Lake Charles, Calcasieu Parish, Louisiana). **Polygyra monodon friersoni** Pilsbry,

Nautilus, 1899, **13**: 36. **Polygyra monodon aliciae,** Walker, Ala. Mus. Nat. Hist., Mus. Pap. No. 8 (1928): 56, fig. 66. **Polygyra monodon fraterna,** Walker, Ibid.; 57. **Stenotrema monodon aliciae** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 679-681, fig. 421 c, d.

MORPHOLOGY. The shell as illustrated in Plate IV, figures 2 and 3. The larger, more depressed form **friersoni** Pilsbry (Type locality: Frierson's Mill, DeSoto Parish, Louisiana) has been extensively confused with **S. fraternum.** Hence Walker (57) as well as others has recorded the latter from Alabama and neighboring states, although it is not a species of the Deep South, being found only in the Upper South and regions to the northward. It is also by reason of this same confusion that Pilsbry (684) records what is really **monodon aliciae** as **fraternum** from the Alabama region, and states that there is "no constant difference in apertural parts between **fraternum** and **monodon.**" Actually there is no intergradation between the characters of the two species, and the differences, even though not startling, are definite and constant. A sectioning of the penis will reveal the specific identity of any specimen in the hands of anyone who doubts its apertural characters. **Living animal:** Head dark gray or gray eyestalks and ocular bands black or gray; foot tan, brownish gray, or gray mottled with white; sole of foot gray; mantle edge gray.

Genitalia: Pilasters of the phallic chamber as shown in Plate X, figures 2 and 3. The pilasters seem to be more heavily lobate in this subspecies than in the northern **monodon.** The specimen from which the latter was drawn, figure 1, was pinned so that the pilasters were laid over on their sides more than those in the other two specimens. Diameter of shell, 7.9-10.0 mm. Phallus and epiphallus, 3.5-5.0 mm. **Localities of dissected specimens:** Harrison Church, Hale County, Alabama. Marengo County, Alabama. 6 miles north of Dallas, Dallas County, Texas, E. P. Cheatum. **Measurements of the shell:** Diameter, 7.0-11.2 mm.; height, 4.8-6.9 mm. Form friersoni is usually correlated with valley bottoms, floodplains, and ravines especially in the Coastal Plain Province, and has a more depressed spire than is the case in the upland form.

	Number	H/D and S.E.
Margerum, Colbert Co., Ala.	25	68.59±.44
Marengo Co., Alabama	30	64.68±.42
Dallas Co., Texas	30	63.18±.46

DISTRIBUTION. The northern limits of this subspecies extend from Virginia across Kentucky, southern Illinois to central Missouri, and southwestward to central Texas. In Alabama it is practically statewide, and it is prevalent over much of Georgia outside of mountains in the north.

ECOLOGY. Not an obligatory rupicole. S. **monodon** aliciae ranges from below 100 feet elevation up to 750 feet elevation. It is found in lowland hardwood forests, and is present in upland hardwood, hardwood-coniferous cover, and in pure pine, but is most abundant in calcareous uplands. It is also found in thickets in prairies and in open fields and clearings. This subspecies inhabits urban localities in Alabama where the soil is not lime-deficient (Decatur, Montgomery, Mobile as well as New Orleans, Louisiana).

28. **Stenotrema fasciatum** Pilsbry, Plate IV, figure 4.

Helix cincta Lewis, Proc. Acad. Nat. Sci. Phila. (1874): 162 (not **Helix cincta** Muller) **(Type locality:** Hayesville, Clay County, North Carolina). **Stenotrema fraternum fasciatum** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 686, fig. 422 b.

MORPHOLOGY. The shell as illustrated in Plate IV, figure 4. There has been some confusion not only about the synonymy of this species but also about its relationships. Pilsbry originally assigned it as a subspecies of **monodon,** which is reasonable in that it belongs more in the **monodon** group than in the **fraternum** group to which it was tied in 1940. The aperture plainly shows that **S. fasciatum** is close to **monodom,** and might well be regarded as a very local subspecies, were it not for the fact that its range is very detached from any other members of **monodon,** and that the configuration of the whorls simulates that of **fraternum** and not **monodom.** Nor yet can it be tied in with **fraternum,** since there is a genuine subspecies of the latter occurring in the same region (**montanum**). The nuclear whorl is radially striated instead of being radially beaded as in **fraternum** and its subspecies. **Genitalia:** Unknown except for dried specimens restored in KOH. Pilsbry quotes from me (Nautilus, 1938, 52: 98)

regarding the characteristics of the pilaster pattern, but my own statement is weakly supported by the restored tissues which could not, of course, be sectioned, and superficially resembled the penial structure of **S. monodon.** Since **fasciatum** is not a subspecies of **monodon,** the similarity in the genitalia will have to be established on fresh tissues. **Measurements of the shell:** Diameter, 9.1-11.0 mm.; height, 4.5-5.5 mm.

DISTRIBUTION. Known from very few localities in southwestern North Carolina. Although other species of **Stenotrema** were abundant around Hayesville, North Carolina I was unable to locate any specimens of **S. fasciatum** in likely places in October 1937.

ECOLOGY. Information given by J. H. Ferriss indicates that this species is found on knobs and mountain slopes, and lives at the bases of **Aesculus octandra** and **Tilia neglecta** in rich ravines at about 2000 feet elevation.

29. **Stenotrema fraternum** (Say), Plate IV, figure 6, Plate IX, figure 5, Plate X, figure 4.

Helix fraterna Say, in S. H. Long's Expedition, 1824, 2: 257, Pl. 15, fig. 3. **Stenotrema fraternum,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 681-684, fig. 422 a.

MORPHOLOGY. The shell as illustrated in Plate IV, figure 6. The convexity of the surface of the inner edge of the outer arc of the peristome as well as the shortened termination of the parietal lamella serve at once to distinguish this species from any members of the **S. monodon** group. **Living animal:** Head brown or dark brown; eyestalks and occular bands deep gray or black; foot tan or brownish; sole of foot brown; mantle edge brown or grayish brown. **Genitalia:** Pilasters of phallic chamber as shown in Plate X, figure 4. Diameter of shell, 9.8-10.0 mm. Phallus and epiphallus, 4.5-5.0 mm. **Localities of dissected specimens:** 5 miles north of Carey, Wyandott County, Ohio. Ann Arbor, Washtenaw County, Michigan. **Measurements of the shell:** Diameter, 7.0-11.5 mm.; height, 4.5-7.0 mm.

	Number	H/D and S.E.
Ann Arbor, Mich.	30	67.47±.47
Douglas Lake, Cheboygan Co., Mich.	30	63.92±.47
Mohawk, (**S. fraternum cavum**) Herkimer Co., N. Y.	25	60.95±.54

The difference between the subspecies and typical **fraternum** is 6.72±.60 per cent, or ten times the standard error, is highly significant.

DISTRIBUTION. Aside from its wide occurrence in the northern part of North America it does extend into the Piedmont, Blue Ridge, and Appalachian Valley regions of Virginia, and also widely in the Appalachian Plateaus of West Virginia, and Kentucky. **Errors:** Pilsbry (684) records this species from Nashville, Tennessee, but all specimens of **Euchemotrema** from that locality examined by me in various collections proved to be a rather large-sized **S. monodon aliciae.**

ECOLOGY. Not an obligatory rupicole. **S. fraternum** ranges between 100 and 2500 feet elevation. It inhabits mountain slopes, ridges, hills, river bluffs, valleys, and the borders of marshes, both in hardwood and hardwood-coniferous cover (rarely in pure pine). It is very common and characteristic in fields, on open roadsides, and in orchards. The snails burrow in leaf litter, under logs, stones, rocks, in rock piles, and at the bases of trees as well as at the roots of grasses.

30. **Stenotrema fraternum imperforatum** (Pilsbry), Plate IV, figure 7.

Polygyra monodon imperforata Pilsbry, Proc. Acad. Nat. Sci. Phila., (1900): 455 (Type locality: Rocky Comfort, Little River County, Arkansas). **Stenotrema fraternum imperforatum** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 686-687, fig. 421 e.

MORPHOLOGY . The shell as illustrated in Plate IV, figure 7. This subspecies has a more dome shaped shell and a flatter base than does **fraternum,** and is, of course, imperforate. **Living animal:** Head gray on top and brownish gray in front; foot and sole brown; mantle edge brown. **Genitalia:** The pilaster structure is quite like that of **S. fraternum.** Diameter of shell, 10.2 mm. Phallus and epiphallus, 5.0 mm. **Locality of dissected specimens:** Rich Mountain, Polk County, Arkansas. **Measurements of shell:** Diameter, 8.4-10.4 mm.; height, 6.7-7.9 mm. The H/D index is sometimes as much as 79%.

DISTRIBUTION. This subspecies is apparently limited to the Ouachita Mountains and the eastern edge of the Ozark Highlands.

ECOLOGY. Possibly an obligatory rupicole. **S. fraternum imperforatum** ranges between 1000 and 2700 elevation. It inhabits the slopes of ridges and mountains, apparently preferring oak-hickory woods on noncalcareous soils (quartzite). It burrows in the leaf carpet and fastens itself to the undersides of ripe or charred logs on rocky ground and talus.

31. **Stenotrema fraternum cavum** (Pilsbry and Vanatta), Plate IV, figure 5.

Polygyra monodon cava Pilsbry and Vanatta, Nautilus, 1911, 25: 12 (Type locality: Cazenovia, Madison County, New York). **Stenotrema fraternum cavum,** Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940) : 684-685, fig. 422 d.

MORPHOLOGY. The shell as illustrated in Plate IV, figure 5. It tends to be umbilicate rather than perforate as is the case in S. **fraternum.** **Measurements of the shell:** Diameter, 8.4-11.9 mm.; height, 5.0-7.8 mm.

	Number	H/D and S.E.
Douglas Lake, Cheboygan Co., Mich.	30	63.92±.47

DISTRIBUTION. **S. fraternum cavum** occurs all along the northern periphery of typical **fraternum** (northern United States), but the pattern of intergradation between the two is very irregular.

32. **Stenotrema fraternum montanum** Archer, Plate IV, figure 8.

Stenotrema fraternum montanum Archer, Nautilus, 1939, 52: 98-99; 53: 33, Plate VII, fig. 9 (Type locality: Knob at CCC Camp NP-4, Smokemont, Swain County, North Carolina). Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940) : 685-686, fig. 422 c.

MORPHOLOGY. The shell as illustrated in Plate IV, figure 8. The shell is low spired like that of **S. fasciatum,** and has a peripheral band. The two have been extensively confused, but

in spite of the remarkable parallelism they can be distinguished by the sculpture of the nuclear whorl and by the aperture (see the key). **Measurements of the shell:** Diameter, 10.1-11.8 mm.; height, 5.1-6.8 mm.

DISTRIBUTION. **S. fraternum montanum** is found in the mountainous regions of western North Carolina, eastern Tennessee, and north Georgia.

ECOLOGY. This race ranges between 2000 and 3000 feet elevation. Its plant cover is chiefly oak-hickory. The snails burrow in leaf mould or under quartzite slabs.

33. **Stenotrema hubrichti** Pilsbry, Plate V, figure 7.

Stenotrema hubrichti Pilsbry, Acad. Nat. Sci. Phila., Mon. No. 3 (1940): 687-688, fig. 423 (Type locality: 2 miles northeast of Aldridge, Union County, Illinois).

MORPHOLOGY. The keeled shell resembles that of S. **barbigerum** rather than any of the Ozarkian species which belong with it geographically speaking. However, the aperture shows that it is a member of **Euchemotrema.** Unfortunately no live material has been available for dissection. **Measurements of the shell:** Diameter, 8.9-9.7; height, 3.8-4.7 (according to Pilsbry).

DISTRIBUTION. This species appears to be confined to southern Illinois. It was described from Pleistocene material, but subsequent to the publication of the description Leslie Hubricht found it alive in another locality.

ECOLOGY. An obligatory rupicole. The snails seem to be confined to talus slopes of ravines according to Hubricht.

PLATES

PLATE I

Fig. 1. Limestone slope about a mile south of Bangor, Blount County, Alabama. This is a rich habitat for **Stenotrema spinosum, S. stenotrema** f. **seminudum,** and **S. deceptum.** Photograph by R. M. Harper, March 17, 1938.

Fig. 2. Looking east towards Mount LeConte and Rainbow Falls. Taken from near Sugarland Mountain, Sevier County, Tennessee. This is a noncalcareous region. At the highest elevations are to be found **Stenotrema altispira, S. altispira depilatum, S. stenotrema,** and at the lower elevations (foreground) are **S. stenotrema** and **S. pilula.**

Photograph by Walter B. Jones, April 4, 1938.

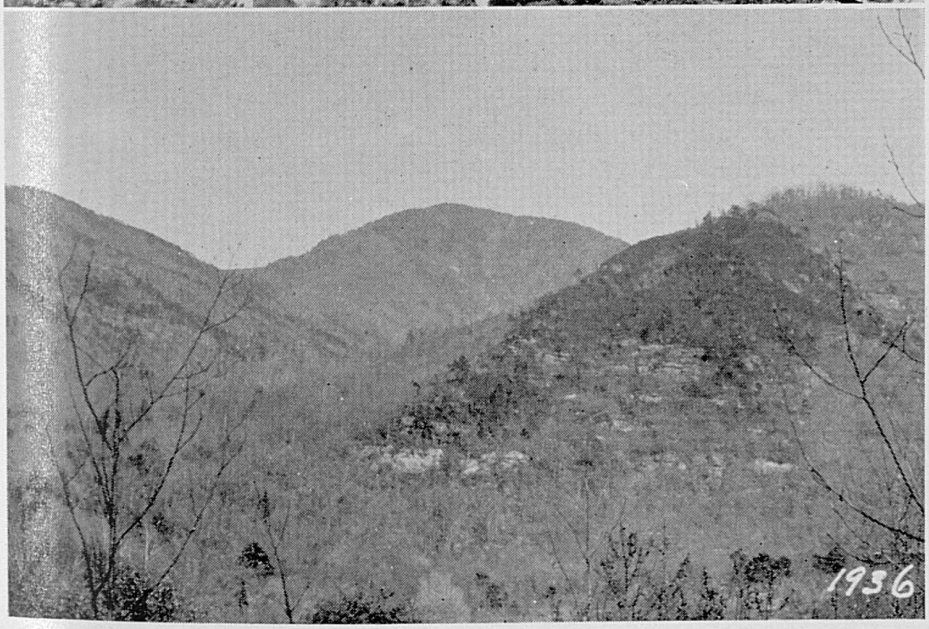

PLATE I

PLATE II

Fig. 1. **Stenotrema barbigerum** (Redfield). Murphy, Cherokee County, North Carolina. Archer, 1934.

Fig. 2. **Stenotrema spinosum** (Lea). Topotype. Claiborne, Monroe County, Alabama. Jones and Archer, 1935.

Fig. 3. **Stenotrema edgarianum** (Lea). North end of Sequatchie Valley, Cumberland County, Tennessee. Clench and Archer, 1932.

Fig. 4. **Stenotrema pilsbryi** (Ferriss). Topotype. Rich Mountain, Polk County, Arkansas. Archer, 1935.

Fig. 5. **Stenotrema labrosum** (Bland). Hot Springs, Garland County, Arkansas. Archer, 1935.

Fig. 6. **Stenotrema edvardsi** (Bland). Somerset, Pulaski County, Kentucky. Museum of Comparative Zoology Collection.

Fig. 7. **Stenotrema barbatum** (Clapp). Yellow Springs, Green County, Ohio. Goodrich, Vander Schalie, Berry, Archer, 1934.

Fig. 8. **Stenotrema barbatum** (Clapp). Ann Arbor, Washtenaw County, Michigan. Archer, 1932.

Fig. 9. **Stenotrema altispira** (Pilsbry). Mount Mitchell, Yancey County, North Carolina. Clench, Rehder, Archer, 1931.

Fig. 10. **Stenotrema altispira depilatum** (Pilsbry). Mount LeConte, Swain County, North Carolina. Clench, Archer, 1934.

Fig. 11 **Stenotrema magnifumosum** (Pilsbry). Murphy, Cherokee County, North Carolina. Archer 1934.

All figures but 2 and 11 by the author.

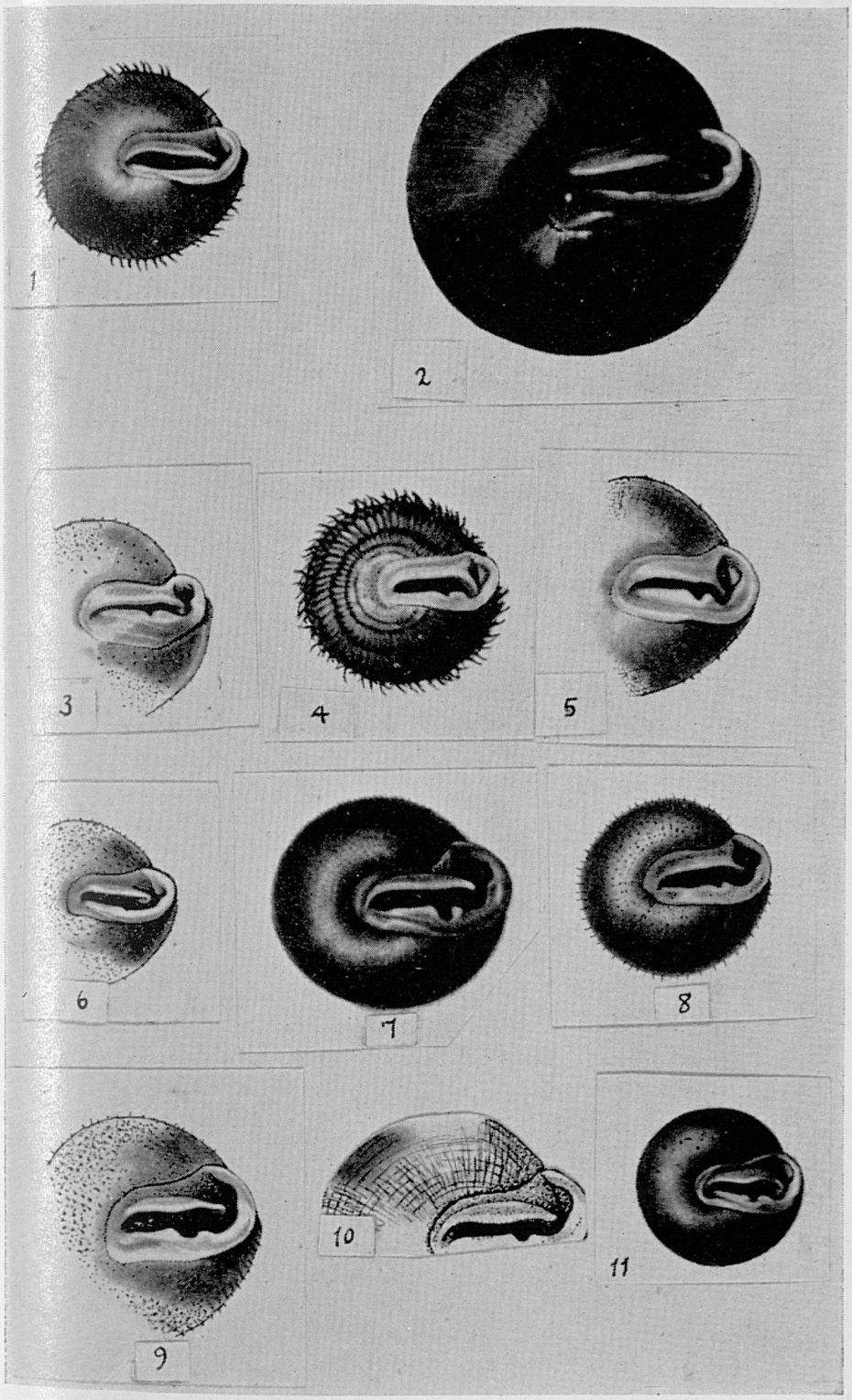

PLATE II

PLATE III

Fig. 1. **Stenotrema stenotrema** (Pfeiffer). Typical form. Gallant, St. Clair County, Alabama. Archer, 1935.

Fig. 2. **Stenotrema stenotrema** (Pfeiffer). Montane form. Pine Mountain, Meriwether County, Georgia. Archer, 1938. (redrawn).

Fig. 3. **Stenotrema pilula** (Pilsbry). Topotype. Thunderhead Mountain, Blount County, Tennessee. Clench, Archer, 1934.

Fig. 4. **Stenotrema hirsutum** (Say). Profile view. Sugar Grove, Fairfield County, Ohio. Goodrich, Vander Schalie, Berry, Archer, 1934.

Fig. 5. **Stenotrema exodon** (Pilsbry). Topotype. Woodville, Jackson County, Alabama. Clench, Archer, 1932.

Fig. 6. **Stenotrema exodon turbinella** (Clench, and Archer). Paint Rock, Jackson County, Alabama. Clench, Archer 1932.

Fig. 7. **Stenotrema deceptum** (Clapp). Monte Sano, Madison County, Alabama. Clench, Archer, 1932.

Fig. 8. **Stenotrema blandianum** (Pilsbry). Topotype. Springfield, Greene County, Missouri. J. H. Ferriss.

Fig. 9. **Stenotrema unciferum** (Pilsbry). Caddo Gap, Montgomery County, Arkansas. Archer, 1935.

Fig. 10. **Stenotrema brevipila** (Clapp). Topotype. Mount Cheaha, Cleburne County, Alabama. Archer, 1939. (redrawn).

Fig. 11. **Stenotrema cohuttense** (Clapp). Sugarloaf Mountain, Parksville, Polk County, Tennessee. Archer, 1934.

Fig. 12. **Stenotrema maxillatum** (Gould). Columbus, Muscogee County, Georgia. J. Neisler.

Drawn by the author.

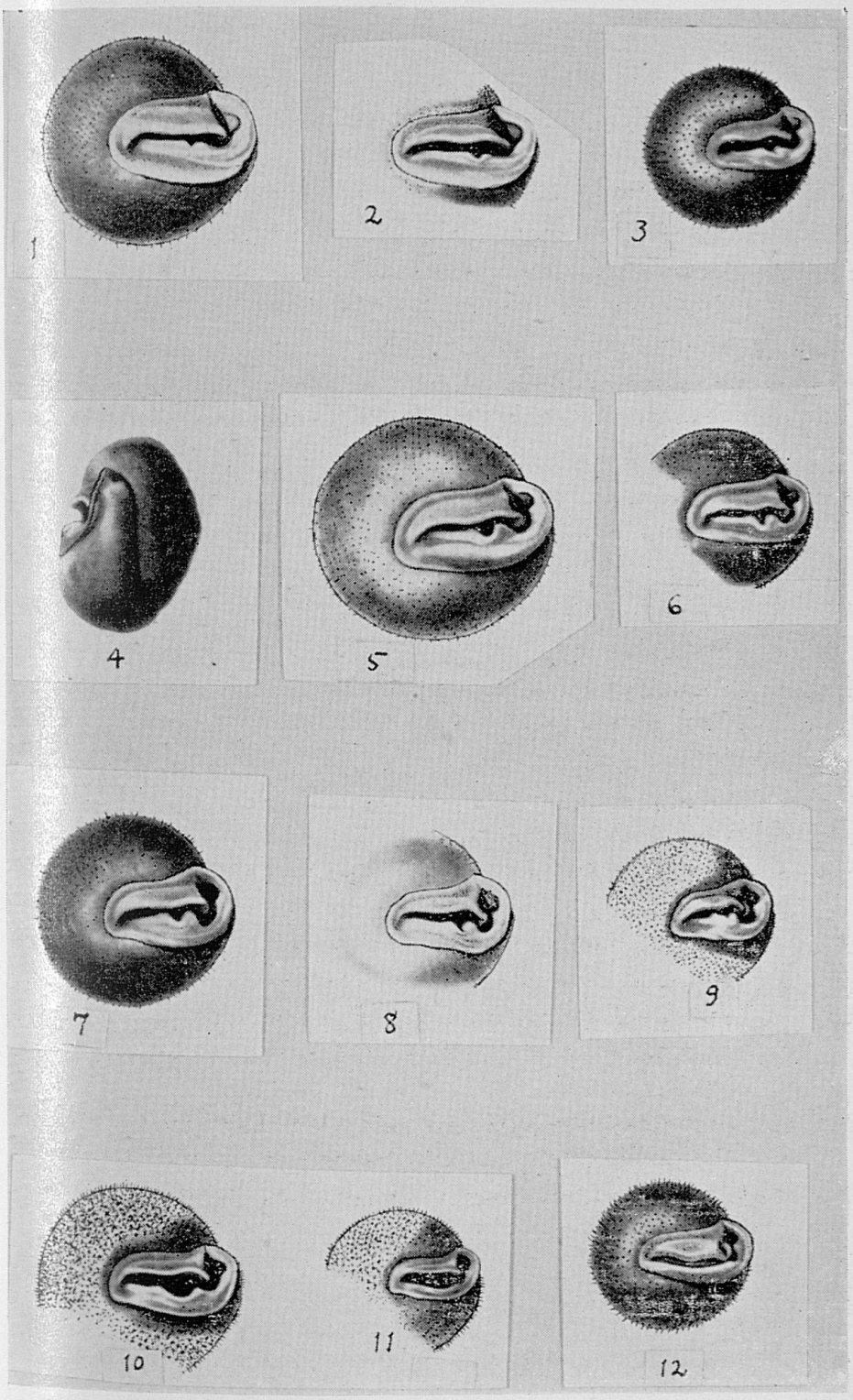

PLATE III

PLATE IV

Fig. 1. **Stenotrema monodon** (Rackett). Petersburg, Monroe County, Michigan. Goodrich, Archer, 1933.

Fig. 2. **Stenotrema monodon aliciae** (Pilsbry). Margerum, Colbert County, Alabama. Jones, Archer, 1935.

Fig. 3. **Stenotrema monodon aliciae** (Pilsbry). Lowland form **(friersoni).** Dallas, Dallas County, Texas. E. P. Cheatum.

Fig. 4. **Stenotrema fasciatum** (Pilsbry). Hayesville, Clay County, North Carolina. A. E. Law.

Fig. 5. **Stenotrema fraternum cavum** (Pilsbry and Vanatta). Mohawk, Herkimer County, New York. Lewis.

Fig. 6. **Stenotrema fraternum (Say).** Ann Arbor, Washtenaw County, Michigan. Archer 1932.

Fig. 7. **Stenotrema fraternum imperforatum** (Pilsbry). Rich Mountain, Polk County, Arkansas. Archer, 1935.

Fig. 8. **Stenotrema fraternum montanum** Archer. Holotype. Smokemont, Swain County, North Carolina. Archer, 1938.

Fig. 9. **Stenotrema barbigerum** (Redfield). Profile. Horse-block Mountain, Cleburne County, Alabama. Archer, 1935.

Fig. 10. **Stenotrema stenotrema** (Pfeiffer). Sketch from life. Brush Creek, Tuscaloosa County, Alabama. Archer 1935.

Fig. 8, photograph by R. S. Hodges. Drawings by the author.

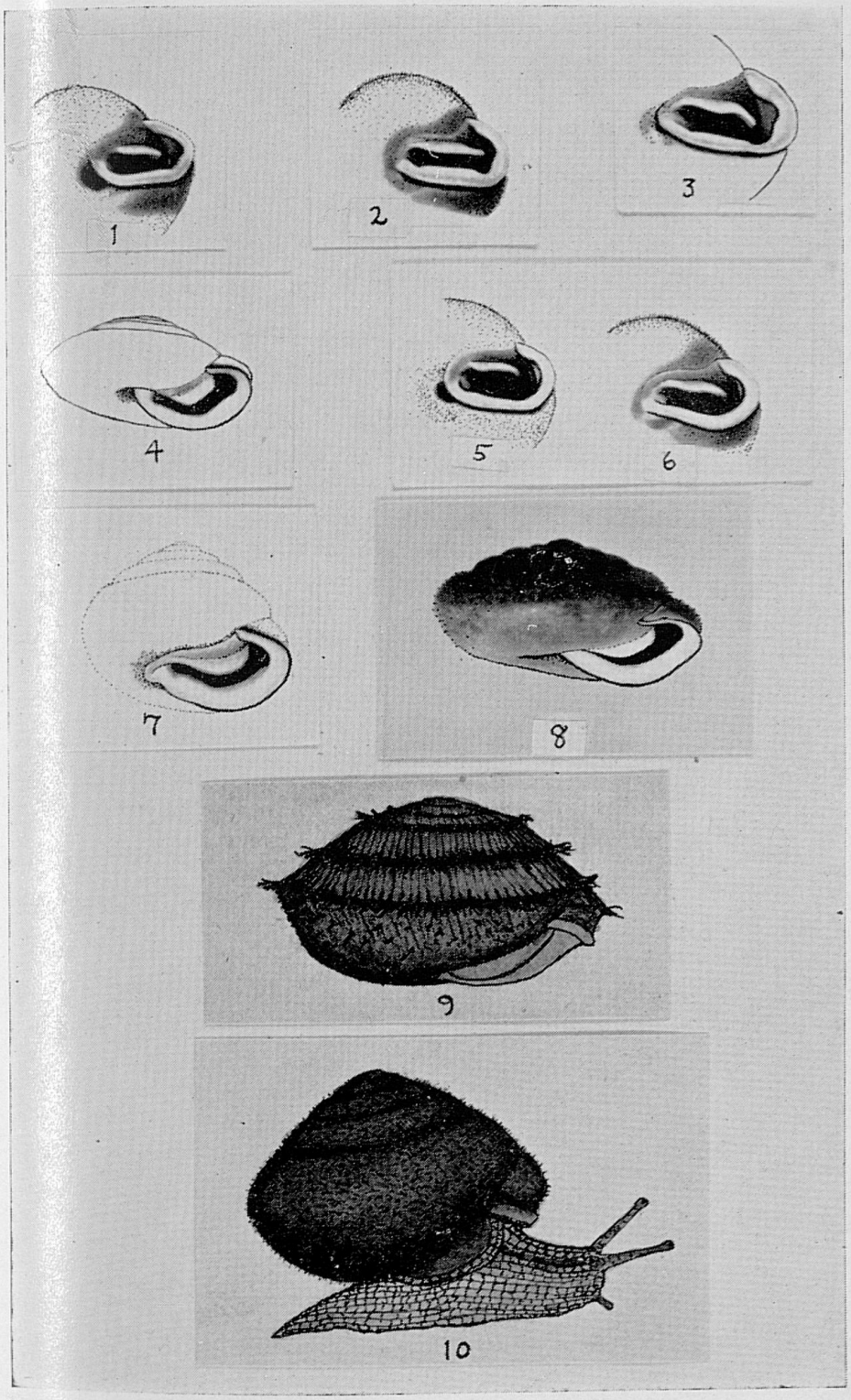

PLATE IV

PLATE V

Fig. 1. **Stenotrema waldense** Archer. Paratype. Doak's Creek, Campbell County, Tennessee. Archer, 1938.

Fig. 2. **Stenotrema florida** Pilsbry. 5.2 miles east of Opelika, Lee County, Alabama. Archer, 1939.

Fig. 3. **Stenotrema stenotrema voluminosum** (Clench and Banks). Smokemont, Swain County, North Carolina. Alabama Museum Expedition, 1938.

Fig. 4. **Stenotrema hirsutum** (Say). Sumiton, Walker County, Alabama. Archer, 1938.

Fig. 5. **Stenotrema caddoense** (Archer). Cold Spring, Bismarck, Hot Spring County, Arkansas. Wheeler, Archer, 1938.

Fig. 6. Diagrammatic view of the aperture of the shell of **Stenotrema** showing terms used in description.

Fig. 7. **Stenotrema hubrichti Pilsbry. Paratype.** McCann School, 2 miles northeast of Aldridge, Union County, Illinois. Hubricht.

Fig. 8. **Stenotrema barbigerum** (Redfield). Longitudinal section and cross section of the phallus. 7 miles south of Havana, Hale, County, Alabama. Archer, 1937.

Fig. 9. **Stenotrema spinosum** (Lea). Sections of the phallus. Lock 14, Tuscaloosa County, Alabama. Archer, 1937.

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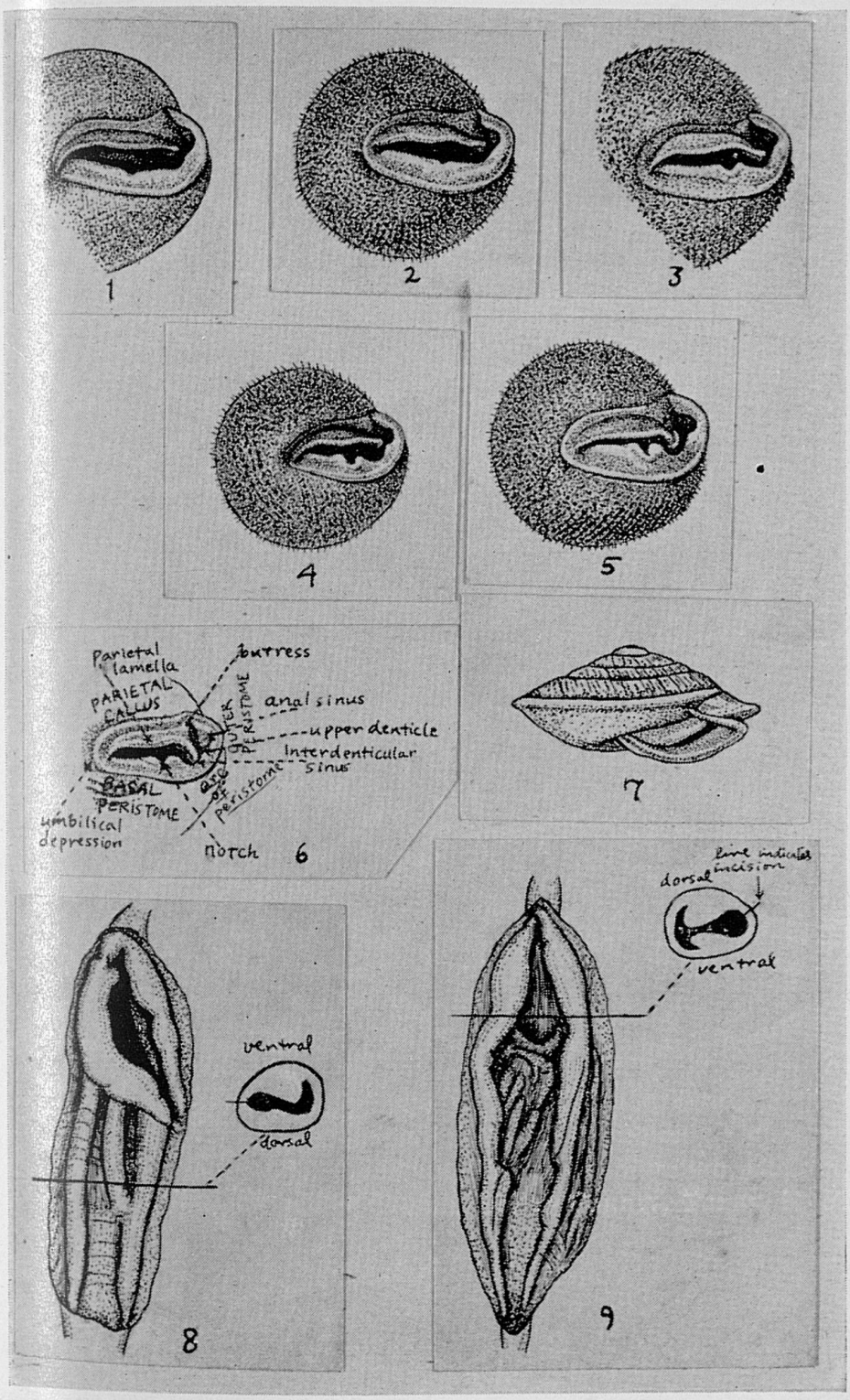
1
2
3
4
5
Parietal lamella
PARIETAL CALLUS
buttress
anal sinus
upper denticle
interdenticular sinus
BASAL PERISTOME
umbilical depression
notch
6
7
ventral
dorsal
8
line indicates incision
dorsal
ventral
9

PLATE V

PLATE VI

Fig. 1. **Stenotrema edgarianum** (Lea). Longitudinal section and cross section of the phallus. Grassy Cove, Cumberland County, Tennessee. Alabama Museum Expedition, 1938.

Fig. 2. **Stenotrema pilsbryi** (Ferriss). Sections of the phallus. Rich Mountain, Polk County, Arkansas. Wheeler, Archer, 1938.

Fig. 3. **Stenotrema labrosum** (Bland). Sections of the phallus. Hot Spring Mountain, Garland County, Arkansas. Wheeler, Archer, 1938.

Fig. 4. **Stenotrema edvardsi** (Bland). Sections of the phallus. 3 miles west of Indian Springs, Sullivan County, Tennessee. Archer, 1938.

Fig. 5. **Stenotrema florida** Pilsbry. Section of the phallus. Big Creek, Houston County, Alabama. Archer, 1939.

Fig. 6. **Stenotrema barbatum** (Clapp). Section of the phallus. Oldtown, Green County, Ohio. Goodrich, Vander Schalie, Berry, Archer, 1934.

Fig. 7. **Stenotrema altispira depilatum** (Pilsbry). Section of the phallus. Clingman's Dome, Blount County, Tennessee. Alabama Museum Expedition, 1938.

Drawn by the author.

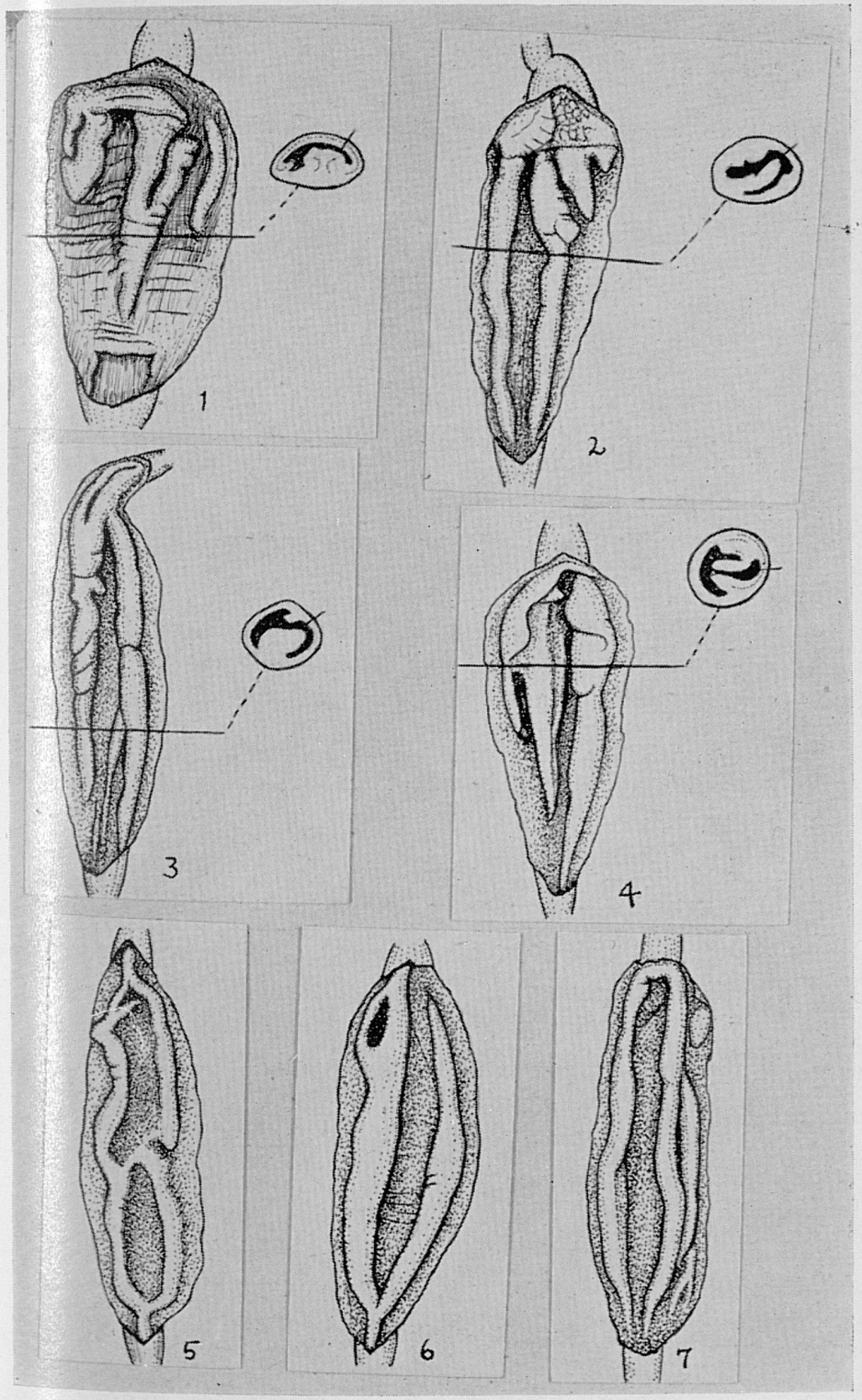

PLATE VI

PLATE VII

Fig. 1. **Stenotrema altispira** (Pilsbry). Cross section of the phallus and longitudinal section of the phallus and epiphallus. New Found Gap, Swain County, North Carolina. Alabama Museum Expedition, 1938.

Fig. 2. **Stenotrema magnifumosum** (Pilsbry). Longitudinal section and cross section of the phallus. Greasy Creek, Cherokee National Park, Polk County, Tennessee. Jones, Archer, 1938.

Fig. 3. **Stenotrema stenotrema** (Pfeiffer). Sections of the phallus. 2 miles east of Mooresville, Hawkins County, Tennessee. Archer, 1938.

Fig. 4. **Stenotrema stenotrema voluminosum** (Clench and Banks). Section of apical half of the phallus. Smokemont, Swain County, North Carolina. Alabama Museum Expedition, 1938.

Fig. 5. **Stenotrema maxillatum** (Gould). Genitalia, basal portion. 7 miles south of Havana, Hale County, Alabama.

Fig. 6. **Stenotrema hirsutum** (Say). Sections of the phallus. Grassy Cove, Cumberland County, Tennessee. Alabama Museum Expedition, 1938.

Drawn by the author.

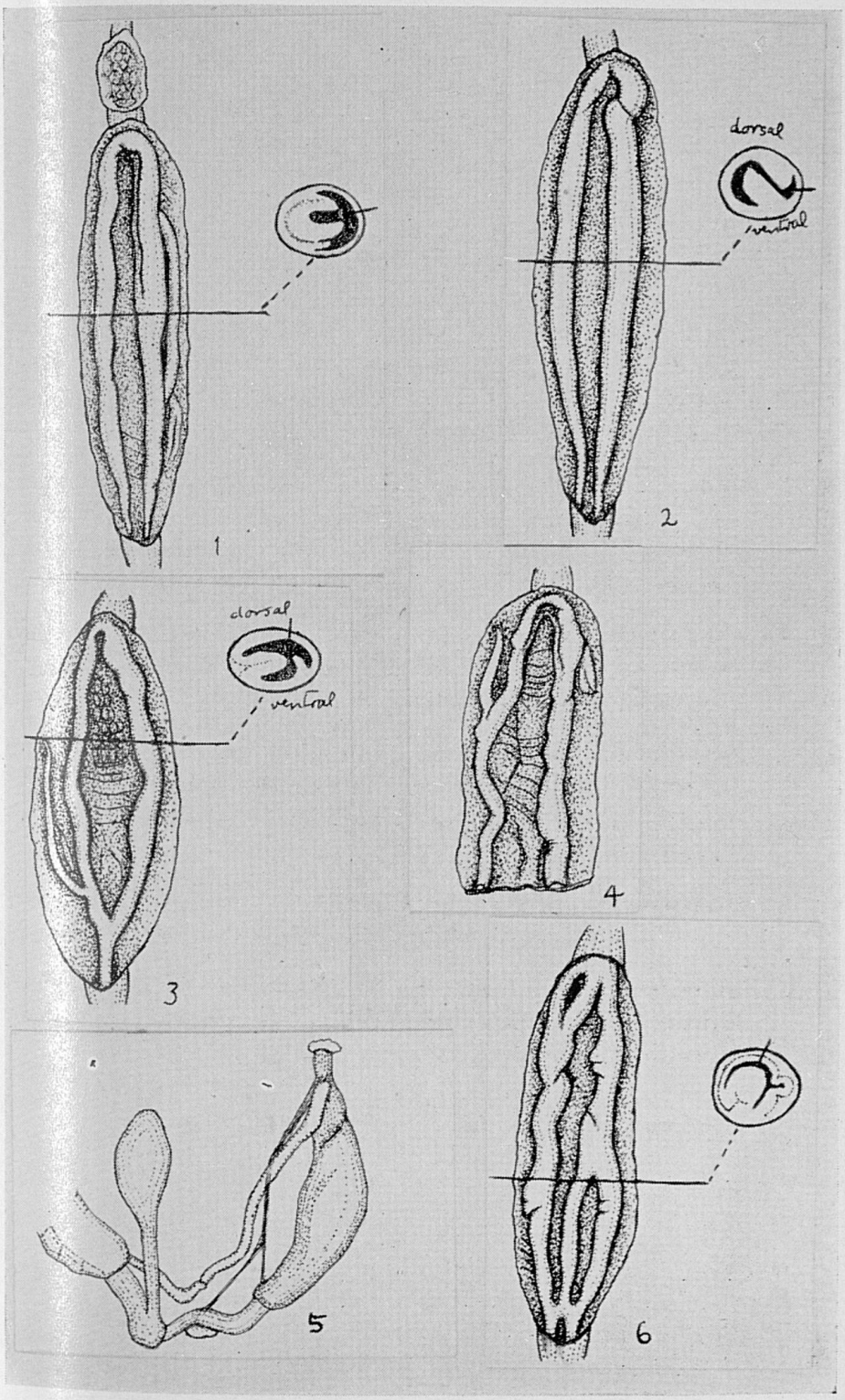

PLATE VII

PLATE VIII

Fig. 1. **Stenotrema pilula** (Pilsbry). Longitudinal section and cross section of the phallus. Rich Mountain, Blount County, Tennessee. Jones, Archer, 1938.

Fig. 2. **Stenotrema exodon** (Pilsbry). Sections of the phallus. Woodville, Jackson County, Alabama. Marsh, Archer, 1938.

Fig. 3. **Stenotrema exodon turbinella** (Clench and Archer). Section of the phallus. Manitou Cave, Fort Payne, DeKalb County, Alabama. Archer, 1937.

Fig. 4. **Stenotrema deceptum** (Clapp). Sections of the phallus. Urban area, Huntsville, Madison County, Alabama. Archer, 1938.

Fig. 5. **Stenotrema caddoense** (Archer). Sections of the phallus. Cold Spring, Bismarck, Hot Spring County, Arkansas. Wheeler, Archer, 1938.

Fig. 6. **Stenotrema unciferum** (Pilsbry). Sections of the phallus. Caddo Gap, Montgomery County, Arkansas. Archer, 1935.

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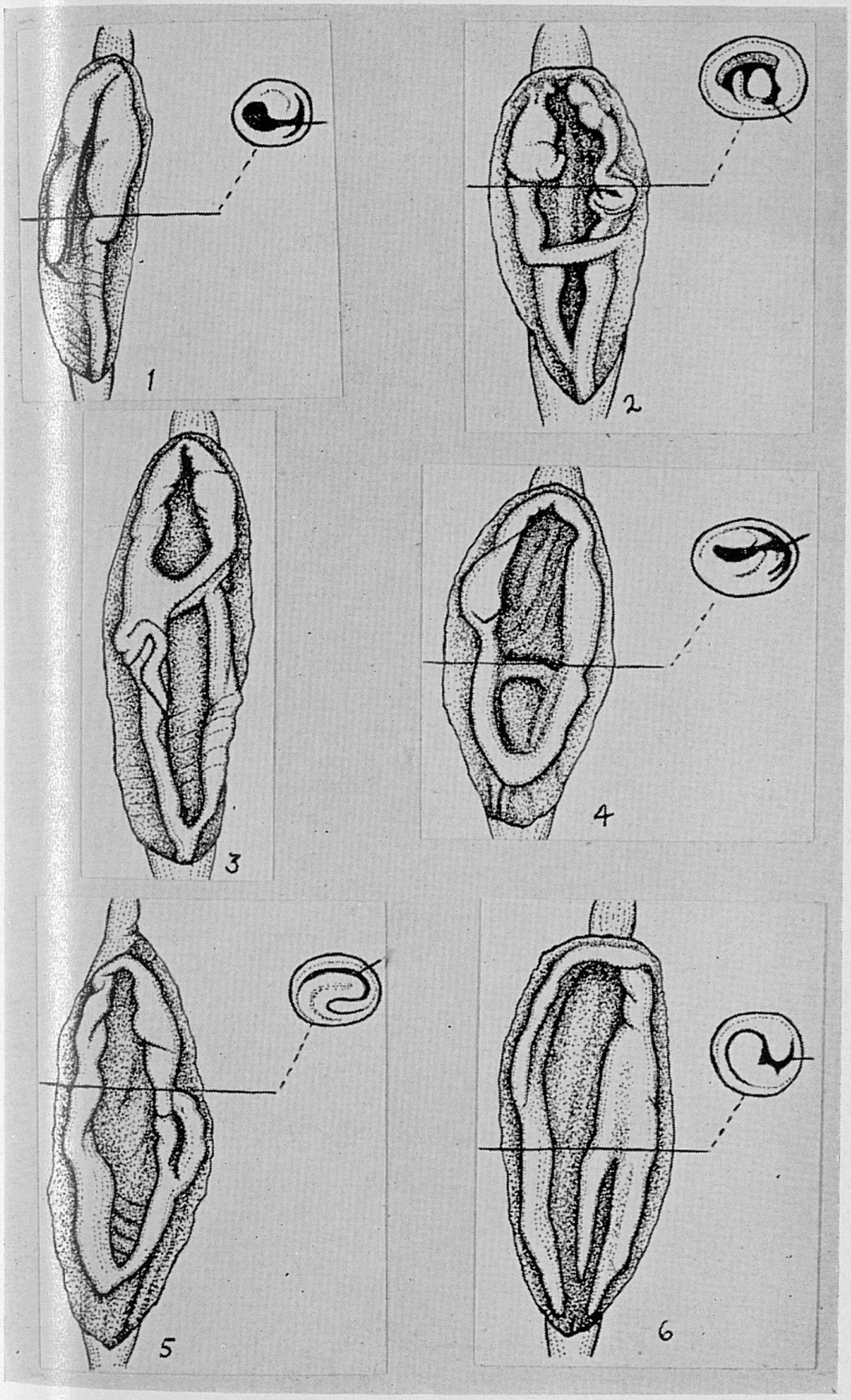

PLATE VIII

PLATE IX

Fig. 1. **Stenotrema blandianum** (Pilsbry). Longitudinal section and cross section of the phallus. Ozark, Christian County, Missouri. Archer, 1938.

Fig. 2. **Stenotrema maxillatum** (Gould). Sections of the phallus. 7 miles south of Havana, Hale County, Alabama. Archer, 1938.

Fig. 3. **Stenotrema brevipila** (Clapp). Sections of the phallus. Indian Mountain, Cherokee County, Alabama. Archer, 1938.

Fig. 4. **Stenotrema cohuttense** (Clapp). Sections of the phallus. Sugarloaf Mountain, Polk County, Tennessee. Archer, 1937.

Fig. 5. **Stenotrema fraternum** (Say). Genitalia, basal portion. Carey, Wyandot County, Ohio. Goodrich, Archer, 1934.

Fig. 6. **Stenotrema exodon** (Pilsbry). Genitalia, basal portion. Topotype. Woodville, Jackson County, Alabama. Archer.

Drawn by the author.

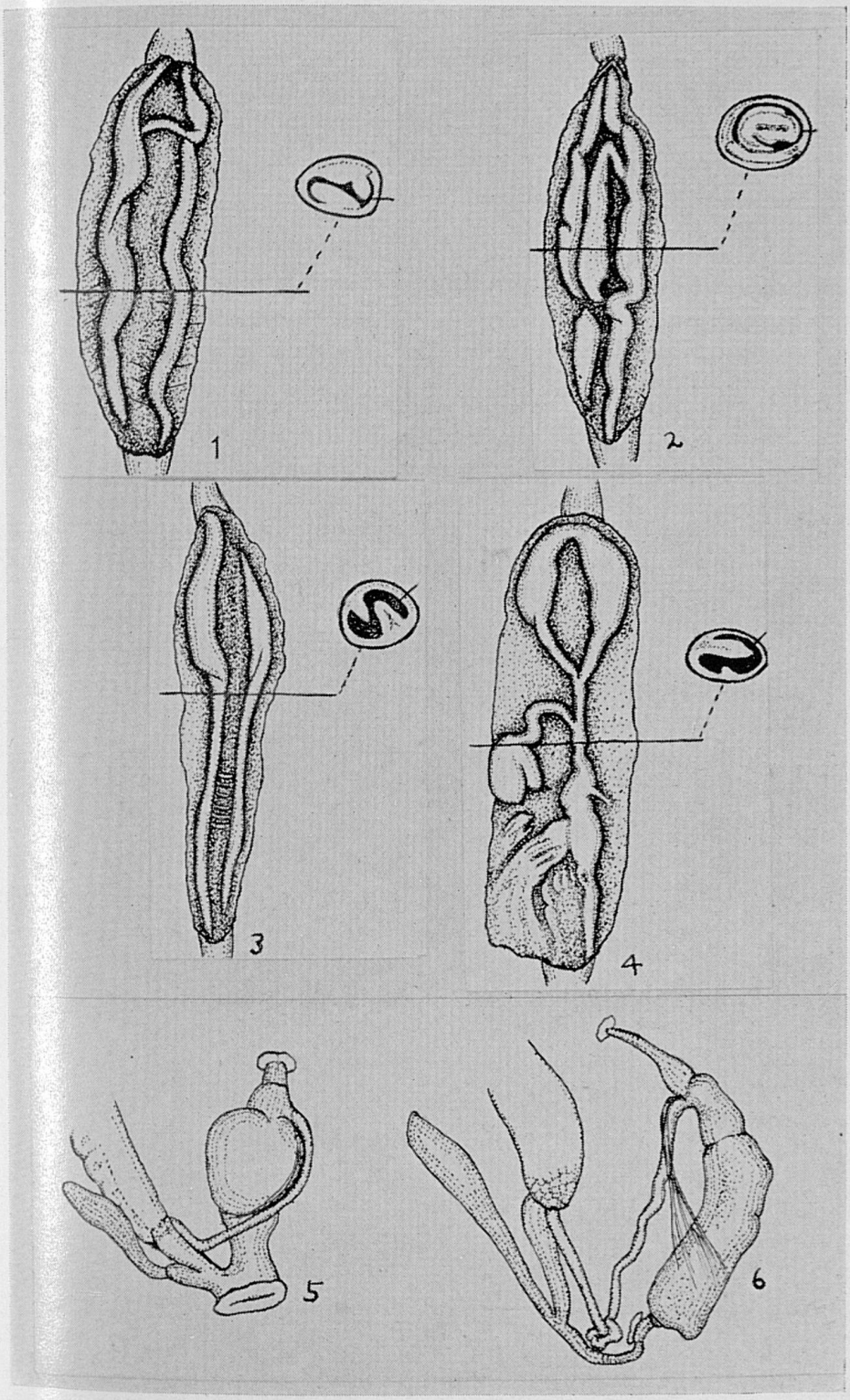

PLATE IX

PLATE X

Fig. 1. **Stenotrema monodon** (Rackett). Longitudinal section and cross section of the phallus. Ann Arbor, Washtenaw County, Michigan. Archer, 1933.

Fig. 2. **Stenotrema monodon aliciae** (Pilsbry). Sections of the phallus. Lowland form **(friersoni).** Dallas, Dallas County, Texas. Cheatum.

Fig. 3. **Stenotrema monodon aliciae** (Pilsbry). Section of the phallus. Upland form. 7 miles south of Havana, Hale County, Alabama. Archer, 1937.

Fig. 4. **Stenotrema fraternum** (Say). Sections of the phallus. 5 miles north of Carey, Wyandot County, Ohio. Goodrich, Archer, 1934.

Fig. 5. **Stenotrema brevipila** (Clapp). Genitalia, basal portion. Indian Mountain, Cherokee County, Alabama.

Fig. 6. **Stenotrema spinosum** (Lea). Genitalia, basal portion. Lock 14, Tuscaloosa County, Alabama.

Drawn by the author.

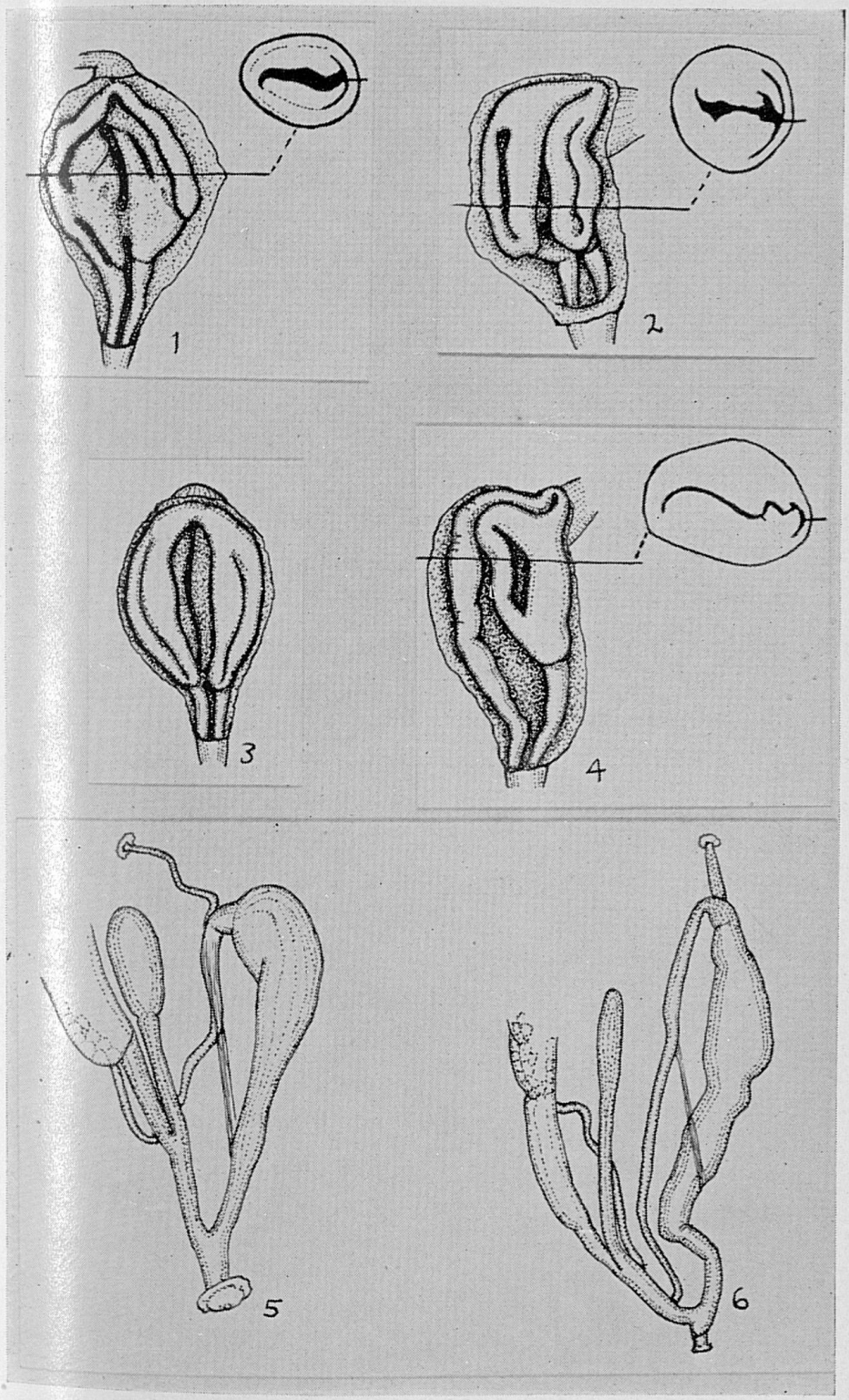

PLATE X

LAND SNAILS OF THE GENUS STENOTREMA IN THE ALABAMA REGION

INDEX

Words beginning with capital letters are miscellaneous topics, a few plant names, and genera, subgenera and sections of snails. Those beginning with small letters are specific names in **Stenotrema,** and are not listed again under the genus.

A

Abnormalities, 14.

Aesculus octandra, 57.

albinism, 14.

altispira, 10, 12, 28, 32-34, 62, 66, 69, 74.

altispira depilatum, 10, 12, 28, 33-34, 62, 63, 65, 69, 73.

Anatomy, 8.

B

barbata, 30.

barbatum, 11, 12, 17, 27, 30-32, 40, 41, 62, 65, 69, 73.

barbigera, 20.

barbigerum, 9, 10, 12-15, 20-21, 52, 62, 64, 65, 69, 71, 72.

blandianum, 39, 46-47, 63, 67, 70, 76.

brevipila, 10, 13, 15, 49-50, 63, 67, 68, 70, 76, 77.

C

caddoense, 40, 47-48, 64, 67, 72, 75.

Caracolla edgariana, 23.

Caracolla spinosa, 21.

Caracollatus (section), 17-19, 29.

Cohutta (section), 17, 18, 49.

cohuttense, 10, 12, 13, 49, 50-51, 63, 67, 70, 76.

Communities, Artificial, 14.

Communities, Hygric, 12.

Communities, Mesic, 12.

Communities, Transitional, 13.

Communities, Xeric, 13.

convexa, 17, 35.

Cychrini, 14.

D

decepta, 45.

deceptum, 9, 13, 14, 15, 39, 41, 42, 45-46, 62, 63, 66, 70, 75.

depilata, 33.

depilatum, 32, 33.

E

edgariana, 23.

edgarianum, 10, 13, 14, 15, 19, 23-24, 62, 65, 70, 73.

edvardsi, 12, 13, 14, 15, 19, 26-27, 28, 62, 65, 69, 73.

edvardsi magnifumosa, 34.

Euchemotrema (subgenus), 17, 52, 58, 60.

INDEX—Continued

Evarthrus, 14.

exodon, 9, 13, 39, 43, 45, 63, 66, 67, 70, 75, 76.

exodon turbinella, 9, 13, 14, 39, 44-45, 63, 66, 70, 75.

F

fasciatum, 10, 12, 53, 56-57, 59, 64, 71.

fimbriata, 25.

florida, 12, 13, 14, 27-30, 64, 65, 72, 73.

fraternum, 11, 15, 53, 55-59, 64, 67, 68, 71, 76, 77.

fraternum cavum, 53, 57, 59, 64, 71.

fraternum fasciatum, 56.

fraternum imperforatum, 53, 58-59, 64, 71.

fraternum montanum, 10, 12, 53, 59-60, 64, 71.

H

Haplotrema, 14.

Helix barbigera, 20.

Helix cincta, 56.

Helix edvardsi, 26.

Helix fraterna, 57.

Helix hirsuta, 40.

Helix labrosa, 25.

Helix maxillata, 51.

Helix monodon, 53.

Helix monodon aliciae, 54.

Helix stenotrema, 35.

Helix stenotrema subglobosa, 43.

hirsuta, 30.

hirsutum, 9, 10, 13-15, 17, 30, 31, 39, 40-43, 45, 63, 64, 66, 70, 72, 74.

hubrichti, 52, 60, 65, 72.

I

imperforatum, 58.

Io, 16.

L

labrosum, 19, 24, 25-26, 62, 65, 70, 73.

M

magnifumosum, 10, 12-15, 27, 28, 34-35, 63, 66, 69, 74.

maxillatum, 10, 12, 13, 15, 35, 51-52, 63, 66, 67, 70, 74, 76.

Maxillifer (section), 18, 19, 51.

Mesodon (genus), 10.

monodon, 11, 15, 52-54, 56, 57, 64, 67, 71, 77.

monodon aliciae, 9, 10, 12-14, 16, 52, 55-56, 58, 64, 67, 68, 71, 77.

N

nuda, 35.

P

Pellaea atropurpurea, 29.

pilsbyri, 19, 24-25, 62, 65, 69, 73.

pilula, 10, 12, 13, 15, 39, 42-43, 45, 62, 63, 66, 70, 75.

Pleuroceridae, 16.

Polygyra barbata, 30.

Polygyra barbigera, 20.

INDEX—Continued

Polygyra blandiana, 46.

Polygyra brevipila, 49.

Polygyra brevipila cherokeensis, 49.

Polygyra caddoensis, 47.

Polygyra cohuttensis, 50.

Polygyra edgariana, 23.

Polygyra edvardsi magnifumosa, 34.

Polygyra hirsuta, 30, 40.

Polygyra hirsuta altispira, 32.

Polygyra hirsuta pilula, 42.

Polygyra hirsuta uncifera, 48.

Polygyra hirsuta yarmouthensis, 30.

Polygyra labrosa, 25.

Polygyra labrosa fimbriata, 25.

Polygyra maxillata, 51.

Polygyra monodon aliciae, 55.

Polygyra monodon cava, 59.

Polygyra monodon fraterna, 55.

Polygyra monodon friersoni, 54.

Polygyra monodon imperforata, 58.

Polygyra pilula, 42.

Polygyra spinosa, 21.

Polygyra stenotrema, 35, 44.

Polygyra stenotrema depilata, 33.

Polygyra stenotrema nuda, 35.

Polygyra stenotrema seminuda, 35.

Polygyra stenotrema subglobosa, 43.

Polygyra stenotrema turbinella, 44.

Polygyra voluminosa, 37.

Polygyridae, 7.

S

seminuda, 35.

Sinistral forms, 15.

spinosum, 9, 12, 13, 19, 20-22, 62, 65, 68-69, 72, 77.

Stenostoma (section), 18, 27, 29.

Stenotrema, Genus, 16.

Abnormalities, 14.

Distribution, 8.

Ecology, 10.

Economic Value, 14.

Enemies, 14.

Generic characters, 16.

key to subgenera, 16.

Section Caracollatus, 17, 19, 29.

Section Cohutta, 17, 18, 49.

Section Maxillifer, 18, 19, 51.

Section Stenostoma, 27.

Section Toxotrema, 38.

Subgenus Euchemotrema, 17, 52, 58, 60.

Subgenus Stenotrema, 17.

Species (already listed alphabetically) 32.

Stenotrema, subgenus, 17.

stenotrema, species, 9, 10, 12-14, 17, 27, 28, 35-38, 62-64, 66, 70, 71, 74.

stenotrema seminudum, 62.

INDEX—Continued

stenotrema voluminosum, 10, 12, 28, 32, 36, 37-38, 64, 66, 72, 74.
subglobosa, 43.

T

Tilia neglecta, 57.
Toxotrema (section), 18, 38.
Triodopsis (genus), 10.
turbinella, 44.

U

unciferum, 39, 47, 48-49, 63, 67, 70, 75.
unciferum caddoense, 47.

V

voluminosum, 37, 38.

W

waldense, 28-29, 64, 72.

Y

yarmouthensis, 30.