
**The Recent Gastropoda of Oklahoma, VI. Terrestrial
Families, Endodontidae and Haplotrematidae.
Revisions and *Retinella Zikmundi* Sp. Nov.**

**BRANLEY A. BRANSON, Department of Biology,
Kansas State College, Pittsburg**

Introduction

As indicated in Part V of this series (Branson, 1963b), I originally intended to include the family Zonitidae in the present contribution. However, more pressing duties have made this impossible. Consequently, Part VII will cover the Zonitidae, the four slug families known from Oklahoma and final conclusions.

Addenda and Revision of *Stenotrema* in Oklahoma

During 1963 several interesting new molluscan discoveries have been made in Oklahoma. Some of these findings, here summarized, have forced a revision of the key presented elsewhere to Oklahoma species of the genus *Stenotrema*. In part IV (Branson, 1962) I overlooked a record for *Stenotrema pilsbryi* Ferriss from Rich Mountain, near Page, LeFlore County (Archer, 1948). In addition, I collected numerous living specimens of *Stenotrema fraternum imperforatum* (Pilsbry) in LeFlore County, Oklahoma and adjacent Arkansas during August, 1963. After dissecting the soft anatomy from several of these it appears that my original conclusions, i. e., that this form is a hill-dwelling variant of *S. leai* Ward, were unwarranted; the two species are quite distinct. *Stenotrema unciiferum* Pilsbry, known for some time from the Caddo and Rich mountains of Arkansas (Archer, 1948), has only recently been reported from Oklahoma (Branson, in press a). In addition, two new species, *Stenotrema glassi* and *S. abaddona*, were described from Sequoyah in the last-cited paper. The key that follows incorporates all of the above information.

KEY TO OKLAHOMA SPECIES OF STENOTREMA

- | | | |
|------|--|---|
| 1 a. | Periphery of shell strongly angular | 2 |
| b. | Periphery of shell rounded or only weakly angular | 5 |
| 2 a. | Notch in basal lip present | 3 |
| b. | Notch in basal lip completely lacking | |
| | <i>Stenotrema glassi</i> Branson | |
| 3 a. | Base deeply impressed, well-like; outer edge of lip strongly adnate for most of length; shell thin and fragile | |
| | <i>Stenotrema abaddona</i> Branson | |
| b. | Base not deeply impressed, not well-like; outer edge of lip adnate for less than three-fourths of its length; shell more or less solid | 4 |
| 4 a. | Body whorl with 5 or 6 conspicuous spiral rows of long perios-tracal hairs | |
| | <i>Stenotrema pilsbryi</i> (Ferriss) | |
| b. | Body whorl with very short, prostrate hairs, rather smooth | |
| | <i>Stenotrema labrosum</i> (Bland) | |
| 5 a. | Notch in basal lip present | 6 |
| b. | Notch in basal lip lacking | 7 |
| 6 a. | Outer end of parietal tooth with an attached or free transverse denticle | |
| | <i>Stenotrema unciferum</i> Pilsbry | |
| b. | Transverse denticle lacking | |
| | <i>Stenotrema stenotrema</i> (Pfeiffer) | |
| 7 a. | Shell subglobose, 7.0—8.0 mm in diameter | |
| | <i>Stenotrema leai</i> Ward | |
| b. | Shell dome-shaped, 9.5—10.5 mm in diameter | |
| | <i>Stenotrema fraternum imperforatum</i> Pilsbry | |

Other species reported from Oklahoma during 1963 were: *Mesodon clenchi* (Rehder), from Cherokee County (Branson, in press a); *Hendersonia occulta* (Say) (Delaware County) and *Ferrissia rivularis* (Say) (Ottawa County) (Branson, in press b). More exact locality data are presented in the original papers.

Collecting Sites

In order to avoid unnecessary repetition of the sites visited during 1963, these are here listed numerically; reference is made in the text by number alone.

1. Heavily-wooded hillside, under decaying logs: Big Spring State Park, Van Buren, Missouri; 1:IV:1963.
2. Bluffs of Spring River, Lowell, Cherokee County, Kansas; 14:IV:1963.
3. Limestone hillside, near Fort Gibson Reservoir, Cherokee County, Oklahoma; 15:IV:1963.
4. Bluffs of White River, 10 miles east of Fayetteville, Highway 45, Arkansas; 20:IV:1963.
5. Well-shaded hillside with leaf litter and moist soil, overlooking Fort Gibson Reservoir, west side of dam, Wagoner County, Oklahoma; 9:V:1963.
6. Shaded bluff with deep leaf litter, rocks and decaying logs; 7.4 miles east of Jet, Highway 59, Adair County, Oklahoma.
7. Banks of South Canadian River, Highway 33, four miles northeast of Thomas, Custer County, Oklahoma; collected by M. R. Curd; 17:VI:1960.
8. Winding Stair Mountain, Winding Stair Road, 0.5 mile west of Highway 259, LeFlore County, Oklahoma; 18:VIII:1963.
9. Walker Mountain, 2.8 miles south on U. S. Highway 59 and 11.1 miles east on Walker Mountain Road, from Page, LeFlore County, Oklahoma.
10. Walnut Mountain, 5.9 miles northwest of Walnut Tower, Walnut Tower Road, LeFlore County, Oklahoma; 20:VIII:1963.

11. Round Mountain, 9.1 miles northwest of Walnut Tower, Walnut Tower Road, LeFlore County, Oklahoma; 20:VIII:1963.
12. West end of Rich Mountain, 1.7 miles south of Page, Highway 259, LeFlore County, Oklahoma.
13. North side of Rich Mountain, 5.6 miles east of Page, Highways 270 and 59, LeFlore County, Oklahoma; deep leaf litter; 21:VIII:1963.
14. Hills overlooking Lake Talihina, near dam, two miles west of Talihina, Latimer County, Oklahoma; 21:VIII:1963.
15. Potato Hills, on Flying-W Ranch, State Highway 63, five miles west and 2.4 miles south of Talihina, Latimer County, Oklahoma; 21:VIII:1963.
16. Blue Mountain, 0.5 mile east on Blue Mountain Road (from its junction with Holson Valley Road, after it branches off U. S. 271, just east of Talihina), LeFlore County, Oklahoma; 22:VIII:1963.
17. Billy Creek bluffs, 1.5 miles north of Muse, Highway 63, 0.5 mile east on county road, LeFlore County, Oklahoma; 22:VIII:1963.
18. Jackfork Mountain, 26.6 miles south of Hartshorn, Pittsburg County, Oklahoma; 22:VIII:1963.
19. Brushy Mountain, five miles east of Stillwell, on Highway 59, 2.8 miles south on county road, Adair County, Oklahoma; copious fossiliferous rocks; 23:VIII:1963.
20. Well-shaded, rocky bluffs, 5.5 miles east of Salina, State Highway 82, Mayes County, Oklahoma; 25:VIII:1963.
21. Well-shaded limestone hills with deep leaf litter, Highway 59, 1.25 miles north of Watts, Adair County, Oklahoma; 25:VIII:1963.
22. Well-shaded, high and moist hillside overlooking Spavinaw Creek, Spavinaw, Mayes County, Oklahoma; 26:VIII:1963.
23. Osage Hills, Osage Hills State Park, four miles south of Highway 50 entrance, Osage County, Oklahoma; 27:VIII:1963.
24. Bluffs of Sand Creek, Osage Hills State Park, Osage County, Oklahoma; 27:VIII:1963.
25. Low hillside, overgrown by oaks, with copious limestone and leaf litter, decaying logs, 0.8 mile north of Childers, Nowata County, Oklahoma; 28:VIII:1963.
26. Neosho River bluffs, Cherokee Recreation Area One, with deep leaf litter, decaying logs and limestone rocks, near Langley, Mayes County, Oklahoma; 29:VIII:1963.
27. Moist, well-shaded hillside, 0.5 mile east of Keystone Dam, old Highway 51, Arkansas River Basin, Tulsa County, Oklahoma.
28. Kiamichi Mountain, one-eighth mile west of junction of Kiamichi Tower Road with Highway 259, LeFlore County, Oklahoma; 21:VIII:1963.

Retinella zikmundi sp. nov.

Figs. 1, 2, 3

Type Locality: station 21.

Description of Holotype (Chicago Natural History Museum 127670)

Shell depressed-discoidal, glistening yellowish-horn in color; first whorl smooth, remaining three and one-eighths bearing close-set transverse (major) grooves crossed by distinct, wavy and crowded spiral striae; transverse sculpture becomes weaker on the base, but spirals present there; umbilicus wide, all whorls visible in it; sutures only moderately impressed; last whorl moderately inflated; aperture ovoid; diameter 4.5 mm; altitude 2.0 mm; diameter of umbilicus 1.5 mm; width of last whorl at aperture 1.5 mm; width of adjacent penultimate whorl 0.8 mm; $4\frac{1}{2}$ whorls. Named in honor of my good friend, Dr. Anton Zikmund, Oakland, California.

Retinella zikmundi belongs to the subgenus *Glyphyalops* H. B. Baker, which included *R. pentadelphia* (Pilsbry) and *R. rhoadsi* (Pilsbry). It is most closely related to *R. pentadelphia* of the Smoky Mountains but differs from that species in being slightly smaller, in possessing more distinct spiral striation and in having a larger umbilicus and less lunate aperture. Measurements and distribution for 15 paratypes are given in Table One. In addition to these records, Dr. Alan Solem, Curator of Lower Invertebrates, Chicago Natural History Museum, kindly informed me that one

TABLE ONE
 Measurements (mm). Collecting Sites and Deposition of Paratypes of *Retziella sikmensis* sp. nov.

Locality	Diameter	Altitude	Umbilicus	Width		Whorls	Deposition
				Penultimate Whorl	Ultimate Whorl		
19	4.7	2.2	1.3	1.5	0.7	4¼	KSC 8221
21	4.0	2.0	1.0	1.3	0.6	4	UCM 26379
21	4.8	2.1	1.3	1.5	1.0	4½	KUMNH 12865
21	4.7	2.0	1.3	1.5	0.9	4¼	U. Oklahoma
21	5.0	2.0	1.5	1.5	1.0	4½	KSC 8232
21	4.5	2.0	1.4	1.5	1.0	4¼	KSC 8232
21	4.3	2.0	1.3	1.5	0.8	4	KSC 8232
21	4.2	2.0	1.0	1.5	0.8	4	KSC 8232
21	3.5	1.5	0.6	1.4	0.8	3¾	KSC 8232
21	3.5	1.9	0.8	1.2	0.6	3%	KSC 8232
21	2.0	1.3	0.5	1.0	0.5	3	KSC 8232
26	4.2	Apex broken					KSC 8255
18	4.0	1.8	1.0			3¾	KSC 8277
18	4.5	2.1	1.2			4	KSC 8277
14	3.8	2.5	1.2			4¼	KSC 8343

specimen (CNHM 127671) was deposited in that museum by Ferriss from Magazine Mountain, Arkansas.

Two other zonitids, of considerable importance in understanding the affinities of the Oklahoma molluscan fauna, were collected during August, 1963.

***Retinella cryptomphala* (Clapp) Figs. 4, 5**

The distribution of collections and measurements for this species are given in Table Two. The base is considerably more excavated and the major grooves closer together than in *R. indentata*. These pale yellowish shells all have the umbilicus completely covered by a tongue-like calus and the whorls are beset by distinct, wavy spiral sculpture, and agree very closely with the characteristics set down for *Er. chryptomphala solida* H. B. Baker by Pilsbry (1946). This form is known from Tennessee, Kentucky, Alabama, Georgia and adjacent Florida. Pilsbry (1946) also cites some questioned records from Polk and Logan counties, Arkansas. Polk County lies adjacent to LeFlore and McCurtain counties and Logan is just east of Fort Smith. The present records, then, should confirm those from Arkansas.

***Guppia sterkii* (Dall) Figs. 6, 7, 8**

New Record: station 3.

This minute species is recognized by its tiny size, imperforate, but impressed base and rather distinct spiral sculpture on the base and whorls (seen best in highlights). The two specimens herein recorded measured: 1.2 mm in diameter; 0.6—0.7 mm in altitude; and possessed $3\frac{1}{3}$ and $3\frac{1}{2}$ whorls respectively. The species, heretofore, has been known from New York, New Jersey, Pennsylvania, the Virginias, North Carolina, Florida, Alabama, Louisiana, Kentucky and the type locality, New Philadelphia, Ohio (Pilsbry, 1946).

Family Haplotrematidae

Shell depressed heliciform, 10.5 to 21.0 mm in diameter; 6.0 to 9.7 mm in altitude; opaque greenish-yellow or greenish-white in color; $4\frac{1}{2}$ to $5\frac{1}{2}$ convexly-rounded whorls; widely phaneromphalous, all whorls being visible in the umbilicus; aperture lunate, lip moderately reflected; shell (in Oklahoma specimens) distinctly transversely striate, especially on base and in umbilical portion of whorls. Animal very light; back and long head-dorsum with small grayish rectangles; sides, collar and the undivided foot nearly dead white; uterus and spermatheca elongated, creamy in color; flagellum and apex of penis short. Carnivorous forms of humid hill-sides.

Genus Haplotrema Ancey

With characters of the family. The genus *Haplotrema* is predominantly western North America in distribution, with a few species occurring in the West Indies, Central and South America. A single species is known from the eastern United States.

***Haplotrema concavum* (Say) Figs. 9, 10, 11**

Records: Fort Gibson, Cherokee County (Simpson, 1888).

New Records: stations given in Table Three.

Simpson's old record from Fort Gibson has long been overlooked by various monographers (Pilsbry, 1946; Baker, 1930; and others). The new

TABLE TWO
Distribution and Measurements of *Retinella cryptomphala* (Clapp)
from Eastern Oklahoma

Locality	Diameter	Altitude	Whorls	KSC Number
20	2.4		3	7822
20	5.5	2.5	4 $\frac{1}{3}$	7822
15	4.7	2.6	5+	8156
10	Broken			8160
17	3.7	2.0	4	8182
12	4.0	2.2	4 $\frac{3}{4}$	8172
22	4.0	2.1	4	8179
16	3.8	2.0	4+	8187
16	3.6	2.0	4 $\frac{1}{2}$	8187
16	5.3	2.2	4 $\frac{1}{2}$	8187
9	5.3	2.7	5	8337
6	5.2	3.0	5	8356

TABLE THREE
Measurements of *Haplotrema concavum* from Oklahoma

Collecting Station	Diameter	Altitude	Whorls	KSC Number
26	15.5	6.5	4 $\frac{7}{8}$	8256
26	15.7	8.2	5 $\frac{1}{8}$	8256
26	15.7	8.0	4 $\frac{7}{8}$	8256
26	17.0	7.8	5 $\frac{1}{8}$	8256
26	18.1	8.0	5 $\frac{1}{8}$	8256
3	18.0	8.0	4 $\frac{1}{2}$	8279
5	11.2	5.5	4 $\frac{1}{2}$	8357
5	15.8	Broken		8357
5	16.2	Broken		8357
1	7.3	3.5	3 $\frac{1}{2}$	8150
1	13.5	6.0	4 $\frac{3}{4}$	8150

records herein presented definitely validate the occurrence of the species in the state and represent the most southwestern localities known to date. Webb has described the mating (1943) and feeding (1950) activities of this form, which feeds primarily upon other land snails by rasping through their shells.

Webb (1951) described *H. concavum kendeighi* as a race from the Great Smoky Mountains in Tennessee. Subsequently, Hubricht (1956) elevated the form to full species rank. However, since *kendeighi* and typical *concavum* intergrade in southern Missouri, this is untenable. At the type locality, and surrounding environs, the first-named from above is relatively distinct. The reason for presenting the above information is that the Oklahoma specimens are not like typical *concavum*, as compared with specimens from Van Buren, Missouri (station 1; Table Three), but are nearly identical in sculpture, apertural configuration and general contours, to topotypes collected by Webb (University of Oklahoma, Stovall Museum 609).

Family Endodontidae

Shell dull, discoidal or depressed-heliciform; whitish-brown to nearly horn colored, often banded, streaked or flammulated with darker colors; sometimes carinated, transversely rib-striated or spirally thread-striate; whorls rounded, flat-topped or intermediate between these extremes; widely to moderately phaneromphalous; aperture lunate, round or compressed, sometimes bearing a few lamina or teeth; lip sharp and unexpanded. Animal light-colored (see under species below) and often granulose above.

foot undivided longitudinally but striate posteriad. Four genera and seven species reported from Oklahoma.

Key to Oklahoma Genera of Endodontidae

- | | | |
|------|--|---------------------|
| 1 a. | Shell capacious; diameter greater than 10 mm; heavily rib-striate and flammulated with reddish-brown | <i>Anguispira</i> |
| b. | Shell diameter less than 10 mm; never flammulated..... | 2 |
| 2 a. | Spire convex; whorls transversely striate | 3 |
| b. | Spire flat; whorls radially thread-striate or nearly smooth..... | <i>Helicodiscus</i> |
| 3 a. | Greatest diameter less than 2.0 mm; umbilicus moderate; jaw of square, loosely-fitted plates..... | <i>Punctum</i> |
| b. | Greatest diameter 5.0 mm or more; umbilicus very wide; jaw in one striated piece | <i>Discus</i> |

Genus *Anguispira* Morse

Shell largest in family, 15 to over 25 mm in diameter; spire moderately convex to depressed-convex; whorls $4\frac{1}{2}$ to 6, the apical one minutely striate, otherwise smooth; remaining whorls moderately to strongly rib-striate; obliquely or transversely flammulated with reddish-brown to dark brown; deeply phaneromphalous; periphery rounded, angulated or carinated; aperture round or subovoid, wider than umbilicus; lip thin and simple. Animal with a broad, light-sooty foot which is granular anteriad, longitudinally-streaked posteriad, the streaks continuing upward around the tail onto the back; sides of foot suffused with tiny melanophores, light bluish-gray in gross coloration; sides of body broken up into blue-gray, squarish granules which become progressively larger anteriad; tentacles gray and very slender; jaw weakly vertically striate with a median projection. Represented in Oklahoma by one widespread and variable species.

Anguispira alternata Say

Fig. 12

Records: Standley, Choctaw County (Pilsbry, 1903); Wyandotte, Ottawa County, Wister and Sugarloaf Mountain, LeFlore County (Pilsbry and Ferriss, 1906); Ottawa (form *angulata*), Cherokee (Fort Gibson) and Pushmataha (Tuskahoma) (form *crassa*) counties (Pilsbry, 1948); Tulsa, Ottawa, Muskogee and Pushmataha counties (Lutz, 1949); Cherokee, McCurtain and Payne counties (Wallen, 1951); Kay County (Wallen and Dunlap, 1953); Sequoyah, Delaware and McCurtain counties (Dundee, 1955); Adair, Choctaw, Haskell, Hughes, LeFlore, Murray, Muskogee, Osage, Ottawa and Sequoyah counties (Branson and Wallen, 1958); Pawnee and Johnston counties (Branson, 1959 a); Caddo County (Caddo Local Fauna, Pleistocene) (Branson, Taylor and Taylor, 1962); Pontotoc and Marshall counties (Branson, 1968).

New Records: stations 5, 18, 20 and 26.

With characters of the genus. As pointed out above and by Pilsbry (1948), *A. alternata* is an exceedingly variable species. Such variation has given rise to the description of numerous "races" and "species," which are mostly figments of the imagination when large numbers of shells are observed from the whole range of the species.

Young *Anguispira* nearly always have strongly angular or carinated shells, such angulation gradually grading into a rounded periphery at about 14 to 15 mm in diameter in typical *alternata* (Douglas, 1963). However, some southern and southwestern populations retain the angulation into the sexually mature state (25 mm or more), whereas others have rounded peripheries at 8 to 9 mm. In the uplifted regions of northeastern Oklahoma three types are found: (1) those with an angular periphery, chestnut spots that tend to fuse into dashes, a row of spots below the angle, radiate dashes on the base and moderately heavy sculpturing; (2)

those with a rounded periphery, depressed apex, heavy, widely-spaced sculpturing and a color pattern moderately reduced; (3) forms intermediate between 1 and 2. This region is thought to be an intergradation area between *A. alternata crassa* Walker (type 2) and *A. alternata angulata* Pilsbry (type 1). Specimens more less typical of *crassa* are found in abundance in east-central, central and south-central parts of the state. In the Jackfork Mountains the basal sculpture is about as heavy as on the whorls above, the periphery being only slightly angled in specimens above 15 mm in diameter. A weakly-differentiated race appears to occupy the Osage Hills region, the periphery being angulated in all stages of growth and the sculpture being quite fine. There seems to be a rather constant increase in the coarseness of sculpture and the tendency towards a decrease in altitude of the shell as series of shells are observed from about southern Mayes County southward into the Kiamichi Mountains. Ones from Walnut, Round, Rich and Winding Stair mountains are exceedingly depressed, possess very coarse and sparse sculpturing. The color pattern, in these latter shells, consists of only a few scattered blotches above and is practically lacking below; the periphery is rather acutely angled. The forms from Murray, Carter, Love, Johnston and Bryan counties, as well as in adjacent Texas, are about like typical *alternata* in shape, but there are no flammules on the base and those above the periphery are scattered and few in number. This form has been named *A. alternata strongylodes* (Pfeiffer). Comparative measurements of shells taken from several localities are given in Table Four.

TABLE FOUR

Measurements of *Anguispira alternata* from several areas of Oklahoma. All measurements in mm.

Locality	Diameter	Altitude	Whorls
20	4.5	2.2	2½
20	16.3	8.8	5¼
26	7.5	4.5	3¾
26	17.5	8.7	5¼
28	9.0	4.3	4
28	8.0	4.0	3¾
28	16.0	7.0	5
6	18.5	8.0	5¼
6	18.0	9.0	5½
22	3.0	1.8	2½
22	16.5	9.5	5½
21	6.0	3.3	3
24	9.0	4.5	4
24	17.0	9.5	5¾
5	18.0	9.0	5¼
11	9.0	4.5	4+
11	17.5	8.6	5½
27	6.0	3.5	3¾
27	14.6	10.0	5½
18	16.2	9.5	5¼
8	9.5	4.3	4
23	11.9	7.5	4¾
23	12.1	7.5	5
23	15.5	8.6	5½
23	17.0	9.5	5¾
12	16.0	9.0	5
12	17.0	9.7	5¼
12	17.9	9.9	5½

Anguispira overwinters in small burrows in the soil and deposits 15 to 25 eggs during propitious periods in jug-shaped pits (Gugler, 1963).

Genus *Discus* Fitzinger

Shell discoidal or disco-turbinate; opaque and brownish-white to corneous; all whorls, except first one and one-half, rib-striate above and below; widely phaneromphalous; whorls gradually increasing in diameter, $3\frac{1}{2}$ to over 6; aperture oval to round, toothless, or with a low tubercle near the columella a short distance within; peristome thin and simple; animal pale with a long, slender foot; jaw arched and striate; central radular teeth tricusped. Two species in Oklahoma.

Key to Oklahoma Species of *Discus*

- 1 a. With $3\frac{1}{2}$ to $4\frac{1}{2}$ whorls; spire low conoid *Discus cronkhitei*
 b. With $5\frac{1}{2}$ to 6 whorls; spire nearly flat *Discus patulus*

Discus cronkhitei (Newcomb)

Figs. 13, 14

Records: Blaine County (Lutz, 1949); Woods, Woodward, Greer and Kiowa counties (Wallen and Dunlap, 1953); Harper County (Bar M Local Fauna, Pleistocene) (Taylor and Hibbard, 1966); Pottawatomie County (Branson, 1969).

With the exception of the specimens reported by Lutz, which I have not seen, all of the above records are based upon Pleistocene fossils. However, living specimens have been secured in Arkansas and Missouri.

Shell 4.5 to nearly 6.0 mm in diameter, 2.8 to 3.4 mm in altitude; disco-turbinate; light brown; first one and one-half whorls smooth, the remaining ones bearing numerous riblets separated by spaces (on body whorl) about 2 times as wide as the riblets; umbilicus contained about 3 times in diameter of shell; aperture round; peristome thin. Animal variable in color, from nearly white in fall to grayish in spring and summer (Missouri specimens).

The specimens from central Oklahoma, Missouri and Arkansas are not distinguishable from the form called *D. cronkhitei catskillensis* by Pilsbry (1948) and Macmillan (1940). Hubricht (1963 a) has recently elevated this form to full species rank because of its slightly angular shell and light colored animal. These are exceedingly variable characters and such differences disappear when samples are secured from the western United States eastward.

D. cronkhitei inhabits moist areas, in both upland and lowland situations, under and in decaying leaves and logs. Zygoposition occurs in late summer at the soil surface in Nebraska (Gugler, 1963).

Discus patulus (Deshayes)

Figs. 15, 16

Records: Sequoyah County, near Sallisaw (Branson, 1969 b).

Shell greatly depressed, only slightly convex above; 7.8 to 9.3 mm in diameter, 3.3 to 4.1 mm in altitude; $5\frac{1}{2}$ to 6 whorls, the first one and one-half smooth, remaining ones with low, rounded riblets that are only slightly more narrow than the interspaces separating them; umbilicus very wide, only 2 to $2\frac{1}{4}$ times in shell diameter; periphery slightly angular; aperture round; peristome thin and simple. Very common in adjacent Arkansas and Missouri under decaying logs and on moist hillsides, especially in the White River Drainage (station 1).

Genus *Helicodiscus* Morse

Shell minute to small; discoidal, spire quite to nearly flat; widely phaneromphalous; pale to greenish in color; whorls narrow, smooth or spirally thread-striate; aperture lunate, often with one to three teeth within; peristome thin, simple. Animal nearly dead or transparent white, with flecks of grayish-orange on mantle; tentacles shortly tapering, unpigmented; foot undivided. Three species in Oklahoma.

Key to Oklahoma Species of *Helicodiscus*

- 1 a. Surface of whorls spirally thread-striate; usually with one to three teeth within aperture *Helicodiscus parallelus*
- b. Surface smooth; teeth never present 2
- 2 a. 2.0 to 3.0 mm in diameter; 3½ to 4 whorls.....
..... *Helicodiscus singleyanus*
- b. 1.3 to 1.5 mm in diameter; 3 to 3¾ whorls.....
..... *Helicodiscus nummus*

***Helicodiscus parallelus* (Say)**

Fig. 17

Records: Fort Gibson, Cherokee County (Simpson, 1888); Ottawa (Wyandotte), Craig (Vinita), Pittsburg (McAlester) and Atoka (Limestone Gap) counties (Pilsbry and Ferriss, 1906); Oklahoma City, Cleveland County (Ferriss, 1906); Payne County (Greger, 1915); Payne (Kipley), Noble (Red Rock), Grady (15 miles east of Chickasha) and Comanche (Wichita Mountains) counties (Walker, 1915); Craig, Tulsa, Muskogee, Pittsburg, Atoka, Murray, Grady, McClain, Cleveland and Blaine counties (Lutz, 1949); Garfield, Johnston, Kay, Logan, Payne and Pontotoc counties (Wallen, 1951); Alfalfa, Beaver, Caddo, Cimarron, Comanche, Cotton, Dewey, Greer, Harper, Kiowa, Lincoln, McCurtain, Noble, Texas, Tillman, Washita, Woods and Woodward counties (Wallen and Dunlap, 1953); Beaver County (Berends Local Fauna, Pleistocene) (Taylor, 1954); Harper County (Bar M Local Fauna, Pleistocene) (Taylor and Hibbard, 1955); Okmulgee County (Dundee, 1955); Adair, Beckham, Bryan, Choctaw, Ellis, Harmon, Haskell, Hughes, LeFlore, Love, Nowata, Osage, Ottawa, Pottawatomie, Roger Mills and Sequoyah counties (Branson and Wallen, 1958); Washington and Pawnee counties (Branson, 1959 a); Caddo and Canadian counties (Caddo Local Fauna, Pleistocene) (Branson, Taylor and Taylor, 1962); Carter and Murray counties (Hubricht, 1962); Major, Custer, Canadian, Oklahoma, Garvin, Carter, Marshall and Mayes counties (Branson, 1963 a).

Shell small; discoidal, spire flat to very slightly everted; very widely phaneromphalous, all whorls visible; whitish-yellow to greenish, dull; 3½ to little more than 5 narrow whorls, faintly to strongly thread-striate; first one and one-half whorls nearly smooth to as heavily striate as others; aperture lunate; peristome thin, simple; toothless as many as three pairs of conical tubercles in aperture and others further within; measurements given in Table Five. Found in decaying wood and leaves and other humid environments.

Hubricht (1962) has recently described several species of *Helicodiscus*, two of which I consider synonyms of *H. parallelus*. *Helicodiscus multidentis* Hubricht is based upon specimens with enlarged, multiple teeth within the shell. Such teeth are rare but are seen in *H. parallelus* throughout its range. The "teeth" are often resorbed, the materials being used during periods of active shell deposition, and later redeposited in various shapes and sizes; hence, are quite variable. *Helicodiscus notius* Hubricht, reported from several localities, including Oklahoma, is based upon shells in which the embryonic whorls retain the spiral threads. Again, this is an exceedingly variable characteristic and can be seen in almost any large sample of fresh shells. *Helicodiscus eigenmanni* Pilsbry differs from so-called "typical" *H. parallelus* in being slightly larger and in possessing spiral striae on the embryonic whorls. I consider *H. eigenmanni* to be only the western representative of *parallelus*. There is nearly continuous variation in the characteristics discussed above, from the western Ozarks

TABLE FIVE

Measurements and Sculpturing of Apical Whorls in *Helicodiscus parallelus* from several Oklahoma Localities. All measurements in mm.

Locality	Diameter	Striation	Whorls
20	2.5	distinct	3 1/4
19	3.5	weak	5 1/2
21	4.0	distinct	4 7/8
21	4.0	distinct	5
23	2.5		
23	4.0	distinct	5 1/2
24	3.5	weak	4 1/2
18	2.0	distinct	3 1/4
18	3.5	distinct	4 1/4
5	3.2	weak	4 1/2
16	2.8	weak	4 1/2
16	3.0	weak	4 1/2
4	3.0	distinct	4 +
Matagorda, Texas	4.0	distinct	5 1/8
25	2.8	distinct	3 7/8
25	4.5	weak	5 1/8
27	4.0	weak	5 1/4
27	3.7	weak	5 1/2
27	3.3	weak	4 7/8
7	1.4	distinct	2 1/4
7	3.6	weak	4 1/4
3	3.5	distinct	4 7/8

into the foothills of the Rockies. These forms should be added to the synonymy of the highly variable *H. parallelus*.

Helicodiscus singleyanus (Pilsbry) Figs. 18, 19

Records: Payne (Ripley), Noble (Red Rock) and Comanche (Wichita Mountains) counties (Walker, 1915); Grady, McClain, Cleveland, Payne and Johnston counties (Lutz, 1949); Blaine, Kay, Logan, Muskogee and Pontotoc counties (Wallen, 1951); Alfalfa, Beaver, Caddo, Cimarron, Garfield, Greer, Harper, Jackson, Kiowa, Lincoln, McCurtain, Noble, Texas, Tillman, Washita, Woods and Woodward counties (Wallen and Dunlap, 1953); Beckham, Bryan, Choctaw, Ellis, Harmon, Haskell, Hughes, LeFlore, Love, Nowata, Osage, Ottawa, Pottawatomie, Roger Mills and Sequoyah counties (Branson and Wallen, 1958); Nowata, Pawnee and Murray counties (Branson, 1959 a); Caddo and Canadian counties (Caddo Local Fauna, Pleistocene) (Branson, Taylor and Taylor, 1962); Garvin and Marshall counties (Branson, 1963 a).

Shell minute, 2.3 to 2.5 mm in diameter, less than 1.0 mm in altitude; whitish to transparent white when fresh; widely phaneromphalous; spire barely convex; whorls, separated by deep sutures, 3 1/4 to 4 1/2, minutely sculptured, the last one being tubular; aperture round; peristome thin, simple. Animal white, eyes not pigmented. Found burrowing in leaf litter, sometimes in decaying wood.

Helicodiscus nummus (Vanatta) Figs. 20, 21, 22

Records: Beaver (Riverside), Noble (Billings), Grady (15 miles east of Chickasha), Comanche (Wichita Mountains) and Pottawatomie (one and one-half miles south of Tecumseh) counties (Walker, 1915); Muskogee and Pontotoc counties (Wallen, 1951); Blaine, Comanche, Cotton, Garfield, Grady, Greer, Jackson, Kiowa, Lincoln, Logan, McCurtain, Noble, Texas, Tillman, Washita and Woods counties (Wallen and Dunlap, 1953); Cimarron, Haskell, Hughes, LeFlore, Osage and Pottawatomie counties (Branson and Wallen, 1958); Murray County (Branson, 1959 a); Caddo and Canadian counties (Caddo Local Fauna, Pleistocene) (Branson, Taylor and Taylor, 1962); Marshall County (Branson, 1963 a).

Shell minute, apex quite or nearly flat; paraffin white; 3 to 3 3/4 whorls separated by impressed sutures, the last one somewhat flattened on the umbilical side; widely phaneromphalous; aperture a slightly lop-sided oval because of whorl flattening; peristome thin and simple; see Table Six for measurements. Animal not seen.

TABLE SIX
Measurements of *Helicodiscus* (?) *nummus*
from three Oklahoma Localities

Locality	Diameter	Altitude	Whorls
22	1.6	0.6	3¾
22	1.5	0.5	3+
18	1.7	0.5	3
18	1.7	0.6	3+
7	1.2	0.7	2½

This species is very poorly known because of a lack of knowledge concerning its soft anatomy. It may actually be a zonitid.

Additional Notes on *Helicodiscus*

Simpson (1888) reported *Helicodiscus fimbriatus* Wetherby, an Appalachian species, from Fort Gibson. However, no other collector has found this species in or near Oklahoma. Hubricht (1963 b) transferred *Paravitrea roundyi* Morrison, a species known from Oklahoma to *Helicodiscus*. Since he gave no reasons for so doing, the species is at present left in the former genus.

Genus *Punctum* Morse

Shell minute. 1.2 to 1.4 mm in diameter, less than 1.0 mm in altitude; light brownish-horn and nearly transparent; disco-turbinate; 3¾ to 4¼ whorls, rather rounded, separated by impressed sutures; first one-fourth whorl smooth; next one weakly striate, remaining ones with high, thin and arched riblets crossed by spiral striations; moderately phaneromphalous (about 3 times in shell diameter); aperture round; peristome thin and simple. One species in Oklahoma.

Punctum vitreum H. B. Baker

Figs. 23, 24, 25

Records: Ripley, Payne County (Walker, 1915) (as *P. pygmaeum*); Cleveland and McClain counties (Lutz, 1949); Muskogee County (Wallen, 1951); Garfield, Grady, Logan, McCurtain, Noble and Washita counties (Wallen and Dunlap, 1953); Beckham, Haskell, Hughes, LeFlore, Osage, Payne, Pottawatomie, Roger Mills and Sequoyah counties (Branson and Wallen, 1958); Murray County (Branson, 1959 a); Marshall and Choctaw counties (Branson, 1963 a).

Concluding Remarks

From the above, and former works, it becomes increasingly clear that not only are the Ouachita and Ozark Mountains clearly related faunistically to the Smokies and Appalachian systems, but they form a more or less distinct speciation center. This will be discussed in more detail in the final contribution.

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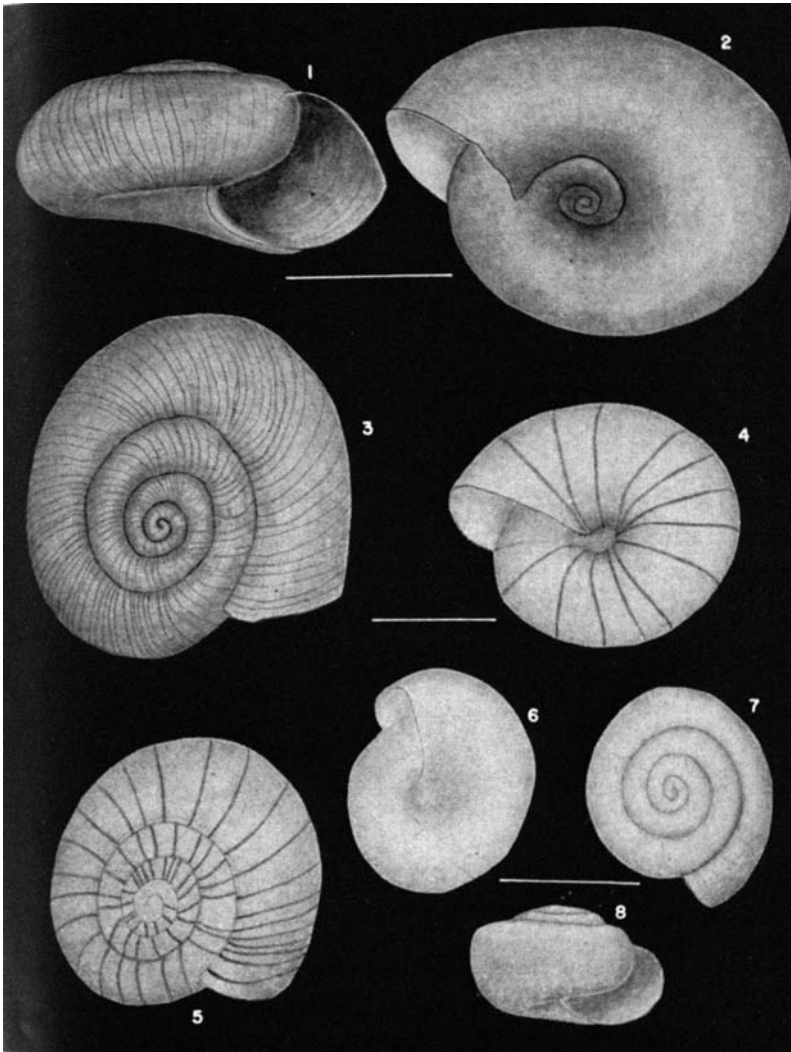


Plate I

1. *Retinella zikmundi* sp. nov.; apertural view; line equals 2.0 mm.
2. *Retinella zikmundi* sp. nov.; basal view.
3. *Retinella zikmundi* sp. nov.; apical view.
4. *Retinella cryptomphala*; basal view; line equals 2.0 mm.
5. *Retinella cryptomphala*; apical view
6. *Guppia sterkii*; basal view; line equals 1.0 mm
7. *Guppia sterkii*; apertural view.
8. *Guppia sterkii*; apical view.

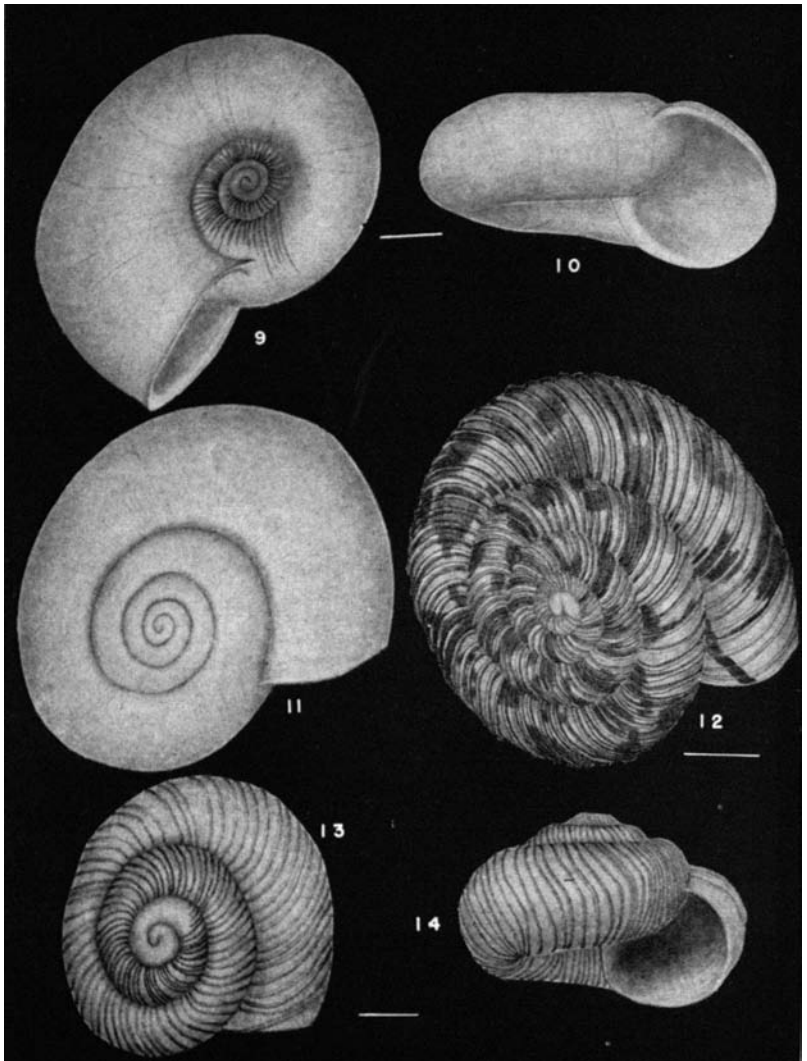


Plate II

9. *Haplotrema concavum*; basal view; line equals 2.0 mm.
10. *Haplotrema concavum*; apertural view.
11. *Haplotrema concavum*; apical view.
12. *Anguispira alternata*; apical view; line equals 2.0 mm.
13. *Discus cronkhitei*; apical view; line equals 2.0 mm.
14. *Discus cronkhitei*; apertural view.

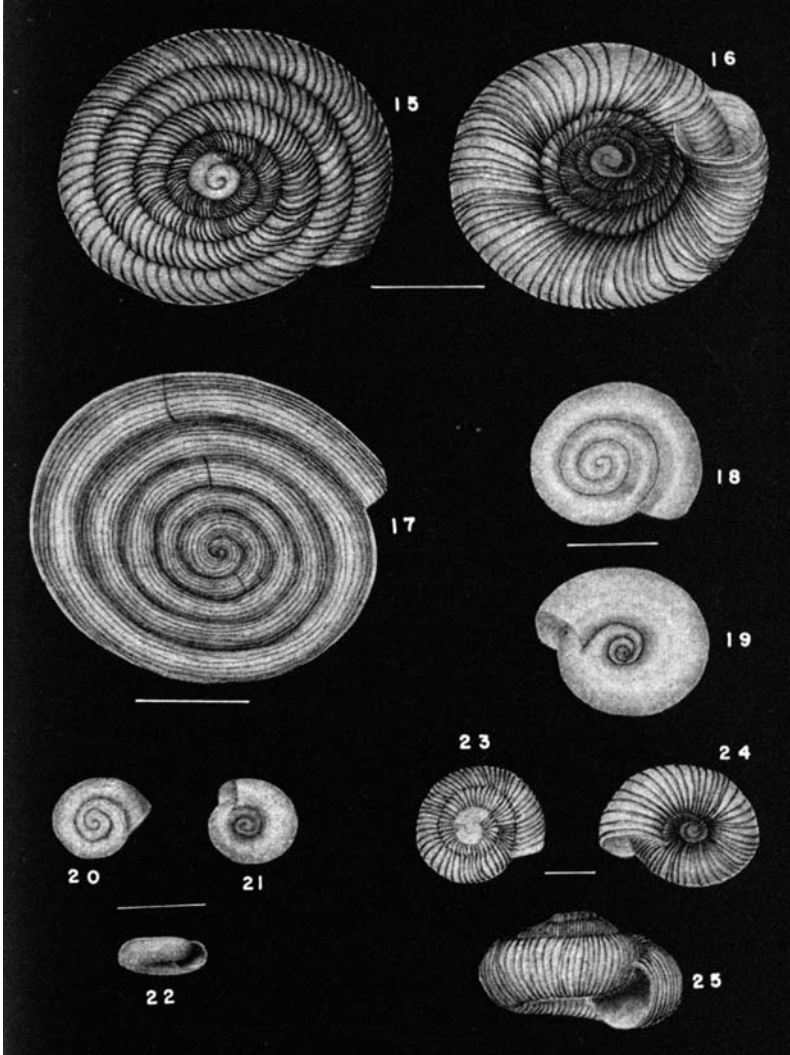


Plate III

15. *Discus patulus*; apical view; line equals 2.0 mm.
16. *Discus patulus*; basal view.
17. *Helicodiscus parallelus*; apical view; line equals 1.0 mm.
18. *Helicodiscus singleyanus*; apical view; line equals 1.0 mm.
19. *Helicodiscus singleyanus*; basal view.
20. *Helicodiscus nummus*; apical view; line equals 1.0 mm.
21. *Helicodiscus nummus*; basal view.
22. *Helicodiscus nummus*; apertural view.
23. *Punctum vitreum*; apical view; line equals 0.5 mm.
24. *Punctum vitreum*; basal view.
25. *Punctum vitreum*; apertural view.