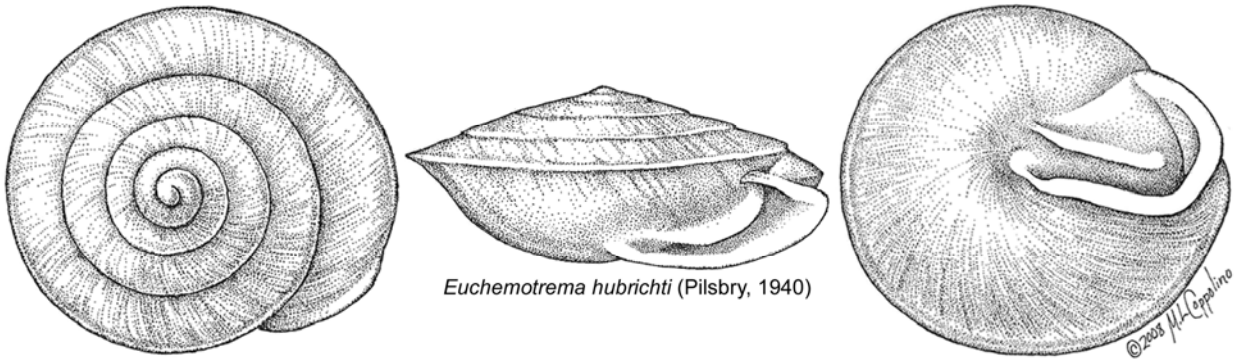

American Malacological Society

Carbondale, Illinois 2008

A Guide for Terrestrial Gastropod Identification

Editors: Kathryn E. Perez, , James R. (Jay) Cordeiro
Illustrator: Marla L. Coppolino

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Terrestrial Gastropod Identification Workshop

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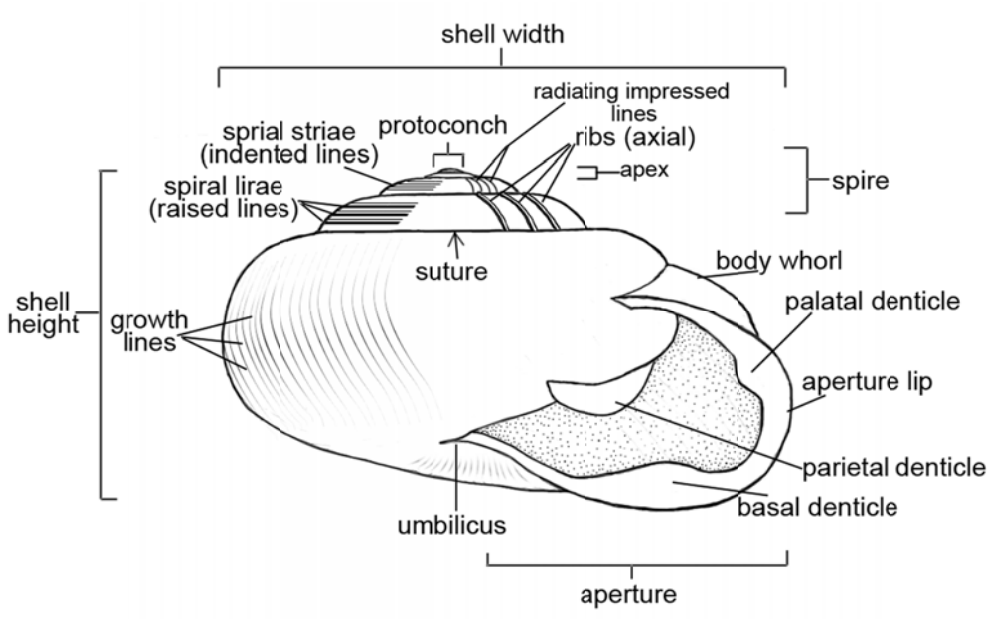
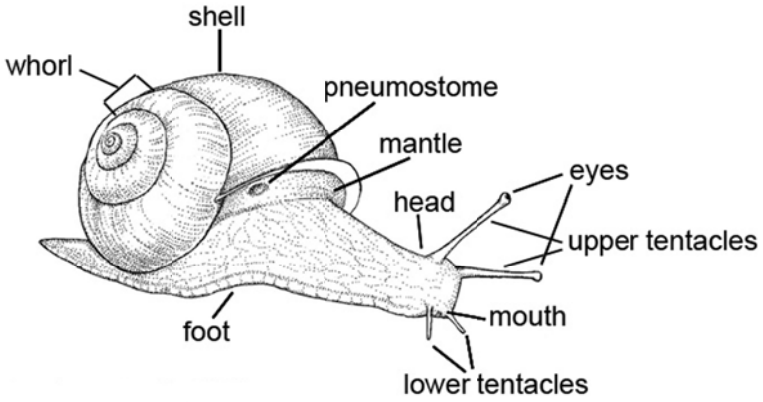
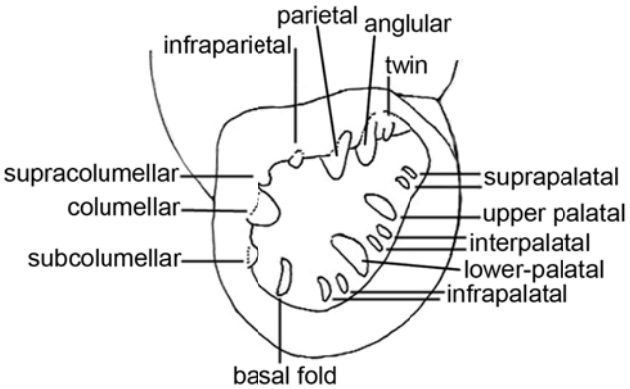
Glossary of land snail terminology

(Images: ©2008 M.L. Coppolino)







Denticles of Pupilloidea (after Pilsbry, 1948)

Anterior – directional term meaning towards the head.

Aperture – the opening of the snail shell, from which the animal extends its head and foot.

Apex – the top or most central whorls of the snail shell, where the earliest growth occurred.

Apical – on the top side of the shell, opposite the base.

Axial – referring to direction that is parallel to the columella; opposite of spiral.

Base – the underside or ventral surface of the shell, opposite the apical side.

Basal – refers to lower or ventral area of the shell or apertural lip.

Beehive – a shell shape that looks something like a traditional beehive.

Body whorl – the outermost and largest shell whorl, formed most recently in the snail's growth; from the aperture to 1.0 whorl back.

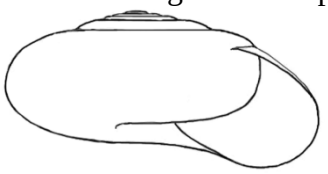
Bulimoid – a higher-than-wide shell shape, e.g. of Bulimulidae

Callus – a thickened area of the shell.

Columella – the central axis of the whorls of the shell.

Conical – a type of shell shape that is relatively broad at its basal portion, with an elongated spire that tapers to a point.

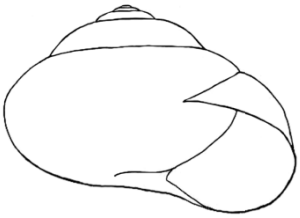
Depressed heliciform – a common, wider-than-high shell shape.



Discoidal – a wider-than-high, very flattened, disc-like shell shape of certain taxa (e.g., Helicodiscidae).

Foot – the flat muscular surface of the snail's body upon which it crawls.

Globose – a shell shape similar to heliciform, but with a higher spire and more rounded shape overall



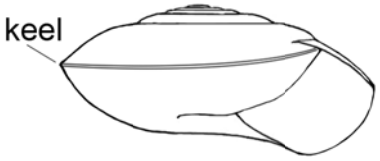
Growth lines – transverse ridges on the shell's surface, formed during the snail's growth.

Head – the anterior region of the snail's body that contains the tentacles and mouth.

Height – the height of the shell is measured from the apex to the most basal part of the shell, parallel to the columella.

Hirsute – describes a shell that has hairs on the surface of its periostracum.

Keel (of the shell) – a sharp edge of the periphery of the shell present in certain taxa.



Keel (of the tail) – a ridge on the tail present in certain taxa.

Lip or apertural lip – the rim of the aperture of the shell, either sharp or thickened depending upon the species.

Lirae – raised lines on the shell's surface that run in a spiral direction.

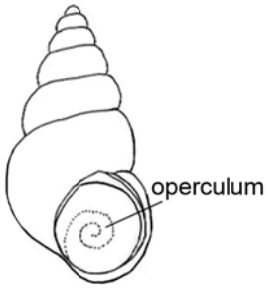
Malacology – the study of mollusks. A scientist who studies mollusks is called a malacologist.

Mantle – one of the features that defines the phylum Mollusca as a taxon; this is a tissue that covers the visceral organs of the animal. In snails, it is located within the shell, and only the edge of the mantle is observable at the aperture. For slugs, the mantle is located dorsally behind

the head, forming a slight hump (in Arionidae, Argiolimacidae and Limacidae slugs), or covers the length of the body (in Philomycidae slugs).

Microsculpture – describes any textural features of the shell's surface usually as seen with the aid of a microscope.

Operculum – a chitinous (proteinaceous) or calcified plate, attached to the dorsal tail area of operculate snails, that, when the snail is withdrawn into its shell, covers some or all of the aperture.



Palatal – refers to the area of the outer portion (greatest distance from columella) of the apertural lip.

Parietal denticle or tooth – the calcified projection on the body whorl within the aperture, present in certain species.

Periostracum – the thin outer covering of the shell, composed of chitinous (proteinaceous) material. In certain species it bears hairs or triangular scale-like projections, while in others it is smooth.

Pneumostome – the opening in the mantle that allows air to pass through and leads to the mantle cavity within, where gas exchange occurs through a vascularized region of the tissue. The pneumostome can be seen opening and closing in a land snail when it is active.

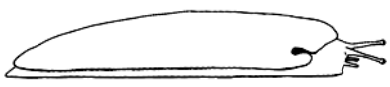
Posterior – directional term meaning towards the tail.

Protoconch – the smallest, earliest-formed whorl or whorls (developed in embryonic stages) at the center of the shell's coil.

Ribs – raised ridges on the shell's surface that run in an axial or transverse direction.

Slug – a snail with a shell that is much reduced or absent. Its mantle may be positioned anteriorly or may cover the entire length of the body, depending on the taxa (mainly for eastern N. American slugs).


Anteriorly-positioned mantle


Mantle covering length of body

Spire – the top whorls of the shell above the last full (body) whorl

Spiral – refers to the direction of the coil of the whorls; opposite of axial.

Striae – indented lines on the shell's surface; can be in either a spiral or an axial direction.

Subcylindrical – refers to a shell shape that is higher than wide, as illustrated below.

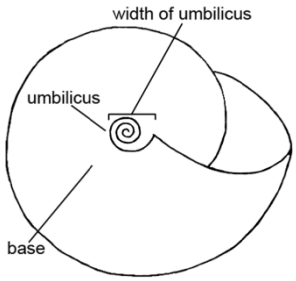
Striae – impressed lines on the shell's surface that run axially.

Succiniform – the shell shape of the Succineidae, which is higher than wide and with a very large aperture. Typically the spire is relatively much shorter and smaller than the body whorl.

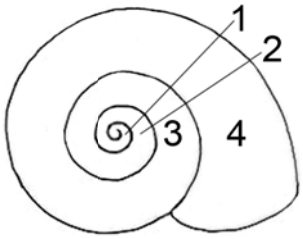
Suture – the seam where the shell's whorls join. Sutures are described as being impressed to varying degrees, for example, shallowly or deeply impressed, depending upon the species.

Tentacles –the sensory appendages on the head of a land snail. There is an upper pair (also called posterior) and a lower pair (also called anterior; these are usually much smaller), both of which are used for chemical sensory function. The upper pair also contains the eyes, for most land snails (some snails are blind, for example, *Helicodiscus parallelus*). In the genus *Vertigo* only the upper tentacles bearing the eyes are present, the lower tentacles are absent. Basommatophoran snail species such as *Carychium*, as well as operculate land snails, have only one pair of tentacles with the eyes at their bases.

Umbilicus – Opening in the center of the base of the shell. It may be open, with the inside of the columella visible, or partially closed by part of the lower insertion of the aperture, or completely closed and appearing as a depression. Its width is measured at its greatest diameter, with the lower insertion as an outer point on the diameter.



Whorl – one revolution of the shell's coil. Whorls are counted from the earliest whorl outward toward the last and largest (body whorl).



Width - the width of the shell is the maximum measurement as taken across the axis perpendicular to the columella.

Global Rank Conservation Status Definitions

James R. (Jay) Cordeiro, NatureServe

NatureServe Conservation Status

Conservation status information – how rare or threatened a species is – is a crucial component in setting priorities and targeting conservation efforts. NatureServe and its various member programs have developed a consistent method for evaluating the health and condition of species.

Many things can contribute to the decline and ultimate demise of a species. The condition of each species is assessed based on many criteria, including number of occurrences, number of occurrences with good viability, population size, range extent, area of occupancy, long- and short-term population and/or habitat trend, threats, number of protected occurrences, intrinsic vulnerability, environmental specificity, and other considerations. Conservation status ranks are assigned on a one to five scale. Global conservation status levels range from critically imperiled (G1) to secure (G5). Listed separately are species known to be extinct (GX) or those that are currently missing or known historically and may be extinct (GH). Species ranked in this latter category (GH) are of highest conservation concern, followed by rare species classified as critically imperiled (G1), imperiled (G2), and vulnerable (G3). Often a numeric range rank (e.g. G2G4) is used to indicate the range of uncertainty in the conservation status of a species. In cases where information on conservation status is lacking or substantially conflicting information exists about status or trends, an unrankable (GU) status is utilized. The GNR rank is used for species where global rank has not yet been assessed. A rank qualifier (Q) is used following a numeric conservation status rank (e.g. G1Q) is used in cases where taxonomic distinctiveness of this entity at the current level is questionable.

Basic Ranks:

GX- Presumed Extinct: Not located despite intensive searches; virtually no likelihood of rediscovery

GH- Possibly Extinct: Missing; known only from historical occurrences but still some hope of rediscovery

G1- Critically Imperiled: At very high risk of extinction due to extreme rarity (often five or fewer populations), steep declines, or other factors.

G2- Imperiled: At high risk of extinction due to very restricted range, few populations (often 20 or fewer), steep decline, or other factors.

G3- Vulnerable: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4- Apparently Secure: Uncommon but not rare; some cause for long-term concern (e.e. widespread declines).

G5- Secure: Common; widespread and abundant.

Variant Ranks:

G#G#- Range Rank: A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or community. A G2G3 rank would indicate that there is a roughly equal chance of G2 or G3 and other ranks are much less likely. Ranges cannot skip more than one rank (e.g., GU should be used rather than G1G4).

GU- Unrankable: Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. Whenever possible, the most likely rank is assigned and a question mark qualifier may be added (e.g., G2?) to express minor uncertainty, or a range rank (e.g., G2G3) may be used to delineate the limits (range) of uncertainty.

GNR- Unranked: Global rank not yet assessed.

Rank Qualifiers:

Q- Questionable Taxonomy: Taxonomy distinctiveness of this entity at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority conservation status.

U.S. Endangered Species Act Conservation Status

The U.S. Endangered Species Act (U.S. ESA) is the primary legislation that affords federal legal protections to threatened and endangered species in the United States, and is administered by the U.S. Fish and Wildlife Service (USFWS) (http://endangered.fws.gov/) and U.S. National Marine Fisheries Service (NMFS) (http://www.nmfs.noaa.gov/prot_res/overview/es.html). As defined by the Act, endangered refers to species that are "in danger of extinction within the foreseeable future throughout all or a significant portion of its range," while threatened refers to "those animals and plants likely to become endangered within the foreseeable future throughout all or a significant portion of their ranges."

LE- Listed Endangered:

LT- Listed Threatened:

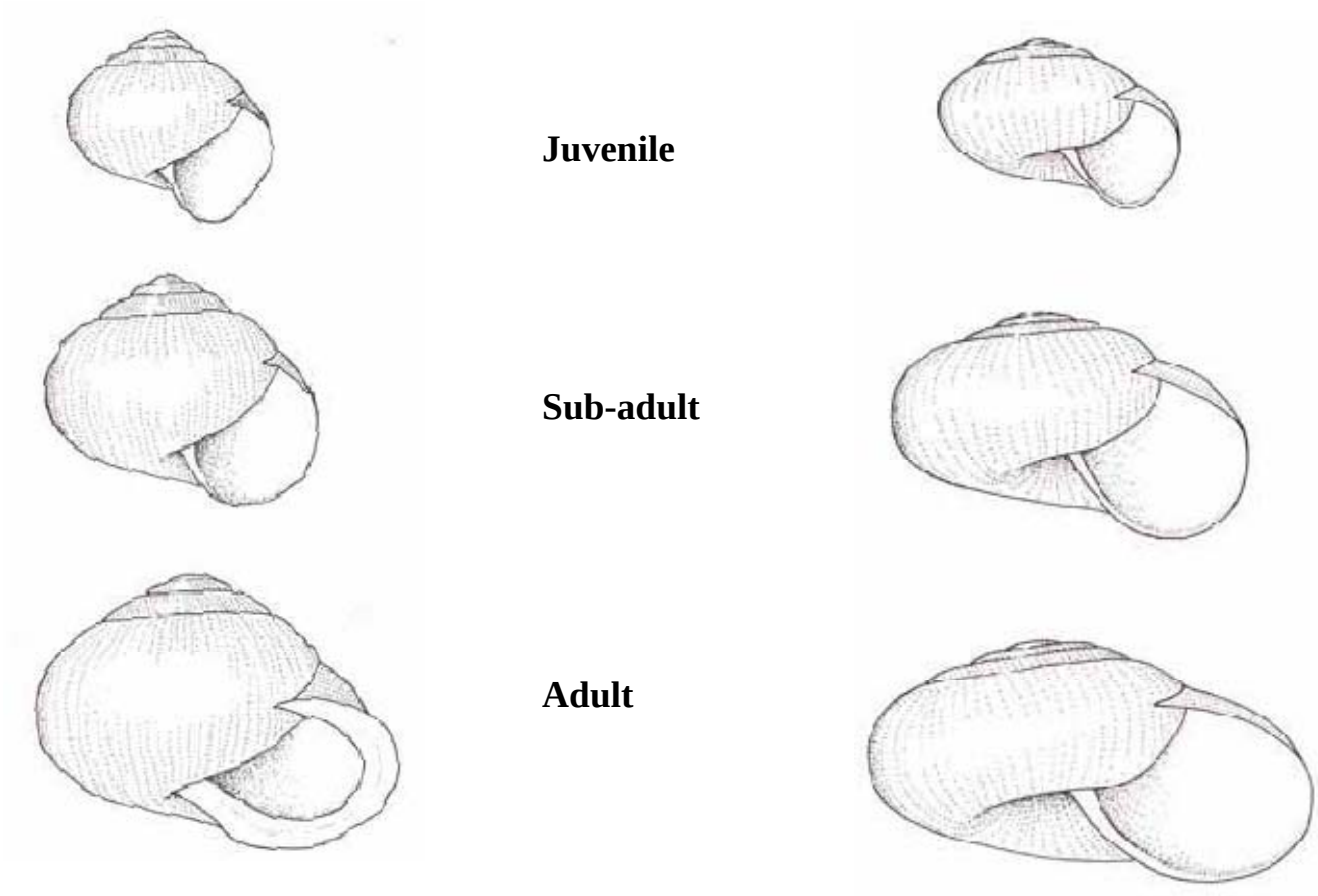
C- Candidate:

Shell Growth

Dan Dourson, Judy Dourson, Copperhead Environmental Consulting

Reprinted with permission from Land Snails of the Great Smoky Mountains (Eastern Region)

Mesodon ***Mesomphix***



Immature shells of any species are difficult, if not impossible, to identify. Determining the maturity of a shell can often be accomplished by examining the aperture. As shells mature, the shape of the aperture changes. Note the aperture of both juvenile species. The bottom seems to droop as if it has an invisible weight attached. This begins to round out until it finally reaches a more horizontal oval shape at maturity.

Immature *Mesodon* species are easily confused with *Mesomphix* species. *Mesodon* and *Triodopsis* species do not form reflected lips until they reach maturity. Other species such as *Mesomphix*, *Anguispira*, and *Ventridens* do not possess reflected lips even at maturity.

Land Snail Collection Strategies

Marla L. Coppolino, Southern Illinois University Carbondale

Despite that land snails don't seem to share the same spotlight in the mollusk world as marine or even freshwater mollusks do, there are many worthwhile reasons to collect and study land snails. Land snails are easily accessible, ubiquitous in distribution, and they do not require expensive or elaborate equipment to collect. They represent an understudied group (Lydeard *et al*., 2004), and there is much knowledge to be gained from these organisms and their habitat associations. Land snails are a vital part of the ecosystem and take up essential nutrients from the detritus and soil, which are then in turn passed on to higher trophic levels, inevitably affecting them for better or for worse (Barker, 2004). Land snails are studied for their capacity as ecological indicators (Shimek, 1930), and even as indicators of the effects of pollution and global climate change (Graveland *et al*., 1994; Regoli *et al*., 2006). Many of these types of studies are in their early stages. Much remains to be learned about land snails. And so, the world needs more land snail collectors!

The literature on land snail collecting suggests a wide array of methodologies. Basic questions should be asked before embarking on research, whether formal or informal, that involve the collection of land snails:

1) Is the study exploratory in nature, that is, is the intention of the collector surveying an area to "see what's there"?
2) Are multiple areas being surveyed?
3) Does the investigation also include comparisons of land snail populations with habitat and microhabitat?
4) Is the method intended to be repeatable and quantifiable?

Land snail collecting can be divided into two basic categories: qualitative and quantitative. Historically speaking, most of the collecting in North America has been qualitative. This means that areas are searched for snails without being under the confines of measured time or space. Locality data for the specimen is recorded by the collector, often along with other information relating to its habitat. The data from these efforts, amassed by important collectors of the past such as Henry Pilsbry, Frank C. Baker, and Leslie Hubricht, have offered contemporary collectors a very useful baseline of information on species, and their habitats and ranges.

Since around the mid-20th century, collecting efforts in North America have turned more towards quantifiable studies. A quantitative study implies that land snails are collected using some standard measurement, either by time, by volume sampled (leaf litter, soil, etc.) or by area, and often by some combination of these factors. Most often, snails collected in this type of study are also accompanied by habitat or microhabitat data, which is also measured in a quantifiable, repeatable way. When a collecting method is quantitative, the snail and habitat/microhabitat data can be used in statistical analyses. Most modern studies use quantitative methods of collection, from which population estimates can be obtained (Bishop, 1977).

The basic tools for land snail collecting are quite simple. In the field, plastic vials with attached snap lids are a good choice for collecting snails. Most often, direct visual search is employed. In many areas, the greatest amount of diversity comprises "micro snails", or generally speaking, snails that measure less than 5 mm at the largest shell dimension, and cannot be readily found in a visual search. To collect these snails most efficiently, leaf litter and usually

the top 2 cm of soil are collected in a bag (either plastic or cloth), to be sorted later in the laboratory. The litter can be searched visually under magnification, and then passed through a series of sieves to pick out the smaller snails.

Depending on the species and the region, land snails have a wide range of microhabitat preferences, but generally the first places to look for snails would be in moist areas: the leaf litter, under bark, coarse woody debris or logs, along bases of trees and rocks, and generally in the interface regions of the forest floor, such as the crevices between a log and the ground litter, and between exposed tree roots. Don't forget to observe tree trunks, limbs and crotches between branches, for snails could be actively crawling there, particularly on a rainy day. In regards to the best time of day to search for living snails, the greatest success often occurs during the overnight hours, but this time isn't necessarily practical. Humid, cool mornings and evenings can yield a large collection of living snails. The best seasons to collect live snails in much of North America are spring and fall, when they are most active, since they hibernate in the cold of winter and aestivate in the heat of summer.

In both qualitative and quantitative collections, the question arises as to whether to collect only empty shells, only live snails, or both. Researchers have advocated different views. In some studies, only living specimens were counted (Boag, 1982; Sulikowska-Drozd, 2005). Many other studies have included both. In any case, the decision relates to the purpose of the study. For maximum recovery of species diversity, a combination of live and dead collected snails is best. A couple of exceptions apply to live-collecting: one, when the species found are rare or endangered, and two, when species are found that tend to exist in high abundances, but in extremely localized habitats. In these cases, it is preferable to limit collecting to one or a few individual specimens. The advantage to including empty shells in the collection is that the presence of even a dead animal can be useful data in a study. Another great pro to collecting empty shells is that, even with a broken fragment remaining, species identification can often be made. The disadvantages include the fact that the time the snail has been dead is largely unknown. Shells usually persist longer on high-pH soils and decompose quicker on low-pH soils. Another uncertainty exists in that often times empty shells fall downward from a higher area, such as a bluff, hence the recorded microhabitat locality of an empty shell could be in error.

A quick but useful note to mention is to remind the collector to have at least some idea of the species he or she will encounter. More specifically, some species are carnivorous, such as the *Haplotrema* species of North America. If a live *Haplotrema* species is placed in the same collection vial as another live, non-carnivorous species, you could very well end your field day with a well-fed *Haplotrema* and the empty shell of its victim!

It is not essential to have the ability to identify all your snails in the field. But an important aspect of snail collection (or of any biological collection) is to label your specimens in the field with locality data. These data can range from the name of the site (park, nature preserve, etc.), to GPS coordinates, quadrangle information, elevation and a full description of the habitat features. It is mainly important that the locality of the collection can be found again by future collectors.

Many examples of quantitative sampling methods exist in the literature. As some basic examples, an area can be sectioned into plots or transects, or into quadrats that commonly measure one square meter and can be placed on the ground. The transect, plot or quadrats can be visually searched for a pre-determined length of time, or as often in the case for quadrats, the entire contents of it (leaf litter, coarse woody debris, etc.) are collected in a large bag and sorted for snails in the laboratory, rather than in the field. Transects or quadrats can be randomly

placed, or samples can be obtained by a stratified random sampling method, meaning that the quadrat is placed in an area randomly selected from other areas that area most likely to contain snails. The latter school of thought follows the knowledge that snails tend to be very patchy in their distribution. As discussed previously, land snails are most likely to be found near bases of trees, rocks, under logs and various microhabitats that could otherwise be missed in a completely random selection of collection areas.

Yet another method advocated by some researchers involves the use of cardboard sheets or masonite boards (Boag, 1982; Hawkins *et al.*, 1998). The sheets or boards are placed at a site and left for a period of time to collect land snails on their undersides. As with all methods, various pros and cons exist with this technique. On the plus side, the sheets or boards can help collect species that may otherwise be found, such as some species of slugs. On the downside, cardboard sheets in particular need to be checked fairly often, as they are prone to warping and disintegrating in excessive rainfall. In general, if treating the use of sheets or boards as a quantitative method, the bias exists that more snails will be attracted to them than would normally be collected in the same two-dimensional area.

Finally, a few words can be suggested regarding other details about land snail collecting. Before venturing to an area with collecting vials in hand, learn whether a permit is required to collect land snails there. If the area is a state park, federally-owned land (including U.S. Forest Service areas), or nature preserve, you will need to obtain a permit. If you happen to be collecting during a hunting season, it is advisable to wear bright colors, or even an orange hunting vest. And lastly, adhere to the basic rules of outdoor safety: it is safer to collect with another person, to have awareness of the animals inhabit the area (e.g. poisonous snakes), and to protect your exposed skin from encounters with poison ivy and biting insects.

Enjoy land snail collecting. With well-recorded data to accompany your collected specimens, your work could be a valuable contribution to the knowledge, and ultimate preservation, of land snail species.

Phylogeny and Classification of North American Terrestrial Gastropods

Kevin J. Roe, Iowa State University

After the Arthropoda, the Mollusca is considered to be the second most diverse of all metazoan phyla, and the gastropods represent the most diverse group of mollusks consisting of ~80% of all mollusks (~80,000 species). It is perhaps no great surprise then that the classification of such a large and diverse group of organisms has continued to change over the years. In general, these changes have reflected our improved understanding of the evolutionary relationships of gastropods. The past several decades have witnessed some dramatic shifts in our understanding of the relationships of the major gastropod lineages, and with them the placement and relationships of terrestrial snails. An understanding of the changes that have taken place in the classification of terrestrial snails will prove to be invaluable when attempting to reconcile the names and associated information contained in recent publications with that found in older, but still very important ones.

In order to fully appreciate the value of a taxonomic classification, it is paramount to realize that classifications schemes are, first and foremost, information retrieval systems. The information they convey is of a set of relationships (all the species in a genus should be more closely related to each other than to species in other genera, and likewise for genera within families) that is arranged hierarchically. By looking at a classification one should be able to understand something about the where the organism of interest fits within this hierarchy. In more modern classifications, there has been some movement away from the use of traditional rankings (class, order, suborder etc.). This fact should not cause any great concern, because what is most important is the relative position of taxa within the hierarchy, not the categorical rank associated with it.

Traditionally, gastropods were classified based on the presence and position of their respiratory apparatus into three groups: Prosobranchia (gills in-front of the heart), Opisthobranchia (gills behind the heart), and Pulmonata (lack gills, but use a highly vascularized mantle for respiration). While convenient, this classification has been recognized to not reflect the evolutionary relationships of gastropods (a misleading information retrieval system) and has been abandoned in favor of classifications based on the objective analysis of both morphological (e.g. Salvini-Plawen and Steiner, 1996; Ponder and Lindberg, 1997; Dayrat and Tillier, 2002) and DNA (e.g. Tillier and Ponder, 1992; Dayrat et al. 2001) data. Current classifications place pulmonates and opisthobranchs together in the clade Euthyneura. This group together with pyramidelids and related snails form the Heterobranchia. Those interested in exploring higher-level gastropod systematics should consult the publications listed in this summary in particular, Bieler (1992) and Ponder and Lindberg (1997). The use of ever more sophisticated methods of analysis and high-tech tools has resulted in a refinement of our knowledge of the relationships of gastropods, but, despite these improvements our understanding is far from complete and still very much in a state of flux. The only way to improve the current state of knowledge of these relationships is to continue to collect and analyze data, and just as importantly, to continue to train researchers to be able to locate and identify gastropods.

Diversity and higher-level systematics of land snails

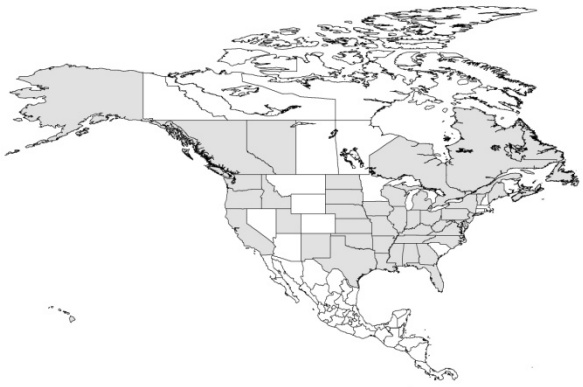
Solem (1978) estimated that there are some 20,500 land pulmonates world-wide, nearly twice the earlier estimate provided by Boss (1971). The focus of this workshop is on the terrestrial snails of the continental United States. Estimates of the number of the number of land snail species are available for several states and regions but accurate estimates for North America or even the U.S are hard to come by. A back of the envelope enumeration of the species listed in Turgeon et al. (1998) results in slightly less than 1100 native species in the U. S. and Canada, with about 70 more non-native species. The increasing problem of invasive, non-native species emphasizes the importance of recognizing all taxa at least at a basic level, and some effort should be made to become familiar with these groups. The terrestrial snails were traditionally placed in two large groups, the Prosobranchia, which has been discarded, and the Pulmonata, which has been retained. The majority of the native land snails in the United States are placed within the latter group. In most recent classifications, the Pulmonata is further divided into three major lineages, the Basomatophora, Systellommatophora, and Stylommatophora based on the number and kind of cephalic tentacles and the location of eyes on the head. In the Basomatophora, one pair of contractile tentacles (they shrink, accordion-like) is present on the head and the eyes are located at their base. In the Systellommatophora, the head has two pairs of contractile tentacles, with eyes on tips of the upper pair. Lastly, the Stylommatophora also have two pairs of tentacles, with eyes on tips of the upper pair, but in this case the tentacles are retractile (they can be inverted, like the fingers of a glove).

The Stylommatophora was traditionally divided into four subgroups, the Orthurethra, Mesurethra, Heterurethra, and Sigmurethra, based on the position and structure of the kidney and ureter (Pilsbry, 1900; Baker, 1955). Of these groups only the Orthurethra has remained consistently supported (e.g. Wade et al, 2001; 2006) and based on the most comprehensive modern analyses the stylommatophorans are divided into two groups, a smaller achatinoid clade and a much larger non-achatinoid clade. Traditionally, the majority of land snail species were placed in the Sigmurethra, and this group was further divided into two groups, the Holopoda and the Aulacopoda based on the morphology and placement of pedal grooves (Pilsbry, 1896; 1900). In recent phylogenetic reconstructions, the achatinoid clade includes only holopod species, whereas the non-achatinoid clade includes holopods and aulacopods.

To a casual observer the revisions to the classifications of terrestrial snails based on recent phylogenetic analyses have apparently only resulted in the reshuffling of some taxa and the loss of several named groups to wit: most land snails are pulmonates, most pulmonates are stylommatophorans, and the majority of stylommatophorans are grouped together in a large non-achatinoid clade. What is not readily apparent is that these new hypotheses inform us about the way organisms evolve and how some characters that at first appear to be similar due to common ancestry are actually derived independently. To fully appreciate the full potential that land snails have to teach us about evolutionary processes requires a more detailed understanding of the different families of land snails.

Agriolimacidae

Megan E. Paustian, University of Maryland



Only 4 species (*Deroceras*) of this family are native to the U.S. and Canada.

Native Agriolimacids are 15-50 mm long slugs. The Agriolimacid mantle has concentric ridges, a pneumostome in the posterior half, and an internal shell. The tail tip is rounded with a short keel extending up the dorsum. Species tend to vary in the complexity or presence of the penial flagellum, which is often a diagnostic character. However, most individuals of *Deroceras laeve* are aphallic.

Native Agriolimacids live in mixed-wood forests, although the habitat and food requirements of most species are poorly known. They may take shelter under leaf litter, vegetation, or coarse woody debris. *D. laeve* is a pervasive species that lives in marshes, moist fields, along riverbanks, and in gardens. This species, which can be a garden pest, consumes live and dead plants.

Two species are found in the west coastal region between Alaska and California, while *D. heterura* is only found in New Mexico. *D. laeve*'s native range is extremely broad, spanning the entire U.S. and the coastal provinces of Canada, as well as much of the Holarctic region worldwide.

Information summarized from Pilsbry (1948), Chichester & Getz (1973), Kerney & Cameron (1994), Burke (1999).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Deroceras hesperium	Pilsbry, 1944	G2	OR, WA; Canada: BC
Deroceras heterura	Pilsbry, 1944	G1G2	NM
Deroceras laeve	(Muller, 1774)	G5	AK, AL, AR, CA, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MD, ME, MI, MO, MS, NC, ND, NE, NJ, NM, NY, OH, OK, PA, SD, TN, TX, UT, VA, VT, WA, WI, WV; Canada: AB, BC, NF, NS, ON, QC
Deroceras monentolophus	Pilsbry, 1944	G4	AK, CA, OR, WA

Annulariidae

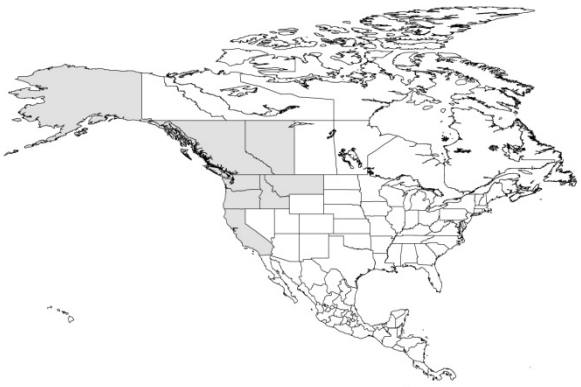
Kathryn E. Perez, Duke University

The single U.S. species of Annulariidae is a calciphile. Hubricht (1985) states it is found crawling on rocks and tree trunks in wet weather. Elongate, 10-12 mm long, operculate, related to Cuban *Chondropoma* species.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Chondropoma dentatum	(Say, 1825)	G2G3	FL

Arionidae (former family)

Megan E. Paustian, University of Maryland



There are 28 species (10 genera) that are native to the western U.S and Canada.

The family Arionidae was recently reclassified, such that the Eurasian subfamily Arioninae now takes the name Arionidae, and the remaining three subfamilies are raised to family status (below). All species are slugs. Most have a pneumostome in the anterior half of the mantle, a wide foot fringe, a ribbed jaw, and an epiphallus.

The Anadenidae are 30-100 mm long. *Prophysaon* (taildropper slugs) are characterised by a tail constriction, visible as a dark line on the sole, where a portion of the tail can break off (autotomize) to distract predators.

The Ariolimacidae includes some diverse slug species. *Ariolimax* (bananaslugs) are famously large slugs that are 100-260 mm long and that have a variably colorful (yellow, olive, or brown) and often spotted mantle. A prominent keel runs centrally along the dorsum, and the pneumostome is located in the posterior half of mantle (RGF, 2004). *Hesperarion*

(westernslugs) are smaller slugs that are about 30-50 mm long. *Hesperarion* and *Ariolimax* have a caudal mucous pit. *Magnipelta* has a distinctive broad mantle that is spread over most of its dorsal body, and it is about 65 mm long. All of these genera have an undivided foot sole.

The Binneyidae are 8-60 mm long slugs. The family is distinguished by a prominent, humped mantle and an external shell that is either tiny and plate-like or large and whorled. *Hemphillia* (jumping-slugs) are thin-bodied slugs whose solid, flexible tails enable them to flip away from predators.

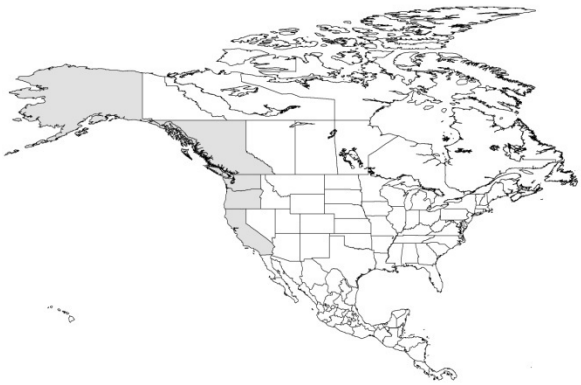
The Anadenids, Ariolimacids, and Binneyids tend to inhabit moist coniferous and deciduous forests. Some species have received special conservation status, particularly those that are restricted to small endemic ranges or that preferentially inhabit old-growth forests undergoing logging (e.g. some *Hemphillia*). Slugs may take shelter under bark, coarse woody debris, or leaf litter. Typical foods are fungus, lichens, detritus, and live plants.
The Anadenids, Ariolimacids, and Binneyids inhabit the western U.S. and Canada westward from the Rocky Mountains. They span north to Alaska, south to California, and east to Montana and Alberta.

Information summarized from Pilsbry (1948), Burch & Pearce (1989), COSEWIC (2003), Forsyth (2004), Pearce *et al*. (2004), Bouchet & Rocroi (2005).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Anadenulus cockerelli	(Hemphill, 1890)	G1G2	CA
Ariolimax californicus	J.G. Cooper, 1872	G2	CA
Ariolimax columbianus	(Gould, 1851)	G5	CA, ID, OR, WA; Canada: BC
Ariolimax dolichophallus	Mead, 1943	G2	CA
Binneya notabilis	J.G. Cooper, 1863	G1	CA
Gliabates oregonius	Webb, 1959	G1	OR
Hemphillia burringtoni	Pilsbry, 1948	G1G2	WA
Hemphillia camelus	Pilsbry and Vanatta, 1897	G4	ID, MT, WA; Canada: AB, BC
Hemphillia danielsi	Vanatta, 1914	G2G3	MT
Hemphillia dromedarius	Branson, 1972	G3G4	WA; Canada: BC
Hemphillia glandulosa	Bland and W.G. Binney, 1872	G3G4	OR, WA; Canada: BC
Hemphillia malonei	Pilsbry, 1917	G3	OR, WA; Canada: BC
Hemphillia pantherina	Branson, 1975	G1	WA
Hesperarion hemphilli	(W.G. Binney, 1875)	G2	CA
Hesperarion mariae	Branson, 1991	G2	OR
Hesperarion niger	(J.G. Cooper, 1872)	G2	CA
Hesperarion plumbeus	Roth, 2004	G1G3	CA
Kootenaia burkei	Leonard, Chichester, Baugh, and Wilke, 2003	G2	ID, MT
Magnipelta mycophaga	Pilsbry, 1953	G3	ID, MT, WA; Canada: BC
Prophysaon andersoni	(J.G. Cooper, 1872)	G5	AK, CA, ID, MT, OR, WA; Canada: BC
Prophysaon boreale	Pilsbry, 1948	G1G3	AK
Prophysaon coeruleum	Cockerell, 1890	G3G4	CA, ID, OR, WA; Canada: BC
Prophysaon dubium	Cockerell, 1890	G4	CA, ID, OR, WA
Prophysaon fasciatum	Cockerell, 1890	G1G3	CA
Prophysaon foliolatum	(Gould, 1851)	G4G5	OR, WA; Canada:
Prophysaon humile	Cockerell, 1890	G3	ID, MT
Prophysaon obscurum	Cockerell, 1890	G1G3	WA
Prophysaon vanattae	Pilsbry, 1948	G4	CA, OR, WA; Canada: BC
Udosarx lyrata	Webb, 1959	G2	ID, MT
Zacoleus idahoensis	Pilsbry, 1903	G3G4	ID, MT, WA

Bradybaenidae

Mark A. Ports, Great Basin College



Taxonomic note: In this workbook we are including the family Monadeniidae and genus *Monadenia* in Bradybaenidae following Roth & Sadeghian (2003) and Roth (1997).

This family is primarily distributed from south-central California, on the west side of the Sierra Nevada and into the Cascade Mountains of southwestern Oregon. *Monadenia fidelis*, a common species, is found in wet, coastal forests of California, Oregon, Washington, British Columbia, and Alaska. There is only one genus, *Monadenia* in this entire region with 37 records of species and subspecies.

The species and subspecies of this genus range in size from 24 mm to 1 cm. They are typically blackish brown, with a sub-peripheral, black band. Species of *Helminthoglypta* have a supra-peripheral band. *Monadenia* shells may be depressed or conical in shape. The periostracum may be smooth, have globular bumps, or bristles. The shell is usually very thin and fragile. The aperature is oval and the number of whorls is 5 to 6. The most effective means to separate these species is by shell size, coloration, and dissection of genitalia.

Most of the *Monadenia* have a life span of 10 - 15 years, are slow growing, and may not reach maturity for 8 -10 years. In dry habitats they may aestivate for up to 8 years. All of these species are hermaphroditic, transfer sperm with a dart apparatus, and lay eggs in loose soil, litter, or beneath downed, rotten trees. *Monadenia* are found in old growth forests along the coast, dry coniferous and deciduous forests of the Sierra Nevada and Cascade mountains, along riparian zones with deciduous trees especially maple, and in wet, mountain meadows. These species depend on talus slopes with a complete canopy of forest which keeps their habitats cool and moist. Aestivation and hibernation in talus slopes require a litter composed of deciduous leaves and detritus. During the wet months, colonies of *Monadenia* will leave the talus slopes and forage into the surrounding habitats to feed on green vegetation, fungi, feces, and dried fruit.

Ten of the species and eleven subspecies of *Monadenia* are considered critically imperiled or sensitive according to survey work of the Northwest Forest Plan and the Sierra Nevada - Cascade management plan. The species of this genus are impacted by lumber removal and cattle grazing which can lead to a dryer and hotter microhabitat. Colony fragmentation, as in all the western land snails, can lead to extinction as individuals die off with little immigration from colonies along riparian zones. Draining of wet meadows for agriculture and urban use, disturbance of talus slopes, and ground fires will also impact these colonies. The status of all western land snails in different habitats are important indicators of the general ecosystem health.

Information summarized from: NatureServe, Roth & Sadeghian (2006), Pilsbry (1939), Northwest Forest Plan (2002), Sierra Nevada-Cascade Mountain Management Plan (1997), Roth (2002).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Monadenia callipeplus	S.S. Berry, 1940	G1G2	CA
Monadenia chaceana	S.S. Berry, 1940	G2	CA, OR
Monadenia churchi	Hanna and A.G. Smith, 1933	G2	CA
Monadenia circumcarinata	(Stearns, 1879)	G1	CA
Monadenia cristulata	S.S. Berry, 1940	G1G2	CA
Monadenia fidelis	(J.E. Gray, 1834)	G4G5	AK, CA, OR, WA; Canada: BC
Monadenia infumata	(Gould, 1855)	G2G3	CA
Monadenia marmarotis	S.S Berry, 1940	G1	CA
Monadenia mormonum	(Pfeiffer, 1857)	G2	CA
Monadenia scottiana	S.S. Berry, 1940	G1G2	CA
Monadenia setosa	Talmadge, 1952	G2	CA
Monadenia troglodytes	Hanna and A.G.Smith, 1933	G1G2	CA
Monadenia tuolumneana	S.S. Berry, 1955	G1	CA
Monadenia yosemitensis	(Lowe, 1916)	G1	CA

Bulimulidae

Kathryn E. Perez, Duke University

The Bulimulidae are a family of hundreds of species, mostly found in South America. Shells are bulimoid in form and typically white or brown background color with grey or brown streaks or stripes. The largest species reach ~40 mm in length.

The genus *Drymaeus* is restricted in the U.S. to Florida where these snails live on trees, bushes, or herbaceous vegetation. The species in this genus are semi-arboreal and are typically found estivating or crawling on vegetation (Hubricht, 1985).

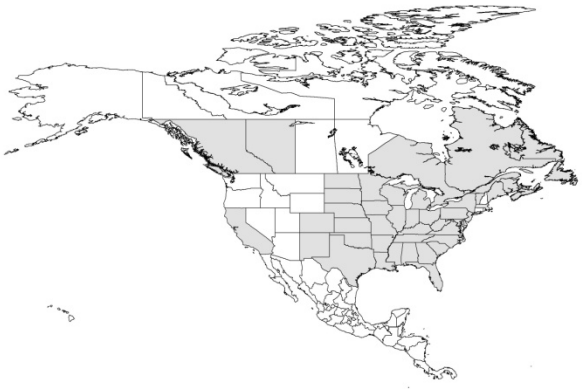
Rabdotus is one of the characteristic snails of the arid and semi-arid regions of Texas and adjacent Mexico (Fullington & Pratt, 1973). The species of *Rabdotus* occupy a range of habitats from coastal plain scrubland to Chihuahuan desert. These snails are colonial and can reach high densities locally and are often found crawling or estivating on tall grass, shrubs, mesquite brush, on human build structures, or under rocks and other cover. They are typically active during times of high humidity, at night, or after rain. In parts of their range after rainfall they have been known to be active in high enough concentrations that slicks caused by smashed snails have

caused cars to run off roads. *Rabdotus* are of interest to a wide range of fields as they have signal specific habitat or environmental types and shells are found in large numbers at archaelogical sites presumably they formed a food source for various cultures. There is a great deal of taxonomic confusion surrounding the species of *Rabdotus* in the U.S. and a thorough modern treatment is necessary.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Drymaeus dominicus	(Reeve, 1850)	G2G3	FL
Drymaeus dormani	(W.G. Binney, 1857)	G2G3	FL
Drymaeus multilineatus	(Say, 1825)	G5	FL
Naesiotus christenseni	(W.B. Miller and Reeder, 1984)	G1	AZ
Naesiotus nigromontanus	(Dall, 1897)	G5	
Rabdotus alternatus	(Say, 1830)	G5	TX
Rabdotus dealbatus	(Say, 1830)	G5	AL, AR, IL, KS, KY, LA, MO, MS, NM, OK, TN, TX, WI
Rabdotus durangoanus	(von Martens, 1893)	G3G5	NM, TX
Rabdotus mooreanus	(Pfeiffer, 1868)	G5	AL, MS, OK, TX
Rabdotus pilsbryi	(Ferriss, 1925)	G5	TX

Carychiidae

Jochen Gerber, Field Museum of Natural History



Shells of the only carychiid genus found in North America, *Carychium*, are minute, elongate, transparent or white, 1.2-2.5 mm high. They have expanded and often thickened peristomes. A characteristic of the group is a columellar fold whose shape is species-specific. It can be seen through the shell wall in transparent shells or can be studied by carefully breaking a "window" into the body whorl. Snails in the genus *Carychium* are found in very moist to wet habitats, such as floodplains, swamps, and moist woods under rotting logs or in leaf litter. *Carychium stygium* is only found in caves.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Carychium clappi	Hubricht, 1959	G5	AL, GA, IN, KY, MD, NC, PA, SC, TN, VA, WV
Carychium exiguum	(Say, 1822)	G5	CO, DE, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, NC, NE, NJ, NM, NY, OH, OK, PA, SC, SD, TN, TX, VA, VT, WI, WV; Canada: AB, NB, NS, ON, QC, NF

Carychium exile	I. Lea, 1842	G5	AL, AR, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, ND, NJ, NY, OH, OK, PA, SC, SD, TN, VA, VT, WI, WV; Canada: AB, NS, ON, QC
Carychium mexicanum	Pilsbry, 1891	G5	AL, FL, GA, LA, MS, OK, SC, TN, TX
Carychium nannodes	G.H. Clapp, 1905	G5	AL, GA, IN, KY, MD, MI, MS, NC, NY, OH, PA, TN, VA, WV; Canada: ON
Carychium occidentale	Pilsbry, 1891	G3G4	CA, ID, OR, WA; Canada: BC
Carychium riparium	Hubricht, 1978	G2G3	IN, KY; Canada: ON
Carychium stygium	Call, 1897	G3G4	KY, TN

Cepolidae

Jochen Gerber, Field Museum of Natural History

This family occurs in the Greater Antilles and in the Bahamas. Only one species, *Hemitrochus varians*, also lives in North America (South Florida). Its medium-sized (ca 15 mm in diameter) shell is globose-conic, perforate, the aperture not expanded. The relatively smooth shell is white with varying arrangements of dark spiral bands. Aperture pinkish within.

Hemitrochus varians lives on shrubs and trees.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Hemitrochus varians	(Menke, 1829)	G2G4	FL

Ceriidae

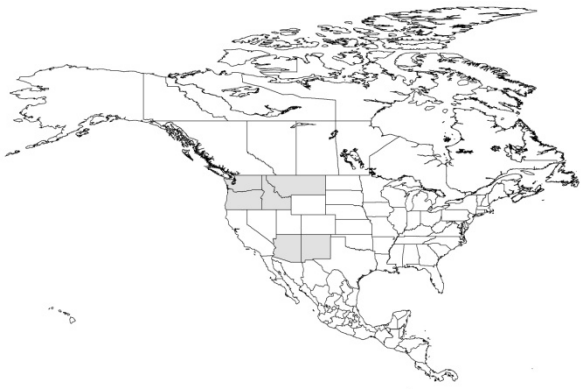
Kathryn E. Perez, Duke University

Cerion is a large genus (~600 spp) endemic to the Caribbean with one U.S. representative. These snails typically found attached to grass stems, trees, and shrumbs near the beach, but above the tide and spray lines. They are large (up to 28 mm length), elongate, many whorled, with opaque-white ribbed shells, sometimes streaked with gray or brown. *Cerion* tend to be inactive by day, estivating attached to vegetation and active at night and in rainy weather. Several Caribbean *Cerion* species have been introduced into Florida.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Cerion incanum	(A. Binney, 1851)	G1	FL, LA

Charopidae

Kathryn E. Perez, Duke University



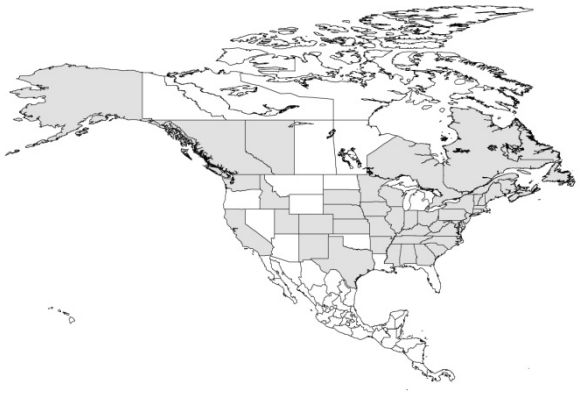
Charopids are helicoid snails with minute, ribbed shells ranging from 1-2.6 mm in height and 2-6 mm width (Pilsbry, 1946). In the U.S. they are limited in distribution to Western states at high elevation. Other members of this family extend throughout South America and they are particularly diverse in South Africa, New Zealand and Australia (Bequaert & Miller, 1973).

Radiodiscus millecostatus range extends north into NM and AZ, but is mostly found in Mexico and south to Costa Rica (Bequaert & Miller, 1973). Metcalf & Smartt (1997) report finding this species in leaf litter in Aspen forest in mountains in New Mexico at 6,800 -10,800 ft. elevation. *R. abietum* is about twice as large as *R. millecostatus* (Pilsbry, 1946) and inhabitats coniferous forests dominated by fir, tends to be found near streams (Pilsbry, 1946).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Radiodiscus abietum	H.B. Baker, 1930	G4	ID, MT, OR, WA
Radiodiscus millecostatus	Pilsbry and Ferriss, 1906	G3	AZ, NM

Cionellidae

Kathryn E. Perez, Duke University

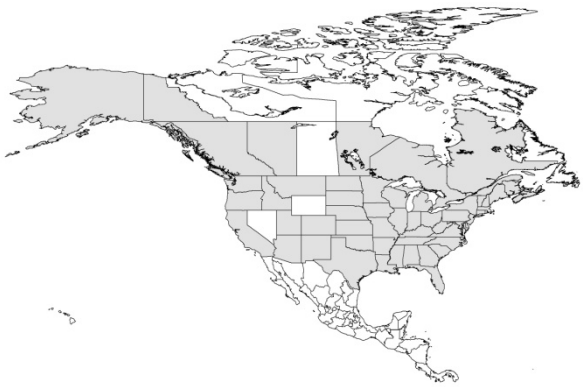


Roth & Sadeghian (2003) state *Cochlicopa lubrica* (formerly *Cionella lubrica*) is Holarctic in distribution, in North America ranging from northern Alaska to Chihuahua and Nuevo Leon Mexico, habitats include near sea level in boreal forest and cold-temperate areas to higher elevations in the western and mountain states. Forsyth (2004) describes *C. lubrica* as 4.4-6.5 mm high, glossy, spindle shaped, with a thickened apertural lip. Forsyth (2004) describes the natural history of *C. lubrica* as occurring mostly in disturbed habitats such as roadsides and gardens where they eat living and dead plant material (summarized from Forsyth 2004). Pilsbry (1946) stated this species lives among damp leaves in densly shaded places, under wood, or in chinks of stone walls.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Cochlicopa lubrica	(Muller, 1774)	G5	AK, CA, CO, IA, ID, IL, IN, KS, MA, ME, MI, MN, MO, NC, NE, NH, NJ, NM, NY, OH, PA, RI, SD, TN, UT, VA, VT, WA, WI, WV; Canada: AB, BC, NB, NS, ON, QC, NF
Cochlicopa lubricella	(Porro, 1838)	G5	CT, DE, IA, IL, IN, KS, MA, ME, MI, MN, MO, NJ, NY, OH, PA, RI, SD, TX, VA, VT, WI, WV; Canada: AB, NS, ON
Cochlicopa morseana	(Doherty, 1878)	G5	AL, AR, CA, GA, IA, IN, KY, MA, MD, ME, MI, MN, MO, MS, NC, NY, OH, PA, SC, TN, VA, VT, WI, WV; Canada: NS, ON
Cochlicopa nitens	(Gallenstein, 1848)	G4	IL, MA, ME, MI, MN, NY, OH, PA, VT, WI; Canada: ON

Discidae Thiele, 1931 (Patulidae Tryon, 1866)

Aydin Örstan, Carnegie Museum of Natural History



Taxonomic Note: Species in this family are discussed under the name Discidae Thiele, 1931 following Bouchet & Rocroi (2005: 66) who consider Patulidae Tryon, 1866 a synonym of Discidae.

The genus *Anguispira* is endemic to North America. *Anguispira* are woodland snails. At least two species, *A. alternata* and *A. fergusoni*, characteristically climb trees in warm and wet weather, especially at night, to feed on fungi and rotting wood. Both *A. alternata* and *A. fergusoni* (and perhaps other species also) become dormant in the winter and laboratory populations of *A. alternata* are known to require exposure to low temperatures prior to reproduction. Increased winter temperatures due to global warming may, therefore, threaten especially the more southern populations of *A. alternata*. The known *Anguispira* species are conchologically variable, especially in spire height and peripheral angulation of the body whorl. In some cases, these variations may reflect cryptic species lumped under currently accepted taxa. The genus is in need of a taxonomic revision.

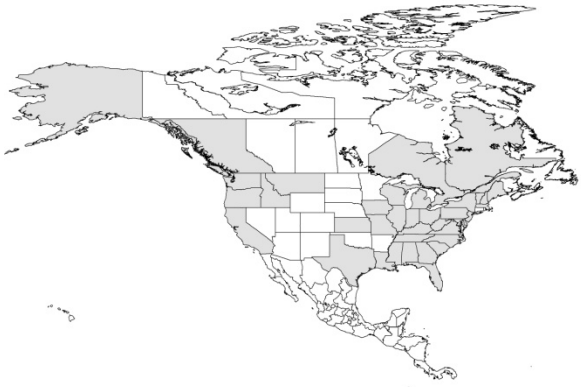
Discus is a Holarctic genus. Most North American *Discus* species live in forests; *D. whitneyi* inhabits wet meadows and marshy places. The European *D. rotundatus* has been recorded in parks and disturbed areas in northeast and northwest U.S. and Canada.

TAXON	AUTHOR	G-RANK	LISTED	DISTRIBUTION
Anguispira alabama	(G.H. Clapp, 1920)	G2		AL, TN
Anguispira alternata	(Say, 1816)	G5		AL, AR, CT, DE, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SD, TN, VA, VT, WI, WV; Canada: NB, NS, ON, QC
Anguispira cumberlandiana	(I. Lea, 1840)	G3		AL, TN
Anguispira fergusoni	(Bland, 1861)	G4		DE, MD, NC, NJ, NY, PA, SC, VA
Anguispira jessica	Kutchka, 1938	G3G4		AL, NC, TN, VA
Anguispira knoxensis	(Pilsbry, 1899)	G1G2		TN
Anguispira kochi	(Pfeiffer, 1821)	G5		ID, IL, IN, KY, MI, MO, MT, OH, OR, PA, TN, WA, WI, WV; Canada: BC, ON
Anguispira macneilli	Walker, 1928	G2		TX
Anguispira mordax	(Shuttleworth, 1852)	G4		AL, KY, NC, TN, VA, WV
Anguispira nimapuna	H.B. Baker, 1932	G1		ID
Anguispira picta	(G.H. Clapp, 1920)	G1	LT	TN
Anguispira rugoderma	Hubricht, 1938	G2		KY
Anguispira strongyloides	(Pfeiffer, 1854)	G5		AL, AR, FL, GA, IL, KY, LA, MO, MS, NC, OK, SC, TN, TX, VA
Discus brunsoni	S.S. Berry, 1955	G1		MT

Discus bryanti	(Harper, 1881)	G3		AL, KY, NC, TN, VA
Discus catskillensis	(Pilsbry, 1896)	G5		CT, DE, IA, IN, KY, MA, MD, ME, MI, MN, MS, NH, NJ, NY, PA, RI, SD, TN, VA, VT, WI, WV; Canada: MB, NS, ON
Discus clappi	(Pilsbry, 1924)	G1		AL, TN
Discus macclintocki	(F.C Baker, 1928)	G1	LE	IA, IL, MO
Discus marmorensis	H.B. Baker, 1932	G1G2		IA, ID
Discus nigrimontanus	(Pilsbry, 1924)	G4		AL, AR, KY, MO, NC, TN, VA
Discus patulus	(Deshayes, 1830)	G5		AL, FL, GA, IA, IL, IN, KY, LA, MD, MI, MO, MS, NC, NY, OH, PA, SC, TN, VA, WI, WV; Canada: ON
Discus selenitoides	(Pilsbry, 1890)	G1		CA
Discus shimekii	(Pilsbry, 1890)	G5		AZ, CO, IA, IL, KS, MO, MT, NE, NM, OR, SD, UT, WY; Canada: AB, BC, YT
Discus whitneyi	(Newcomb, 1864)	G5		AK, AZ, AR, CA, CT, DE, IA, ID, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MT, NC, ND, NE, NJ, NM, NY, OH, OK, PA, SD, TX, UT, VA, VT, WA, WI, WV; Canada: AB, BC, NB, NS, QC, LB, NF
Speleodiscoides spirellum	A.G. Smith, 1957	G1		CA

Haplotrematidae

Jochen Gerber, Field Museum of Natural History



These snails have medium-sized to large, depresseed to almost planispiral, openly umbilicated shells, mostly light-colored shells. The peristome is not or very narrowly expanded and usually blunt, but not particularly thickened, and it lacks folds or teeth.

The Family is restricted to the Americas and the West Indies. In North America, only two species live east of the Rocky Mountains, one, *Haplotrema concavum*, with a very wide distribution. The bulk of the North American species is found in the states and provinces bordering the Pacific.

Haplotrematids live usually in forest habitats in leaf litter and under logs and stones. They are known to be omnivorous: they eat other snails, earth worms, etc., as well as plant material.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Ancotrema hybridum	(Ancey, 1888)	G5	CA, ID, OR, WA; Canada: BC
Ancotrema sportella	(Gould, 1846)	G4	AK, CA, ID, OR, WA; Canada: BC
Ancotrema voyanum	(Newcomb, 1865)	G1G2	CA, OR
Ancotrema zopherum	Roth, 1990	G1	CA
Haplotrema alameda	Pilsbry, 1930	G1G2	CA

Haplotrema caelatum	(Mazyck, 1886)	G1	CA
Haplotrema catalinense	(Hemphill, 1890)	G1	CA
Haplotrema concavum	(Say, 1821)	G5	AL, AR, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, NH, NJ, NY, OH, OK, PA, SC, TN, TX, VA, VT, WI, WV; Canada: ON, QC
Haplotrema costatum	A.G. Smith, 1957	G1	CA
Haplotrema duranti	(Newcomb, 1864)	G2G3	CA
Haplotrema guadalupense	Pilsbry, 1927	G2G4	CA
Haplotrema keepi	(Hemphill, 1890)	G1	CA
Haplotrema kendeighi	Webb, 1951	G2	NC, TN
Haplotrema minimum	(Ancey, 1888)	G1G2	CA
Haplotrema mokelumnense	Roth, 1990	G1	CA
Haplotrema transfuga	(Hemphill, 1892)	G1G2	CA
Haplotrema vancouverense	(I. Lea, 1839)	G5	AK, CA, ID, MT, OR, WA; Canada: BC

Helicarionidae

Kathryn E. Perez, Duke University

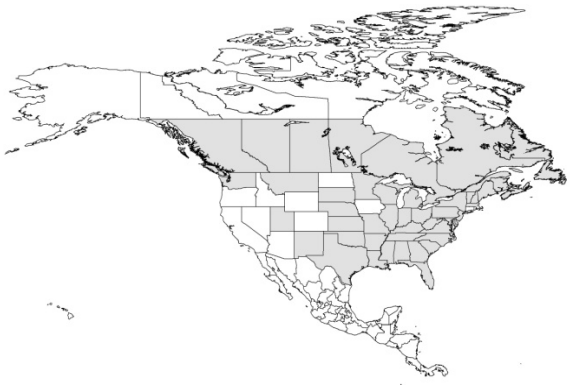
These three genera were previously part of the Zonitiidae. *Guppya* are low spired, small (3.5 mm wide), helicoid snails and *Euconulus* are higher spired bee-hive shaped snails. Hubricht (1985) states that most *Euconulus* species are found in moist leaf litter on wooded hillsies and in ravines. Forsyth (2004) describes *E. fulvus* as being common and widespread, preferring logs and debris, under grass and leaf litter at dry and moist sites at all elevations. *E. dentatus* is also found in leaf litter but in dryer situations than the other species. *Dryachloa dauca* is found in lawns and on roadsides (Hubricht, 1985) and *Guppya* species are very small from <1 mm to 3 mm and found also in moist leaf litter, *Guppya gundlachi* particularly prefers wet places such as swamps and the undersides of palmetto leaves (Hubricht, 1985).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Dryachloa dauca	F.G. Thompson and Lee, 1980	G2	AL, FL, LA
Euconulus alderi	(Gray, 1840)	G4Q	MA, ME, MI, MN, WI
Euconulus chersinus	(Say, 1821)	G5	AL, FL, GA, IL, KY, LA, ME, MI, MS, NC, NJ, OK, PA, SC, TN, VA, WI; Canada: NS, QC
Euconulus dentatus	(Sterki, 1893)	G5	AL, AR, DE, GA, IL, IN, KY, LA, MD, MO, MS, NC, NY, PA, SC, TN, VA, WV
Euconulus fulvus	(Muller, 1774)	G5	AK, CA, GA, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, ~~MO~~, MS, MT, NC, NE, NH, NJ, NM, NY, OH, OK, PA, SD, TN, TX, UT, VA, VT, WA, WI, WV; Canada: AB, BC, NB, NS, ON, QC, NF

Euconulus polygyratus	(Pilsbry, 1899)	G5	DE, IL, IN, KS, MD, MA, ME, MI, MO, NY, PA, WI, WV; Canada: AB, MB, ON, SK
Euconulus praticola	(Reinhardt, 1883)	G5	Canada: AB, BC
Euconulus trochulus	(Reinhardt, 1883)	G5	AL, AR, FL, GA, IL, IN, KY, LA, MO, MS, NC, OK, SC, TN, TX, VA
Guppya gundlachi	(Pfeiffer, 1839)	G3	FL, TX
Guppya miamiensis	Pilsbry, 1903	G3Q	FL, TX
Guppya sterkii	(Dall, 1888)	G5Q	AL, AR, FL, GA, IA, IL, IN, KY, LA, MD, MI, MO, MS, NC, NJ, NY, OH, OK, PA, SC, TN, VA, WI, WV; Canada: ON

Helicinidae

Kathryn E. Perez, Duke University

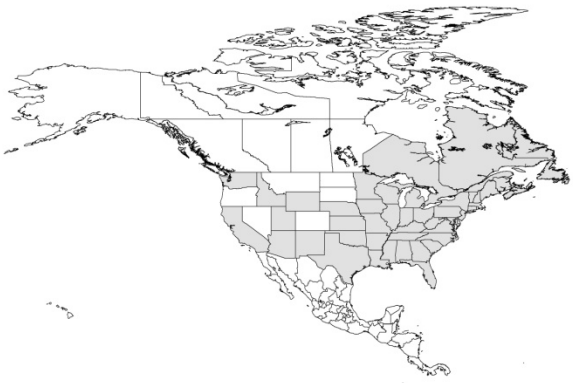


This family of small operculate snails is largely tropical with only a few species in the U.S. Helicinids tend to occur in large colonies in moist shaded areas, often in disturbed areas. These species tend to climb and occur on sides of buildings, on grass, shrubs, and in trees. Fullington & Pratt (1974) state that *Oligyra orbiculata* estivates arboreally in the summer and hibernate in the winter in soil at the base of shrubs and rocks. *Hendersonia occulata* is relatively uncommon and lives on well shaded, humid, and leafy slopes in limestone terrain (Pilsbry, 1946). From the more widely distributed fossil distribution it appears this species was much more widespread in the past and now is restricted to a more limited distribution.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Helicina clappi	Pilsbry, 1909	G2G3	FL
Hendersonia occulta	(Say, 1831)	G4	IA, IL, IN, KS, KY, MD, MI, MN, MO, MS, NC, NE, OH, PA, TN, VA, WI, WV; Canada: ON
Lucidella tantilla	Pilsbry, 1902	G4	FL, MD
Oligyra orbiculata	Say, 1818	G5	AR, FL, GA, KY, LA, MO, MS, OK, TX, AL, TN

Helicodiscidae

Barry Roth, San Francisco, CA



The Helicodiscidae are distributed from North America to northern South America and in Western Europe and the Indo-Pacific region. The shell is small to minute, with few, flatly coiled, slowly expanding whorls, and broadly open umbilicus; sculpture, when present, consists of spiral ridges or striations. One or more sets of paired lamellae are present in body whorl of some species. The kidney is elongate, triangular, and reaches the hindgut. The central tooth of the radula is three-cusped and reduced in size, lateral teeth are three to five three-cusped, and marginals are short and broad. An epiphallus is present. The ovotestis is elongate, unbranched, and served by a long, straight hermaphroditic duct.

Habitats of helicodiscids include rock piles, leaf litter, and the undersides of rocks on wooded hillsides. Many species are calciphiles, found in limestone rubble and/or caves. Some have a tendency to burrow in soil. A few are characteristic of open grassy places, such as roadsides, meadows, old fields, along railroads, and (*Helicodiscus parallelus*) in vacant city lots. In its native range in the eastern USA, *Lucilla singleyana* (formerly *Helicodiscus singleyanus*) is also found in greenhouses; in California, where it is introduced, it is found on roots and bulbs in gardens.

Information summarized from Pilsbry (1948), Hubricht (1985), Solem (1985), Falkner *et al*. (2002).

TAXON	AUTHOR	G-RANK	LISTED	DISTRIBUTION
Helicodiscus aldrichianus	(G.H. Clapp, 1907)	G3		AL, TN
Helicodiscus barri	Hubricht, 1962	G3G4		AL, GA, TN
Helicodiscus bonamicus	Hubricht, 1978	G1		NC, TN
Helicodiscus diadema	Grimm, 1967	G1		VA
Helicodiscus eigenmanni	Pilsbry, 1900	G5Q		AR, AZ, KS, NM, TX, UT
Helicodiscus enneodon	Hubricht, 1967	G3G4Q		TN, VA
Helicodiscus fimbriatus	Wetherby, 1881	G4		AL, GA, KY, NC, SC, TN, WV
Helicodiscus hadenoecus	Hubricht, 1962	G3		AL, KY, TN, VA
Helicodiscus hexodon	Hubricht, 1966	G1		TN
Helicodiscus inermis	H.B. Baker, 1929	G4		AL, FL, GA, IL, IN, LA, MD, MO, MS, NC, NE, NJ, OH, OK, TN, TX, VA, WI, WV
Helicodiscus lirellus	Hubricht, 1975	G1		VA
Helicodiscus multidens	Hubricht, 1962	G3		TN, VA
Helicodiscus notius	Hubricht, 1962	G5Q		AL, AR, FL, GA, IL, IN, KS, KY, LA, MD, MO, MS, NC, OK, PA, SC, TN, TX, VA, WV

Helicodiscus nummus	(Vanatta, 1899)	G1G2		AR, KY, OK, TX
Helicodiscus parallelus	(Say, 1817)	G5		AL, AR, CT, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SC, TN, TX, VA, VT, WI, WV; Canada: NB, NS, ON, QC, NF
Helicodiscus punctatellus	Morrison, 1942	G1		KY, TN
Helicodiscus salmonaceus	Hemphill, 1890	G2		ID, WA
Helicodiscus saludensis	(Morrison, 1937)	G1		NC, SC
Helicodiscus shimeki	Hubricht, 1962	G4G5		CT, IA, IL, IN, KY, MA, MD, ME, MI, MN, NH, NY, PA, TX, VA, VT, WI, WV; Canada: ON
Helicodiscus singleyanus	(Pilsbry, 1889)	G5		AL, AR, CA, DE, IL, IN, KS, KY, LA, MD, MI, MO, NE, NJ, NM, NY, OH, OK, PA, TN, TX, VA, WI, WY; Canada: ON
Helicodiscus tridens	(Morrison, 1935)	G2		OK, TX
Helicodiscus triodus	Hubricht, 1958	G2		NC, VA, WV
Polygyriscus virginianus	(P.R. Burch, 1947)	G1	LE	VA

Helminthoglyptidae

Mark A. Ports, Great Basin College

The family *Helminthoglyptidae* is a diverse and widespread group of land snails from California, Oregon, Arizona, New Mexico, and west Texas. This family is composed of eleven genera with approximately 83 species of *Helminthoglypta,* 13 species of *Sonorelix,* 9 species of *Micrarionta*, 1 species of *Chamaeariontales,* 1 species of *Herpeterous*, 8 species of *Xerarionta*, 2 species of *Cahuillus,* 7 species of *Eremarionta,* 1 species of *Noyo,* 4 species of *Rothelix,* and 72 species of *Sonorella.*

The *Helminthoglyptidae* vary in diameter from 5 mm to 4 cm, and range from a dark brown color to a pearly white color. The shells are generally depressed-helicoid in shape, thin in texture, with a thin, reflexed peristome, normally without aperatural teeth. Most have a single dark supra-peripheral band while some of the Mohave Desert species may not have any band. In all of these genera (especially the Sonorella) the best way to identify them is the dissection of their genitalia or the study of their phylogeny.

This family occupies habitat types that include wet temperate forest in Oregon and northern California, dry coniferous and deciduous forests of the west side of the Sierra Nevada, coastal mountains and canyons of conifers and oak, chaparral brush of coastal California, desert valleys and mountains of California, Arizona, Texas and New Mexico. Most species of this family are associated with rocky or talus slopes and ledges of dolomite, granite, or shale. Existing in large to small colonies most species are active in the morning and evening or after

precipatation during the day. Those species (*Helminthoglypta hertlieni),* that occupy the moist temperate forests will feed on fungi, green herbaceous plants, and underground roots. Desert genera will also feed on fungi and green forbs and feces.

All of the Helminthoglyptidae are hermaphroditic and some of the snails in this family lay eggs. Some species (*Helminthoglypta*) reproduce throughout the fall and deposit eggs in litter or in talus slopes. In northern and central California *Helminthoglypta* may lay two broods which will hatch in the late summer and following spring. In the desert genera, *Sonorelix, Sonorella,* and *Eremarionta,* these species may lay eggs twice in wet summers or once every three years during droughts. Some of the *Sonorella* are viviparous, the eggs hatching in the uterus where the young grow for a time before leaving the adult snail, while other species of this genus will lay 40 eggs at a time. The desert species may live up to six years, spending most of the dry summer and fall in aestivation.

There are several species and subspecies of *Helminthoglypta, Sonorella, Xerarionta,* and *Cahuillus* that are considered critically imperiled due to a limited distribution (on mountain tops or along a riparian zone), which results in fragmented colonies with little immigration.

Impacts on these genera also include disruption of talus and foraging habitats by cattle grazing, loss of water in riparian zones to agriculture, loss of aspen forests, human recreation, invasive plants, and hot ground fires. The status of all western land snails in different habitats are important indicators of the general ecosystem health.

Information is summarized from Pilsbry (1939), NatureServe, Bequaert & Miller (1973), Roth & Sadeghian (2006), Northwest Forest Plan (2002), Natural Heritage Research, Sierra Nevada and Cascade Mountains Management Plan (1997).

TAXON	AUTHOR	G-RANK	LISTED	DISTRIBUTION
Cahuillus greggi	(W.B. Miller, 1981)	G1G2		CA
Cahuillus indioensis	(Yates, 1890)	G2G3		CA
Chamaearionta aquaealbae	(S.S. Berry, 1922)	G1		CA
Eremarionta brunnea	(Willett, 1935)	G1		CA
Eremarionta immaculata	(Willett, 1937)	G1		CA
Eremarionta millepalmarum	(S.S. Berry, 1930)	G1		CA
Eremarionta morongoana	(S.S Berry, 1929)	G1G3		CA
Eremarionta newcombi	(Pilsbry and Ferriss, 1923)	GHQ		AZ
Eremarionta orocopia	(Willett, 1939)	G1		CA
Eremarionta rowelli	(Newcomb, 1865)	G3G4		AZ, CA
Eremariontoides argus	(Edson, 1912)	G2		CA
Helminthoglypta allyniana	(S.S. Berry, 1920)	G2		CA
Helminthoglypta allynsmithi	Pilsbry, 1939	G1		CA
Helminthoglypta arrosa	(W.G. Binney, 1858)	G2G3		CA
Helminthoglypta avus	(Bartsch, 1916)	G1		CA
Helminthoglypta ayresiana	(Newcomb, 1861)	G1G2		CA
Helminthoglypta benitoensis	Lowe, 1930	G2G4		CA
Helminthoglypta berryi	Hanna, 1929	G1		CA
Helminthoglypta californiensis	(I. Lea, 1838)	G1G2		CA
Helminthoglypta callistoderma	Pilsbry, 1917	G1		CA
Helminthoglypta carpenteri	(Newcomb, 1861)	G2		CA
Helminthoglypta caruthersi	Willett, 1934	G1		CA
Helminthoglypta coelata	(Bartsch, 1916)	G1		CA
Helminthoglypta concolor	Roth and Hochberg, 1988	G1G3		CA
Helminthoglypta contracostae	(Pilsbry, 1895)	G1G2		CA
Helminthoglypta crotalina	S.S. Berry, 1928	G1		CA

Helminthoglypta cuyama	Hanna and A.G. Smith, 1937	G3		CA
Helminthoglypta cypreophila	(W.G. Binney and Bland, 1869)	G5		CA
Helminthoglypta diabloensis	(J.G. Cooper, 1869)	G2		CA
Helminthoglypta dupetithouarsii	(Deshayes, 1840)	G2G3		CA
Helminthoglypta edwardsi	Gregg and W.B. Miller, 1976	G1G3Q		CA
Helminthoglypta euomphalodes	S.S Berry, 1938	G1		CA
Helminthoglypta exarata	(Pfeiffer, 1857)	G2		CA
Helminthoglypta expansilabris	(Pilsbry, 1898)	G2		CA
Helminthoglypta fairbanksi	Reeder and W.B. Miller, 1986	G1		CA
Helminthoglypta ferrissi	Pilsbry, 1924	G1		CA
Helminthoglypta fieldi	Pilsbry, 1930	G1		CA
Helminthoglypta fisheri	(Bartsch, 1904)	G1		CA
Helminthoglypta fontiphila	Gregg, 1931	G1		CA
Helminthoglypta graniticola	S.S Berry, 1926	G1		CA
Helminthoglypta greggi	Willett, 1931	G1		CA
Helminthoglypta hertleini	Hanna and A.G. Smith, 1937	G1		CA, OR
Helminthoglypta inglesi	S.S. Berry, 1938	G1		CA
Helminthoglypta isabella	S.S Berry, 1938	G1		CA
Helminthoglypta jaegeri	S.S Berry, 1928	G1		CA
Helminthoglypta liodoma	S.S Berry, 1938	G1		CA
Helminthoglypta mailliardi	Pilsbry, 1927	G3		CA, OR
Helminthoglypta micrometalleoides	W.B. Miller, 1970	G1		CA
Helminthoglypta milleri	Reeder, 1986	G1		CA
Helminthoglypta mohaveana	S.S Berry, 1927	G1		CA
Helminthoglypta montezuma	Reeder and W.B. Miller, 1986	G1		CA
Helminthoglypta morroensis	(Hemphill, 1911)	G2G3		CA
Helminthoglypta napaea	S.S. Berry, 1938	G1		CA
Helminthoglypta nickliniana	(I. Lea, 1838)	G3		CA
Helminthoglypta orina	S.S. Berry, 1938	G1		CA
Helminthoglypta petricola	(S.S Berry, 1916)	G1		CA
Helminthoglypta phlyctaena	(Bartsch, 1916)	G1G2		CA
Helminthoglypta piutensis	Willett, 1938	G1		CA
Helminthoglypta proles	(Hemphill, 1892)	G1		CA
Helminthoglypta reediana	Willett, 1932	G1		CA
Helminthoglypta salviae	Roth, 1987	G2		CA
Helminthoglypta sanctaecrucis	Pilsbry, 1927	G1		CA
Helminthoglypta sequoicola	(J.G. Cooper, 1866)	G2		CA
Helminthoglypta similans	Hanna and A.G. Smith, 1937	G1		CA
Helminthoglypta sonoma	Pilsbry, 1937	G1		CA
Helminthoglypta stageri	Willett, 1938	G1		CA
Helminthoglypta stiversiana	(J.G. Cooper, 1876)	G1G2		CA
Helminthoglypta talmadgei	Roth, 1988	G1G3		CA
Helminthoglypta taylori	Reeder and Roth, 1988	G1		CA
Helminthoglypta tejonis	S.S. Berry, 1930	G1		CA
Helminthoglypta thermimontis	S.S. Berry, 1953	G1		CA
Helminthoglypta traskii	(Newcomb, 1861)	G1G2		CA
Helminthoglypta tudiculata	(A. Binney, 1843)	G2G3		CA
Helminthoglypta tularensis	(Hemphill, 1892)	G1		CA
Helminthoglypta umbilicata	(Pilsbry, 1898)	G2		CA
Helminthoglypta uvasana	Roth and Hochberg, 1992	G1G2		CA

Helminthoglypta vasquezi	Roth and Hochberg, 1992	G1		CA
Helminthoglypta venturensis	(Bartsch, 1916)	G1Q		CA
Helminthoglypta walkeriana	(Hemphill, 1911)	G2	LE	CA
Helminthoglypta waltoni	Gregg and W.B. Miller, 1976	G1G3Q		CA
Helminthoglypta willetti	(S.S. Berry, 1920)	G1		CA
Herpeteros angelus	(Gregg, 1949)	G1G2		CA
Maricopella allynsmithi	Gregg and W.B. Miller, 1969	G1		AZ
Micrarionta beatula	Cockerell, 1929	G1		CA
Micrarionta facta	(Newcomb, 1864)	G1G2		CA
Micrarionta feralis	(Hemphill, 1901)	G1		CA
Micrarionta gabbi	(Newcomb, 1864)	G1		CA
Micrarionta opuntia	Roth, 1975	G1		CA
Micrarionta rufocincta	(Newcomb, 1864)	G1		CA
Mohavelix micrometalleus	(S.S. Berry, 1930)	G1		CA
Myotophallus rooseveltianus	(S.S Berry, 1917)	G2		AZ
Noyo intersessa	(Roth, 1987)	G2		CA
Rothelix cuyamacensis	(Pilsbry, 1895)	G1		CA
Rothelix lowei	(Bartsch, 1918)	G1		CA
Rothelix rhodophila	(Reeder and W.B. Miller, 1987)	G1		CA
Rothelix warnerfontis	(Reeder and W.B. Miller, 1988)	G1		CA
Sonorelix avawatzica	(S.S. Berry, 1930)	G1G2		CA
Sonorelix baileyi	(Bartsch, 1904)	G1		CA
Sonorelix borregoensis	(S.S. Berry, 1929)	G1		CA
Sonorelix harperi	(Bryant, 1900)	G1		CA
Sonorelix melanopylon	(S.S. Berry, 1930)	G1		CA
Sonorelix rixfordi	(Pilsbry, 1919)	G1		CA
Sonorella ambigua	Pilsbry and Ferriss, 1915	G5		AZ
Sonorella anchana	S.S. Berry, 1948	G1		AZ
Sonorella animasensis	Pilsbry, 1939	G1		NM
Sonorella apache	Pilsbry and Ferriss, 1915	G1		AZ
Sonorella ashmuni	Bartsch, 1904	G2		AZ
Sonorella baboquivariensis	Pilsbry and Ferriss, 1915	G5		AZ
Sonorella bagnarai	W.B. Miller, 1967	G1		AZ
Sonorella bartschi	Pilsbry and Ferriss, 1915	G1		AZ
Sonorella bequaerti	W.B. Miller, 1967	G2		AZ
Sonorella bicipitis	Pilsbry and Ferriss, 1910	G3G4		AZ
Sonorella binneyi	Pilsbry and Ferriss, 1910	G1		AZ
Sonorella bowiensis	Pilsbry, 1905	G1		AZ, CA
Sonorella bradshaveana	W.B. Miller, 1984	G1		AZ
Sonorella caeruliﬂuminis	Pilsbry and Ferriss, 1919	G1G2		AZ
Sonorella christenseni	Fairbanks and Beeder, 1980	G1		AZ
Sonorella clappi	Pilsbry and Ferriss, 1915	G1		AZ
Sonorella coloradoensis	(Stearns, 1890)	G5		AZ
Sonorella coltoniana	Pilsbry, 1939	G1		AZ
Sonorella compar	Pilsbry, 1919	G1		AZ
Sonorella dalli	Bartsch, 1904	G1		AZ
Sonorella danielsi	Pilsbry and Ferriss, 1910	G3		AZ
Sonorella delicata	Pilsbry and Ferriss, 1919	G1		AZ
Sonorella dragoonensis	Pilsbry and Ferriss, 1915	G1		AZ
Sonorella eremita	Pilsbry and Ferriss, 1915	G1		AZ
Sonorella ferrissi	Pilsbry, 1915	G1		AZ

Sonorella franciscana	Pilsbry and Ferriss, 1919	G2		AZ
Sonorella galiurensis	Pilsbry and Ferriss, 1919	G2		AZ
Sonorella grahamensis	Pilsbry and Ferriss, 1919	G1		AZ
Sonorella granulatissima	Pilsbry, 1905	G3G4		AZ
Sonorella hachitana	(Dall, 1896)	G2		NM
Sonorella huachucana	Pilsbry, 1905	G4G5		AZ
Sonorella hueconensis	Gilbertson and Metcalf, 2005	G1G2		TX
Sonorella imitator	Gregg and W.B. Miller, 1974	G2		AZ
Sonorella imperatrix	Pilsbry, 1939	G1		AZ
Sonorella imperialis	Pilsbry and Ferriss, 1923	G1		AZ
Sonorella insignis	Pilsbry and Ferriss, 1919	G1		AZ
Sonorella macrophallus	Fairbanks and Reeder, 1980	G1		AZ
Sonorella magdalenensis	(Stearns, 1890)	G2G3		AZ
Sonorella meadi	W.B. Miller, 1966	G1		AZ
Sonorella metcalfi	W.B. Miller, 1976	G2		NM, TX
Sonorella micra	Pilsbry and Ferriss, 1910	G1G2		AZ
Sonorella micromphala	Pilsbry, 1939	G1		AZ
Sonorella milleri	Christensen and Reeder, 1981	G2Q		AZ
Sonorella mustang	Pilsbry and Ferriss, 1919	G3		AZ
Sonorella neglecta	Gregg, 1951	G1G2		AZ
Sonorella odorata	Pilsbry and Ferriss, 1919	G2		AZ
Sonorella optata	Pilsbry and Ferriss, 1910	G2		AZ
Sonorella orientis	Pilsbry, 1936	G3		NM
Sonorella papagorum	Pilsbry and Ferriss, 1915	G1		AZ
Sonorella parva	Pilsbry, 1905	G4		AZ
Sonorella pedregosensis	Gilbertson and Radke, 2006	G1G2		AZ
Sonorella reederi	W.B. Miller, 1984	G1		AZ
Sonorella rinconensis	Pilsbry and Ferriss, 1910	G2		AZ
Sonorella rosemontensis	Pislbry, 1939	G3		AZ
Sonorella russelli	W.B. Miller, 1984	G1		AZ
Sonorella sabinoensis	Pilsbry and Ferriss, 1919	G4		AZ
Sonorella santaritana	Pilsbry and Ferriss, 1915	G3G4		AZ
Sonorella simmonsi	W.B. Miller, 1966	G2G3		AZ
Sonorella sitiens	Pilsbry and Ferriss, 1915	G4		AZ
Sonorella superstitionis	Pilsbry, 1939	G3		AZ
Sonorella todseni	W.B. Miller, 1976	G1		NM
Sonorella tortillita	Pilsbry and Ferriss, 1919	G3		AZ
Sonorella tryoniana	Pilsbry and Ferriss, 1923	G1		AZ
Sonorella vespertina	Pilsbry and Ferriss, 1915	G1		AZ
Sonorella virilis	Pilsbry, 1905	G2		AZ
Sonorella walkeri	Pilsbry and Ferriss, 1915	G5		AZ
Sonorella waltoni	W.B. Miller, 1968	G1		AZ
Sonorella xanthenes	Pilsbry and Ferriss, 1923	G2		AZ
Xerarionta intercisa	(W.G. Binney, 1857)	G1		CA
Xerarionta kellettii	(Forbes, 1850)	G1		CA
Xerarionta redimita	(W.G. Binney, 1858)	G1G2		CA
Xerarionta stearnsiana	(Gabb, 1868)	G2		CA
Xerarionta tryoni	(Newcomb, 1864)	G1		CA

Humboldtianidae

Kathryn E. Perez, Duke University

Humboldtiana comprises ~50 species most of which are endemic to Mexico. Ten species in the group are found in the Trans-Pecos mountainous region in West Texas and the Guadalupe mountains of New Mexico. The rest of the species are found in mountainous areas south to the Trans-Volcanic belt in Mexico D.F. Populations of *Humboldtiana* occur in isolated mountainous habitat and individuals of different species are not known to co-occur. Their low vagility and dispersal potential has resulted in high levels of endemism and very restricted distributions (Mejía & Zúñiga, 2007**).** The majority of *Humboldtiana* species are known only from dry shell material and many species remain to be described making designations of relationships within the group tentative (Thompson & Brewer, 2000). Also included in the family Humboldtianidae is the genus *Bunnya*, three slug-like species of snail with reduced shells.

These snails are typically found in high elevation habitat, 10,000-13,000 feet above sea level in pine forests, oak forests, pine-oak forests and xerophytic shrubland (Mejía & Zúñiga, 2007). *Humboldtiana* have been observed eating lichen and ripe cactus tuna (KEP, pers obs.).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Humboldtiana agavophila	Pratt, 1971	G1	TX
Humboldtiana cheatumi	Pilsbry, 1935	G2	TX
Humboldtiana chisosensis	Pilsbry, 1927	G1	TX
Humboldtiana edithae	Parodiz, 1954	G1	TX
Humboldtiana ferrissiana	Pilsbry, 1928	G2	TX
Humboldtiana fullingtoni	Cheatum, 1972	G1	TX
Humboldtiana hoegiana	(Pilsbry, 1939)	G3	TX
Humboldtiana palmeri	Clench, 1930	G2	TX
Humboldtiana texana	Pilsbry, 1927	G2	TX
Humboldtiana ultima	Pilsbry, 1927	G2	NM, TX

Megomphicidae

Barry Roth, San Francisco, CA

Megomphicidae consists of about eight living species, all occurring in western North America between Idaho and western Montana, USA, and northern Baja California, Mexico. Most of the species have restricted ranges, some of them being known from only a few localities. Fossil species, the earliest dating from the late Cretaceous Period, extend the historic range to Alberta, Canada, and eastern Wyoming, USA. The possibility that the localized species are "long-branch endemics" (i.e., members of a little-ramified clade that is the sister-group of a much more branching clade) lends them special interest for conservation purposes and phylogenetic analysis.

The shell is medium sized to large, many-whorled, discoidal, and conspicuously umbilicate, with the lip of the aperture simple or thickened by a ridge, but not reflected. The periphery is rounded or compressed. Species of *Polygyroidea* and *Polygyrella* develop apertural barriers when adult; *Polygyrella* has one or two radial series of lamellae within the body whorl. The reproductive system includes an accessory sac arising from the free oviduct near the insertion of the spermathecal duct.

Species of *Glyptostoma* are found on rocky hillsides under plant debris, in rock piles, wood rat nests, and spaces beneath logs, stumps, and boulders. *Ammonitella* inhabits talus around limestone ledges and leaf litter under shrubs or trees; it also occurs in caves. *Polygyrella* and *Polygyroidea* are typically found in shaded rockslides. *Megomphix* occurs in and under rotting logs and in caves and rock crevices.

Information summarized from Pilsbry (1939; 1946), Smith (1957).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Ammonitella yatesii	J.G. Cooper, 1869	G1	CA
Glyptostoma gabrielense	Pilsbry, 1938	G2	CA
Glyptostoma newberryanum	(W.G. Binney, 1858)	G2	CA
Megomphix californicus	A.G. Smith, 1960	G1G2	CA
Megomphix hemphilli	(W.G. Binney, 1879)	G3	OR, WA
Megomphix lutarius	H.B. Baker, 1932	G1	OR, WA
Polygyrella polygyrella	(Bland and J.G. Cooper, 1861)	G3	ID, MT, OR, WA
Polygyroidea harfordiana	(J.G. Cooper, 1870)	G1	CA

Oleacinidae

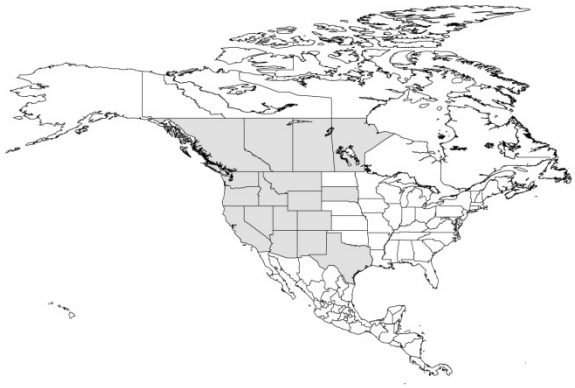
Kathryn E. Perez, Duke University

A single species of this family is found in the U.S. in Florida; the family is more widely distributed in the Greater Antilles. This small (6-8 mm) elongate, ribbed snail was previously called *Varicella gracillima* (Pfeiffer, 1839). Hubricht (1985) states that this snail is a calciphile and tends to be found in leaf litter, under rocks or trash, usually in hammocks or under sea grape plants above beaches. This species also climbs up the trunks of trees in wet weather.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Melaniella gracillima	(Pfeiffer, 1839)	G4	FL

Oreohelicidae

Mark A. Ports, Great Basin College



There are 96 species, several subspecies, and two genera of the family *Oreohelicidae*. Approximately 50 species and subspecies are considered critically imperiled or sensitive. Species of the genus *Radiocentrum* are found in southern Arizona, southwestern New Mexico, and south into northwestern Chihuahua. The genus *Oreohelix* is centered in the mountain states, south to western Chihuahua, north to British Columbia and Alberta, and east to the Black Hills of South Dakota. This includes the states of Colorado, Wyoming, Utah, Nevada, Montana, and Idaho.

The genus *Oreohelix* range in size from 9 mm to 2.5 cm in diameter. They typically have one to two brown, supra-peripheral bands circling the whorls, some with indistinct bands, to no bands at all. Most species have different degrees of color varying from brown to blackish red.

The various species have 4 to 6 tubular or carinate whorls and a typically depressed shell, sometimes discoidal or pyramidal in some species. The aperature is rounded to angular with no teeth, the peristome blunt or sharp, and the lip of the aperature is not reflected.

Species of the genus *Oreohelix* are viviparous, the eggs hatching in the uterus where the young grow for a time before leaving the adult snail. In the genus *Radiocentrum* the adults are oviparous, the eggs leaving the uterus before hatching. The genus *Radiocentrum* has species located in isolated mountain ranges of Arizona and New Mexico, California, and west Texas. The greatest diversity and abundance of species in the genus *Oreohelix*, including many subspecies, are found in two regions that include the Wasatch Mountains of Utah and the northwest river basins of Idaho. Many of the subspecies are taxonomically difficult to classify because of the great variation in shell morphology within a single canyon or even a single colony. Undescribed species and subspecies are still being found today using genetic techniques and the dissection of the genitalia.

The one habitat requirement of both genera is the presence of limestone and dolomite talus slopes, although some colonies are found in granite and shale. They exist in a wide variety of habitat sites that have vegetation varying from dry sagebrush, aspen forests, and coniferous forests to riparian zones that have a brush understory and an overstory of deciduous trees. Colonies may occupy an area ranging from 15 meters on dry slopes up to several miles in once glaciated canyons. They can be found in elevations of 600 ft. to 10,000 ft. These snails are typically active in the spring and fall, feeding on fungi, aspen and willow leaves, green forbs, and feces. They are most active in the early morning and evening and after rain showers.

Most colonies of *Oreohelix* and *Radiocentrum* exist in limestone talus on north facing slopes. During the winter they hibernate 5 to 8 ft. down into the talus slopes with minimal litter. During the summer or in stressful conditions they aestivate 3 to 15 cm inside talus slopes and in litter next to streams. During these times they cover their aperature with a thin wall of mucus and calcium.

Smaller species live up to 3 years while larger species may live up to 10 years in undisturbed habitat. The isolated mountains of Utah, Montana, southern Arizona, New Mexico, and eastern Nevada have colonies of the *Oreohelicidae* that are endemic and in some cases, undescribed. Populations of *Oreohelicids* throughout their range are impacted through overgrazing by cattle, drought, and invasive weeds such as cheat grass, loss of aspen forest, colony fragmentation, and ground fires. The status of all western land snails in different habitats are important indicators of the general ecosystem health.

Information summarized from Pilsbry (1939), Bequaert & Miller (1973), Frest (1994), Metcalf and Smartt (1997), Weaver *et al.* (2007), Ports (2004).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Oreohelix alpina	(Elrod, 1901)	G1	MT
Oreohelix amariradix	Pilsbry, 1934	G1G2	MT
Oreohelix anchana	Gregg, 1953	G2	AZ
Oreohelix barbata	Pilsbry, 1905	G1	AZ, NM
Oreohelix californica	S.S. Berry, 1931	G1	CA
Oreohelix carinifera	Pilsbry, 1912	G1	MT, WY; Canada: MB
Oreohelix concentrata	(Dall, 1896)	G2	AZ
Oreohelix confragosa	Metcalf, 1974	G1	NM
Oreohelix elrodi	(Pilsbry, 1900)	G1	MT
Oreohelix eurekensis	J. Henderson and Daniels, 1916	G1	UT

Oreohelix florida	Pilsbry, 1939	GX	NM
Oreohelix grahamensis	Gregg and W.B. Miller, 1974	G2	AZ
Oreohelix hammeri	Fairbanks, 1984	G1	ID, OR
Oreohelix handi	Pilsbry and Ferriss, 1918	G1	CA, NV
Oreohelix haydeni	(Gabb, 1869)	G2G3	CO, ID, NM, UT
Oreohelix hemphilli	(Newcomb, 1869)	G1G3	ID, NV
Oreohelix hendersoni	Pilsbry, 1912	G1	CO
Oreohelix houghi	W.B. Marshall, 1929	G1	AZ, NM
Oreohelix howardi	Jones, 1944	G1	UT
Oreohelix idahoensis	(Newcomb, 1866)	G1G2	ID
Oreohelix intersum	(Hemphill, 1890)	G1	ID
Oreohelix jaegeri	S.S. Berry, 1931	G1	NV
Oreohelix jugalis	(Hemphill, 1890)	G1G2	ID
Oreohelix junii	Pilsbry, 1934	G2	WA
Oreohelix litoralis	Crews and Metcalf, 1982	G1	NM
Oreohelix loisae	Ports, 2004	G1G3	NV
Oreohelix magdalenae	Pilsbry, 1939	G1	NM
Oreohelix metcalfei	Cockerell, 1905	G2	NM
Oreohelix neomexicana	H. A. Pilsbry, 1905	G3	NM, TX
Oreohelix nevadensis	S.S. Berry, 1932	G1	NV
Oreohelix parawanensis	Gregg, 1941	G1	UT
Oreohelix peripherica	(Ancey, 1881)	G2	ID, OR, UT
Oreohelix pilsbryi	Ferriss, 1917	G1	NM, WY
Oreohelix pygmaea	Pilsbry, 1913	G1	WY
Oreohelix strigosa	(Gould, 1846)	G5	AZ, ID, MT, NM, NV, OR, SD, UT, WA, WY; Canada: AB, BC
Oreohelix subrudis	(Reeve, 1854)	G5	AZ, ID, MT, NM, UT, WA; Canada: AB, BC, SK
Oreohelix swopei	Pilsbry and Ferriss, 1917	G1	NM, WY
Oreohelix tenuistriata	J. Henderson and Daniels, 1916	GH	ID
Oreohelix variabilis	Henderson, 1929	G2Q	OR
Oreohelix vortex	S.S. Berry, 1932	G1G2	ID
Oreohelix waltoni	Solem, 1975	G1G2	ID
Oreohelix yavapai	Pilsbry, 1905	G5	AZ, MT, UT
Radiocentrum avalonense	(Hemphill, 1905)	G1	CA
Radiocentrum chiricahuana	(Pilsbry, 1905)	G2	AZ
Radiocentrum clappi	(Ferriss, 1904)	G2	AZ
Radiocentrum ferrissi	(Pilsbry, 1915)	G1	NM, TX
Radiocentrum hachetanum	(Pilsbry, 1915)	G1	NM

Orthalicidae

Kathryn E. Perez, Duke University

Snails of the family Orthalicidae are some of the most commonly encountered and visible snails in Florida. Species in the genus *Liguus* are restricted to the Greater Antilles with one highly morphologically, but not genetically variable species (Hillis *et al.* 1991) present in Florida. Shells of *Liguus fasciatus* are bulimoid in shape, range from 40-72 in length, and have incredibly colored and patterned shells, with colors including pink, orange, yellow, green, blue, brown, and black. These snails seem to prefer limestone-rich areas and are found on smooth-barked trees including Tamarisk, Poisonwood, Black Ironwood, and Pigeonplum.

Orthalicus species also have colorfully striped shells and their conspicuous abundance and colorful stripes have led to a great deal of attention from collectors and taxonomists. *Orthalicus reses reses* is believed to have been extirpated from its native habitat by the invasive fire ant *Solenopsis invicta* (Forys *et al*. 2001).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Liguus fasciatus	(Muller, 1774)	G3	FL
Orthalicus floridensis	Pilsbry, 1899	G3	FL
Orthalicus reses	(Say, 1830)	G2	FL

Philomycidae

Megan E. Paustian, University of Maryland

There are 21 species (3 genera) that inhabit the eastern U.S. and Canada. All species of Philomycidae (mantleslugs) are slugs. *Pallifera* are small slugs that are 7-30 mm long, while the medium-large *Philomycus* and *Megapallifera* are 50-100 mm long. The Philomycidae are characterised by a mantle that covers the entire dorsal body, and these slugs lack an internal shell and divisions on the foot sole. *Philomycus* alone employs a calcified dart in mating. Philomycid mantles are usually marked with longitudinal rows of gray, brown, or black spots, stripes, or chevrons, which form patterns diagnostic to species. Some *Pallifera* species have solid color mantles.

Philomycids occupy both deciduous and coniferous forest, although they favor old, moist deciduous forest (particularly beechwood and basswood). Some species prefer rocky cliffsides or upland pine forest. Some species have received special conservation status, particularly those that are restricted to small endemic ranges. Slugs are found in moist locations beneath loose bark, under dead logs, in tree crevices, and in leaf litter. They are best observed during rainy weather and at night when they move and forage on tree trunks (*Philomycus*, *Megapallifera*) or the ground (*Pallifera*). As implied by the family name, most species feed on fungus and lichen. *Megapallifera* consume algae that grow on tree trunks and other surfaces.

This family is restricted to the eastern half of the U.S. and Canada. Species range north to Ontario and Nova Scotia, south to Florida and Louisiana, and as far west as Iowa and Oklahoma. *Pallifera pilsbryi* is found in Arizona.

Information summarized from Pilsbry (1948), Burch (1962), Chichester & Getz (1973), Hubricht (1985), Fairbanks (1990).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Megapallifera mutabilis	(Hubricht, 1951)	G5	AL, AR, DE, GA, IA, IL, IN, KY, LA, MD, MO, MS, NC, NY, OH, PA, SC, TN, TX, VA, WI, WV; Canada: ON
Megapallifera ragsdalei	(Webb, 1950)	G3	AR, IL, KY, MO, OK
Megapallifera wetherbyi	(W.G. Binney, 1874)	G2G3	KY, TN, VA
Pallifera dorsalis	(A. Binney, 1842)	G5	IA, IL, IN, KY, MA, MD, ME, MI, NC, NY, OH, PA, VA, WI, WV; Canada: NS, ON
Pallifera fosteri	F.C. Baker, 1939	G5	AL, FL, GA, IL, IN, KY, MA, MD, MI, MO, MS, NC, OH, SC, TN, VA, WI, WV; Canada: ON
Pallifera hemphilli	(W.G. Binney, 1885)	G4	IN, MI, NC, TN, VA
Pallifera marmorea	Pilsbry, 1948	G3	AR, IL, KY, LA, MO, OK
Pallifera megaphallica	Grimm, 1961	G5	
Pallifera ohioensis	(Sterki, 1908)	G5	ME, OH

Pallifera pilsbryi	C.D. Miles and Mead, 1960	G2	AZ
Pallifera secreta	Cockerell, 1900	G4	IN, KY, MD, NC, PA, TN, VA, WV
Pallifera tournescalis	Branson, 1968	G1	OK
Pallifera varia	Hubricht, 1953	G2G4	KY, VA
Philomycus batchi	Branson, 1968	G1	KY, OK
Philomycus bisdodus	Branson, 1968	G1	KY, OK
Philomycus carolinianus	(Bosc, 1802)	G5	AL, AR, FL, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MO, MS, NC, NJ, NY, OH, OK, PA, SC, TN, TX, VA, WI, WV; Canada: ON
Philomycus flexuolaris	Rafinesque, 1820	G5	DE, GA, KY, MD, ME, NC, NH, NJ, NY, PA, TN, VA, WV; Canada: NS, ON, QC
Philomycus sellatus	Hubricht, 1972	G2G3	AL, TN
Philomycus togatus	(Gould, 1841)	G5	AL, CT, GA, KY, LA, MD, MS, NC, NY, OH, PA, TN, VA, WV; Canada: ON
Philomycus venustus	Hubricht, 1953	G4	KY, NC, SC, TN, VA, WV
Philomycus virginicus	Hubricht, 1953	G3	KY, NC, TN, VA, WV

Polygyridae

Kathryn E. Perez, Duke University

There are ~ 230 named extant species in 23 genera in the family Polgyridae in the U.S. and Canada, another ~ 40 species occur only in Mexico.

Polygyrids range in size from 4 - 44 mm. They range in shape from globose to strongly keeled or flattened. Apertures have a reflected lip and many have 1-3 apertural teeth. The majority of polygyrid shells are a brownish color without color bands. A few banded exceptions are: *Triodopsis multilineata, Stenotrama fraternum fasciatum, Mesodon elevatus, sAllogona profunda, Praticolella* spp., *Daedalochila texasiana,* and *D. scintilla.*

Polygyrids can be found occupying deep leaf litter, on top of ground cover, urban areas, under rocks and decaying logs and other objects that retain moisture (such as roadside cardboard). A few are almost arboreal as *Praticolella* and *Daedalochila* species often occupy grass, shrubs, and small trees in wet weather. Polygyrids are most typically active at night or whenever moisture in the atmosphere is most prevalent, such as after rain. During drought or cold months of the year, some species burrow deep in soil or humus. It is assumed that most polygyrids feed on mycelia or fruiting bodies of fungi, but they can grow on plant material such as lettuce, carrots, and tomatoes when held in the laboratory.

This family is widespread in North America, occupying all U.S. states except Wyoming, Colorado, Utah, and Nevada. It also occurs in eastern Canada and southern Alaska. The genus *Ashmunella* occupies the semi-arid mountain ranges of Texas, New Mexico, and Arizona. Information summarized from Pilsbry (1941), Cheatum & Fullington (1971), Hubricht (1985).

TAXON	AUTHOR	G-RANK	LISTED	DISTRIBUTION
Allogona lombardii	A.G. Smith, 1943	G1		ID
Allogona profunda	(Say, 1821)	G5		AL, AR, IA, IL, IN, KS, KY, LA, MD, MI, MN, MO, MS, NC, NE, NY, OH, PA, TN, VA, WI, WV; Canada: ON
Allogona ptychophora	(A.D. Brown, 1870)	G5		ID, MT, OR, WA; Canada: BC
Allogona townsendiana	(I.Lea, 1838)	G3G4		OR, WA; Canada: BC
Appalachina chilhoweensis	(J. Lewis, 1870)	G4		KY, NC, TN
Appalachina sayana	(Pilsbry, 1906)	G5		KY, MA, MD, ME, MI, NH, NC, NY, PA, RI, TN, VA, VT, WV; Canada: ON, NB, NS, QC
Ashmunella amblya	Pilsbry, 1940	G3		NM, TX
Ashmunella angulata	Pilsbry, 1905	G2G3		AZ
Ashmunella animasensis	Vagvolgyi, 1974	G1		NM
Ashmunella ashmuni	(Dall, 1897)	G1		NM
Ashmunella auriculata	Vagvolgyi, 1974	G2		NM
Ashmunella bequaerti	Clench and W.B Miller, 1966	G1		TX
Ashmunella binneyi	Pilsbry and Ferriss, 1917	G1		NM
Ashmunella carlsbadensis	Pilsbry, 1932	G1		NM, TX
Ashmunella chiricahuana	(Dall, 1896)	G1G2		AZ
Ashmunella cockerelli	Pilsbry and Ferriss, 1917	G2		NM
Ashmunella danielsi	Pilsbry and Ferriss, 1915	G1		NM
Ashmunella edithae	Pilsbry and Cheatum, 1951	G1		TX
Ashmunella esuritor	Pilsbry, 1915	G1G2		AZ
Ashmunella ferrissi	Pilsbry, 1905	G1		AZ
Ashmunella harrisi	Metcalf and Smartt, 1977	G1		NM
Ashmunella hebardi	Pilsbry and Vanatta, 1923	G1		NM
Ashmunella kochii	G.H. Clapp, 1908	G1		NM
Ashmunella lenticula	Gregg, 1953	G1		AZ
Ashmunella lepiderma	Pilsbry and Ferriss, 1910	G1G2		AZ
Ashmunella levettei	(Bland, 1881)	G1G2		AZ, NM
Ashmunella macromphala	Vagvolgyi, 1974	G1		NM
Ashmunella mearnsii	(Dall, 1895)	G2		NM
Ashmunella mendax	Pilsbry and Ferriss, 1917	G1		NM
Ashmunella mogollonensis	Pilsbry, 1905	G1		AZ, NM
Ashmunella mudgei	Cheatham, 1971	G1		TX
Ashmunella organensis	Pilsbry, 1936	G2		NM
Ashmunella pasonis	(Drake, 1951)	G2G3		NM, TX
Ashmunella pilsbryana	Ferriss, 1914	G1		AZ
Ashmunella proxima	Pilsbry, 1905	G2G3		AZ
Ashmunella pseudodonta	(Dall, 1897)	G1		NM
Ashmunella rhyssa	(Dall, 1897)	G1G2		NM
Ashmunella rileyensis	Metcalf and Hurley, 1971	G1		NM
Ashmunella salinasensis	Vagvolgyi, 1974	G1		NM
Ashmunella sprouli	R.W. and K.E. Fullington, 1978	G1G3		TX
Ashmunella tetrodon	Pilsbry and Ferriss, 1915	G3		NM
Ashmunella thompsoniana	(Ancey, 1887)	G2G3		NM
Ashmunella todseni	Metalf and Smartt, 1977	G1		NM
Ashmunella varicifera	(Ancey, 1901)	G2G3		AZ

Ashmunella walkeri	Ferriss, 1904	G1		NM
Cryptomastix devia	(Gould, 1846)	G3		OR, WA; Canada: BC
Cryptomastix germana	(Gould, 1851)	G4		OR, WA; Canada: BC
Cryptomastix harfordiana	(W.G. Binney, 1886)	G3G4		ID, OR, WA
Cryptomastix hendersoni	(Pilsbry, 1928)	G1G2		ID, OR, WA
Cryptomastix magnidentata	(Pilsbry, 1940)	G1		ID
Cryptomastix mullani	(Bland and J.G. Cooper, 1861)	G4		ID, MT, OR, WA; Canada: BC
Cryptomastix populi	(Vanatta, 1924)	G2		ID, OR, WA
Cryptomastix sanburni	(W.G. Binney, 1886)	G1		ID, MT
Daedalochila auriculata	Say, 1818	G3		FL, LA
Daedalochila auriformis	(Bland, 1859)	G4		AL, FL, GA, LA, MS, TN, TX
Daedalochila avara	(Say, 1818)	G3		FL
Daedalochila bisontes	Coles and Walsh, 2006	G2		AR
Daedalochila chisosensis	(Pilsbry, 1936)	G2G3		TX
Daedalochila delecta	(Hubricht, 1976)	G2G3		FL
Daedalochila dorfeuilliana	(I. Lea, 1838)	G4G5		AR, IL, KS, LA, MO, OK, TN, TX
Daedalochila fatigiata	(Say, 1829)	G3		AL, IN, KY, TN
Daedalochila hausmani	(Jackson, 1948)	G2		FL
Daedalochila hippocrepis	(Pfeiffer, 1848)	G1		TX
Daedalochila jacksoni	(Bland, 1866)	G3		AR, KS, MO, OK
Daedalochila leporina	(Gould, 1848)	G4G5		AL, AR, IL, IN, KY, LA, MO, MS, OK, TN, TX
Daedalochila peninsulae	(Pilsbry, 1940)	G2		FL
Daedalochila peregrina	(Rehder, 1932)	G2		AR
Daedalochila plicata	(Say, 1821)	G4		AL, GA, IN, KY, TN, VA
Daedalochila polita	(Pilsbry and Hinkley, 1907)	G3		TX
Daedalochila postelliana	(Bland, 1859)	G3		GA, LA, NC, SC
Daedalochila scintilla	(Pilsbry and Hubricht, 1962)	G1		TX
Daedalochila subclausa	(Pilsbry, 1899)	G3		AL, FL, GA
Daedalochila triodontoides	(Bland, 1861)	G3		LA, MS, TX
Daedalochila troostiana	(I. Lea, 1839)	G4		AL, KY, TN
Daedalochila uvulifera	(Shuttleworth, 1852)	G3		FL
Euchemotrema fasciatum	(Pilsbry, 1940)	G3		AL, NC, TN
Euchemotrema fraternum	(Say, 1824)	G5		AL, AR, CT, DE, GA, IA, IL, IN, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NH, NJ, NY, OH, OK, PA, RI, SC, TN, VA, VT, WI, WV; Canada: NB, NS, ON
Euchemotrema hubrichti	(Pilsbry, 1940)	G1		IL, MI, WI
Euchemotrema leai	(A. Binney, 1841)	G5		AL, AR, GA, IA, IL, IN, KS, KY, LA, ME, MI, MN, MO, MS, NE, NY, OH, OK, PA, SD, TN, TX, VA, WI; Canada: NB, ON, QC
Euchemotrema wichitorum	(Branson, 1972)	G2		OK
Fumonelix archeri	(Pilsbry, 1940)	G1		NC, TN
Fumonelix christyi	(Bland, 1860)	G3		GA, LA, NC, SC, TN, VA
Fumonelix jonesiana	(Archer, 1938)	G1		NC, TN
Fumonelix orestes	(Hubricht, 1975)	G1		NC
Fumonelix wetherbyi	(Bland, 1873)	G2G3		KY, TN
Fumonelix wheatleyi	(Bland, 1860)	G4		GA, NC,TN, VA
Hochbergellus hirsutus	Roth and W.B. Miller, 1992	G1		OR
Inflectarius approximans	(G.H. Clapp, 1905)	G2		AL
Inflectarius downieanus	(Bland, 1861)	G3		AL, KY, NC, TN
Inflectarius edentatus	(Sampson, 1889)	G2G3		AR, MO, OK
Inflectarius ferrissi	(Pilsbry, 1897)	G2		NC, TN
Inflectarius inflectus	(Say, 1821)	G5		AL, AR, FL, GA, IL, IN, KS, KY, LA, MI, MO, MS, NC, OH, OK, TX, VA, WV, TN; Canada: ON
Inflectarius kalmianus	(Hubricht, 1965)	G3		KY, NC, TN, VA

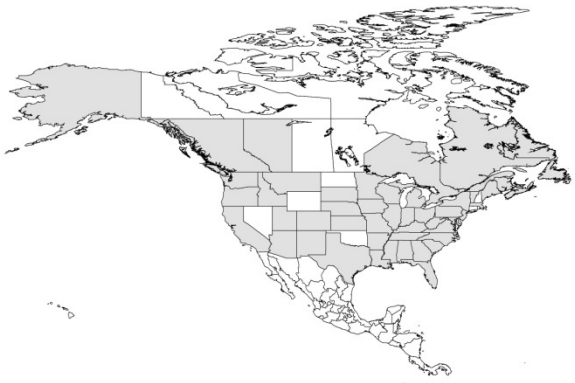
Inflectarius magazinensis	(Pilsbry and Ferriss, 1907)	G1	LT	AR
Inflectarius rugeli	(Shuttleworth, 1852)	G5		AL, GA, IN, KY, NC, SC, TN, VA, WV
Inflectarius smithi	(G.H. Clapp, 1905)	G2		AL, TN
Inflectarius subpalliatus	(Pilsbry, 1893)	G2		NC, SC, TN
Inflectarius verus	(Hubricht, 1954)	G1		NC, SC
Linisa tamaulipasensis	(I. Lea, 1857)	G3		TX
Linisa texasiana	(Moricand, 1833)	G3G4		AL, AR, KS, LA, MO, MS, NM, OK, TX
Lobosculum pustula	(Ferussac, 1832)	G3G4		AL, FL, GA, SC
Lobosculum pustuloides	(Bland, 1858)	G3G4		AL, FL, GA, KY, MS, NC, SC, TN, VA
Mesodon altivagus	(Pilsbry, 1900)	G2G3		NC, TN
Mesodon andrewsae	W.G. Binney, 1879	G3		NC, TN, VA, WV
Mesodon clausus	(Say, 1821)	G5		AL, AR, GA, IA, IL, IN, KS, KY, LA, MD, MI, MN, MO, MS, NC, NY, OH, OK, PA, TN, TX, VA, WI, WV; Canada: ON
Mesodon elevatus	(Say, 1821)	G5		AL, AR, IL, IN, KY, MI, MO, MS, NC, NY, OH, OK, TN, VA; Canada: ON
Mesodon mitchellianus	(I. Lea, 1839)	G4		IN, KY, MI, NC, NY, OH, PA, TN, VA, WV
Mesodon normalis	(Pilsbry, 1900)	G5		AL, GA, KY, NC, SC, TN, VA
Mesodon sanus	(Clench and Archer, 1933)	G3		AL, LA, TN
Mesodon thyroidus	(Say, 1816)	G5		AL, AR, CT, DE, FL, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, NC, NJ, NY, OH, OK, PA, SC, TN, TX, VA, WI, WV; Canada: ON
Mesodon trossulus	Hubricht, 1966	G1		AL
Mesodon zaletus	(A. Binney, 1837)	G5		AL, AR, GA, IA, IL, IN, KY, LA, MD, MI, MO, MS, NC, NY, OH, OK, PA, TN, TX, VA, WI, WV; Canada: ON, QC
Millerelix deltoidea	(Simpson, 1889)	G2		AR, MO, OK
Millerelix gracilis	Hubricht, 1961	G2G3		TX
Millerelix lithica	(Hubricht, 1961)	G3		AR, OK
Millerelix mooreana	(W.G. Binney, 1858)	G3		TX
Millerelix simpsoni	(Pilsbry and Ferriss, 1907)	G2		AR, OK
Neohelix albolabris	(Say, 1816)	G5		CT, DE, IL, IN, KY, LA, MA, MD, ME, MI, MS, NC, NH, NJ, NY, OH, PA, RI, SC, TN, VA, VT, WI, WV; Canada: NB, QC
Neohelix alleni	(Sampson, 1883)	G5		AL, AR, IA, IL, KS, LA, MI, MN, MO, MS, OK, TN
Neohelix dentifera	(A. Binney, 1837)	G5		CT, KY, MA, MD, ME, NC, NH, NY, OH, PA, VT, WV, VA; Canada: QC
Neohelix divesta	(Gould, 1848)	G3G4		AR, KS, LA, MO, OK, TX
Neohelix lioderma	(Pilsbry, 1902)	G1G2		OK
Neohelix major	(A. Binney, 1837)	G4G5		AL, DE, GA, MD, MS, NC, NJ, SC, TN, VA
Neohelix solemi	Emberton, 1988	G4		MD, NC, NJ, NY
Patera appressa	(Say, 1821)	G4		IL, KY, MD, NC, OH, SC, VA, WV, AL, IN, TN
Patera binneyana	(Pilsbry, 1899)	G2G3		AR, OK, TX
Patera clarki	(I. Lea, 1858)	G3		GA, KY, NC, SC, TN
Patera clenchi	(Rehder, 1932)	G1		AR
Patera indianorum	(Pilsbry, 1899)	G2G3		AR, OK
Patera kiowaensis	(Simpson, 1888)	G2G3		AR, OK
Patera laevior	(Pilsbry, 1940)	G4		AL, GA, IN, KY, MD, MS, NC, OH, TN, VA
Patera leatherwoodi	Pratt, 1971	G1		TX
Patera panselenus	(Hubricht, 1976)	G2		KY, VA, WV
Patera pennsylvanica	(Green, 1827)	G4		IL, IN, KY, MI, MO, OH, PA, WV, TN; Canada: ON
Patera perigrapta	Pilsbry, 1894	G5		AL, AR, GA, KY, LA, MO, MS, NC, SC, TN
Patera roemeri	(Pfeiffer, 1848)	G3G4		OK, TX
Patera sargentiana	(C.W. Johnson and Pilsbry, 1892)	G2		AL
Polygyra cereolus	(Muhlfeld, 1816)	G4		AL, FL, GA, HI, KY, LA, MS, NC, SC, TX
Polygyra septemvolva	Say, 1818	G5		AL, FL, GA, LA, MI, MS, NC, NM, SC, TX
Praticolella bakeri	Vanatta, 1915	G2G3		FL

Praticolella berlandieriana	(Moricand, 1833)	G2G3		TX
Praticolella candida	Hubricht, 1983	G2		TX
Praticolella griseola	(Pfeiffer, 1841)	G3		TX
Praticolella jejuna	(Say, 1821)	G3		FL, SC
Praticolella lawae	(J. Lewis, 1874)	G3		AL, GA, MS, NC, TN
Praticolella mobiliana	(I. Lea, 1841)	G3		AL, FL, GA, MS
Praticolella pachyloma	(Menke, 1847)	G3G4		TX
Praticolella taeniata	Pilsbry, 1940	G3G4		TX
Praticolella trimatris	Hubricht, 1983	G2		TX
Stenotrema altispira	(Pilsbry, 1894)	G3		NC, TN, VA
Stenotrema angellum	Hubricht, 1958	G4		IN, KY, TN
Stenotrema barbatum	(G.H. Clapp, 1904)	G5		AL, CT, DE, GA, IA, IL, IN, KS, KY, LA, MA, MD, MI, MN, MO, MS, NC, NJ, NY, OH, PA, SC, TN, VA, WI, WV; Canada: ON
Stenotrema barbigerum	(Redfield, 1856)	G3G4		AL, GA, KY, NC, SC, TN
Stenotrema blandianum	(Pilsbry, 1903)	G2		AR, MO
Stenotrema brevipila	(G.H. Clapp, 1907)	G2		AL, GA
Stenotrema burringtoni	Grimm, 1971	G5Q		CT, NJ, NY, VA, WV
Stenotrema calvescens	Hubricht, 1961	G3		AL, TN
Stenotrema cohuttense	(G.H. Clapp, 1914)	G2		GA, TN
Stenotrema deceptum	(G.H. Clapp, 1905)	G3G4		AL, TN
Stenotrema depilatum	(Pilsbry, 1895)	G2		NC, TN
Stenotrema edgarianum	(I. Lea, 1841)	G2G3		TN
Stenotrema edvardsi	(Bland, 1856)	G4G5		GA, KY, NC, PA, TN, VA, WV
Stenotrema exodon	(Pilsbry, 1900)	G2		AL, GA, TN
Stenotrema florida	Pilsbry, 1940	G3		AL, FL, GA
Stenotrema hirsutum	(Say, 1817)	G5		AL, CT, DE, IN, KS, KY, MA, MD, MI, MS, NC, NJ, NY, OH, PA, TN, VA, WI, WV, IL; Canada: NS, ON
Stenotrema labrosum	(Bland, 1862)	G3G4		AR, IA, LA, MO, OK
Stenotrema magnafumosum	(Pilsbry, 1900)	G4		AL, GA, NC, SC, TN
Stenotrema maxillatum	(Gould, 1848)	G3		AL, GA
Stenotrema morosum	Hubricht, 1978	GH		TN
Stenotrema pilsbryi	(Ferriss, 1900)	G2		AR, OK
Stenotrema pilula	(Pilsbry, 1900)	G3G4		GA, NC, SC, TN, VA
Stenotrema simile	Grimm, 1971	G2		MD, WV
Stenotrema spinosum	(I. Lea, 1830)	G4		AL, GA, MS, TN, VA
Stenotrema stenotrema	(Pfeiffer, 1842)	G5		AL, AR, GA, IL, IN, KS, KY, LA, MD, MO, MS, NC, OH, OK, SC, TN, TX, VA, WV
Stenotrema unciferum	(Pilsbry, 1900)	G2		AR, OK
Stenotrema waldense	Archer, 1938	G2		TN
Trilobopsis loricata	(Gould, 1846)	G2G3		CA, OR
Trilobopsis penitens	(Hanna and Rixford, 1923)	G1		CA
Trilobopsis roperi	(Pilsbry, 1889)	G1		CA
Trilobopsis tehamana	(Pilsbry, 1928)	G1		CA
Trilobopsis trachypepla	(S.S. Berry, 1933)	G1		CA
Triodopsis alabamensis	(Pilsbry, 1902)	G4		AL, GA, SC, TN, VA
Triodopsis anteridon	Pilsbry, 1940	G3		KY, TN, VA, WV
Triodopsis burchi	Hubricht, 1950	G3		NC, VA, WV
Triodopsis claibornensis	Lutz, 1950	G2		KY, TN
Triodopsis complanata	(Pilsbry, 1898)	G2		KY, TN
Triodopsis cragini	Call, 1886	G4		AR, KS, LA, MO, OK, TX
Triodopsis discoidea	(Pilsbry, 1904)	G3		IL, IN, KY, MO, OH
Triodopsis fallax	(Say, 1825)	G5		DE, MD, NC, NJ, PA, SC, TN, VA, WV
Triodopsis fraudulenta	(Pilsbry, 1894)	G4		IL, KY, MD, PA, TN, VA, WV
Triodopsis fulciden	Hubricht, 1952	G1G2		NC
Triodopsis henriettae	(Mazyck, 1877)	G3		TX

Triodopsis hopetonensis	(Shuttleworth, 1852)	G4G5		AL, FL, GA, KY, LA, MD, MO, MS, NC, NJ, SC, TN, VA
Triodopsis juxtidens	(Pilsbry, 1894)	G5		GA, KY, MD, ME, NC, NJ, NY, PA, SC, VA, WV
Triodopsis messana	Hubricht, 1952	G4		NC, SC, VA
Triodopsis neglecta	(Pilsbry, 1899)	G3		AR, KS, MO, OK
Triodopsis obsoleta	(Pilsbry, 1894)	G4		MD, NC, VA
Triodopsis palustris	Hubricht, 1958	G3		FL, GA, SC
Triodopsis pendula	Hubricht, 1952	G3		NC, VA
Triodopsis picea	Hubricht, 1958	G3		MD, PA, VA, WV
Triodopsis platysayoides	(Brooks, 1933)	G1	LT	WV
Triodopsis rugosa	Brooks and McMillan, 1940	G1		TN, VA, WV
Triodopsis soelneri	(J.B. Henderson, 1907)	G2		NC
Triodopsis tennesseensis	(Walker and Pilsbry, 1902)	G4		AL, GA, IN, KY, NC, TN, VA, WV
Triodopsis tridentata	(Say, 1816)	G5		AL, CT, DE, GA, IL, IN, KY, MA, MD, MI, MS, NC, NH, NJ, NY, OH, PA, SC, TN, VA, VT, WI, WV; ; Canada: ON, QC
Triodopsis vannostrandi	(Bland, 1875)	G4		AL, FL, GA, SC
Triodopsis vulgata	Pilsbry, 1940	G5		AL, GA, IL, IN, KY, MI, MS, NC, NY, OH, PA, TN, VA, WI; Canada: ON
Triodopsis vultuosa	(Gould, 1848)	G3G4		AR, LA, TX
Vespericola armiger	(Ancey, 1881)	G1		CA
Vespericola columbianus	(I. Lea, 1838)	G5		AK, OR, WA; Canada: BC
Vespericola depressa	(Pilsbry and Henderson, 1936)	G2Q		OR, WA
Vespericola embertoni	Roth and Miller, 2000	G2G3		CA
Vespericola eritrichius	(S.S. Berry, 1939)	G1		CA
Vespericola euthales	(Berry, 1939)	G3		CA, OR
Vespericola haplus	(S.S Berry, 1933)	G1		CA
Vespericola karokorum	Talmadge, 1962	G2G3		CA
Vespericola klamathicus	Roth and W.B. Miller, 1995	G2		CA
Vespericola marinensis	Roth and W.B. Miller, 1993	G2G3		CA
Vespericola megasoma	(Pilsbry, 1928)	G3		CA, OR
Vespericola ohlone	Roth, 2003	GX		CA
Vespericola orius	(S.S. Berry, 1933)	G1G2		CA
Vespericola pilosus	(J. Henderson, 1928)	G2G3		AK, CA, OR, WA
Vespericola pinicola	(S.S Berry, 1916)	G1		CA
Vespericola pressleyi	Roth, 1985	G1		CA
Vespericola rhodophila	Roth and Miller, 2000	G1G3		CA
Vespericola rothi	Cordero and W.B. Miller, 1995	G1		CA
Vespericola sasquatch	Roth and Miller, 2000	G1G3		CA
Vespericola scotti	Cordero and W.B. Miller, 1995	G1		CA
Vespericola shasta	(S.S Berry, 1921)	G1		CA
Vespericola sierranus	(S.S. Berry, 1921)	G2		CA, OR
Webbhelix chadwicki	(Ferriss, 1907)	G1Q		KS, NE
Webbhelix multilineata	(Say, 1821)	G5		AR, IA, IL, IN, KS, KY, MD, MI, MN, MO, NE, NY, OH, PA, WI, WV, TN; Canada: ON
Xolotrema caroliniense	(I. Lea, 1834)	G4		AL, AR, GA, LA, MS, NC, SC, TN
Xolotrema denotatum	(Ferussac, 1821)	G5		AR, KY, MA, MD, MO, MS, NC, NJ, NY, OH, PA, VT, WV, AL, IN, MI, TN, VA; Canada: ON
Xolotrema fosteri	(F.C. Baker, 1921)	G5		AL, AR, DE, GA, IA, IL, IN, KY, LA, MD, MO, NJ, OH, TN, TX, WI
Xolotrema obstrictum	(Say, 1821)	G4		AL, IL, IN, KY, LA, MS, TN
Xolotrema occidentale	(Pilsbry and Ferriss, 1907)	G1		AR

Punctidae

Aydin Örstan, Carnegie Museum of Natural History



Punctum is a Holarctic genus. The North American *Punctum* species are among our smallest land snails. In fact, *P. smithi*, whose adult shell diameters barely reach ~1.2 mm, is one of the smallest land snails in the world. *Punctum* are primarily woodland snails that are widespread throughout North America. The range of *P. conspectum* [*P. conspectum* is a junior synonym of *Paralaoma servilis*] extends to Alaska. Although *Punctum* specimens may, on occasion, be abundant in litter samples, because of their diminutive sizes, live *Punctum* are difficult to observe and study in the wild. Consequently, virtually nothing is known about the natural histories of individual species. The European *P. pygmaeum* is known to be able to reproduce without mating in captivity. The anatomies of most North American *Punctum* species have also not been studied.

Paralaoma servilis (also known as *P caputspinulae*) is known from a few disjunct locations in western North America. It is probably a non-native species.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Paralaoma servilis	(Shuttleworth, 1852)	G5	CA, ID, NM, WA; Canada: BC
Punctum blandianum	Pilsbry, 1900	G4	AL, KY, NC, TN, VA
Punctum californicum	Pilsbry, 1898	G5	AK, AZ, CA, CO, MT, NM, OR, SD, WA; Canada: BC
Punctum hannai	Roth, 1985	G1G3	CA
Punctum minutissimum	(I. Lea, 1841)	G5	AL, AR, CA, CO, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NM, NY, OH, OK, OR, PA, SC, SD, TN, TX, UT, VA, VT, WI, WV; Canada: AB, NB, NS, ON, QC, NF
Punctum randolphi	(Dall, 1895)	G4	AK, CA, ID, OR, WA; Canada: BC
Punctum smithi	Morrison, 1935	G4	AL, IL, IN, KY, MD, NC, TN, VA, WV
Punctum vitreum	(H.B. Baker, 1930)	G5	AL, AR, DE, IA, IL, IN, KY, LA, MD, MN, MO, MS, NC, NJ, OK, PA, TN, TX, VA, WI, WV
"Zonites" diegoensis	Hemphill, 1892	G1Q	CA

Pupillidae

Jeffrey C. Nekola, University of New Mexico

Nine genera (*Bothriopupa, Chaenaxis, Columella, Gastrocopta, Pupilla, Pupisoma, Pupoides, Sterkia* and *Vertigo*) and ~125 species are currently thought to constitute this family in Canada and the continental United States, with an unknown number of additional taxa residing in Mexico. All have shells taller than wide (approaching equal in *Pupisoma*), with maximum dimensions ranging from 1.2 mm (*Vertigo hebardi*) - 5.0 mm (*Pupoides albilabris*). Shell color typically ranges from yellow-brown-brick red, while in *Chaenaxis* and *Gastrocopta* this often tends to be white or horn-yellow. Aperture margins vary considerably, ranging from simple to reflected to thickened. Apertural lamellae range from 0-9 or more, with their number and arrangement being vital for species-level taxonomy. Pupillids occur in almost all habitat types, ranging from arctic tundra and semi-tropical grasslands to forests, peatlands, and bluffs. While individuals tend to be most common in leaf litter accumulations, they may also be found in wet turf, vertical rock outcrops (e.g. *Vertigo meramecensis, Gastrocopta corticaria*) or mossy tree trunks (e.g. *Vertigo rowelli*). Based on observations of lab-reared populations, most Pupillids appear to be generalist detritivores that feed on a variety of fungal hyphae and/or algal mats. All species are also capable of uniparental reproduction, allowing for the founding of new populations by the successful establishment of only a single individual.

The global biodiversity center for *Gastrocopta, Pupilla,* and *Vertigo* is in North America which supports at least 2/3 of all known global taxa. While found in every U.S. state and Canadian province, the Pupillidae become particularly abundant and diverse with increasing latitude, constituting more than 90% of taxa and individuals in taiga and tundra situations. Many of these have yet to be scientifically described. This family is also abundant and diverse in some lower latitude landscapes, including the Upper Midwest, the Southern Appalachians, 'sky island' mountains of the Southwest, the central Rockies, and the fog-belt of the California coast. Information summarized from Pilsbry (1948), Hubricht (1985).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Bothriopupa variolosa	(Gould, 1848)	G1	FL
Chaenaxis tuba	(Pilsbry and Ferriss, 1906)	G4	AZ
Columella columella	(Martens, 1830)	G5	AK, AZ, CO, IA, IL, ID, IN, KS, KY, MI, MO, MS, MT, NE, NM, OH, SE, TX, UT, WA, WI, WY; Canada: AB, BC, ON
Columella edentula	(Draparnaud, 1805)	G5	AK, AL, AR, CT, GA, IA, ID, IL, IN, KY, MA, MD, ME, MI, MO, MS, MT, NJ, NY, OH, OK, OR, PA, TN, WA, WI, WV, WY; Canada: AB, BC, LB, MB, NB, NF, NS, ON, QC, YT
Columella simplex	(Gould, 1840)	G5Q	AL, AR, CT, GA, IA, IL, IN, KY, MA, MD, ME, MI, MN, MO, MS, NC, NM, NY, OH, OK, PA, SD, TN, TX, VA, WI, WV; Canada: ON

Gastrocopta abbreviata	(Sterki, 1909)	G4	AL, IA, IL, KS, LA, MN, MO, MS, ND, NE, OK, SD, TX, WI
Gastrocopta armifera	(Say, 1821)	G5	AL, AR, DE, FL, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, NC, ND, NE, NJ, NM, NY, OH, OK, PA, SC, SD, TN, TX, VA, VT, WI, WV; Canada: QC
Gastrocopta ashmuni	(Sterki, 1898)	G4G5	AZ, NM, TX, UT
Gastrocopta carnegiei	(Sterki, 1916)	G1G3Q	OH
Gastrocopta clappi	(Sterki, 1909)	G4G5	AL, KY, TN, VA
Gastrocopta cochisensis	(Pilsbry and Ferriss, 1910)	G3G4	AZ, NM
Gastrocopta contracta	(Say, 1822)	G5	AL, AR, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, ND, NE, NJ, NM, NY, OH, OK, PA, SC, SD, TN, TX, VA, VT, WI, WV; Canada: ON, QC
Gastrocopta corticaria	(Say, 1816)	G5	AL, CT, FL, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, NC, NE, NJ, NY, OH, OK, PA, TN, TX, VA, VT, WI, WV; Canada: NB, ON, QC
Gastrocopta cristata	(Pilsbry and Vanatta, 1900)	G5	AZ, CO, DE, KS, LA, MD, MO, NJ, NM, OK, TX, VA
Gastrocopta dalliana	(Sterki, 1898)	G2G4	AZ, NM, TX
Gastrocopta holzingeri	(Sterki, 1889)	G5	AR, IA, IL, IN, KS, KY, MI, MN, MO, NC, ND, NE, NM, NY, OH, OK, SD, TN, TX, VA, WI, WV; Canada: BC, ON, QC
Gastrocopta pellucida	(Pfeiffer, 1841)	G5	AL, CA, FL, GA, KS, LA, MD, MO, MS, NC, NE, NJ, NM, OK, SD, TX, UT, VA, WI
Gastrocopta pentodon	(Say, 1822)	G5	AL, AR, CA, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NJ, NY, OH, OK, PA, SC, SD, TN, TX, VA, VT, WI, WV; Canada: AB, NS, ON, QC
Gastrocopta pilsbryana	(Sterki, 1890)	G4G5	AZ, CO, NM, TX, UT
Gastrocopta procera	(Gould, 1840)	G5	AL, AR, FL, GA, IA, IL, IN, KS, KY, LA, MD, MO, MS, NC, NE, NM, NY, OH, OK, SC, SD, TN, TX, VA, WI
Gastrocopta prototypus	(Pilsbry, 1899)	G1	AZ, NM
Gastrocopta quadridens	Pilsbry, 1916	G2G3	AZ, NM, UT
Gastrocopta riograndensis	(Pilsbry, 1916)	GH	TX
Gastrocopta riparia	Pilsbry, 1916	G3G5	AL, FL, GA, LA, MS, TX
Gastrocopta rogersensis	Nekola and Coles, 2001	G3G4	AR, IA, IL, MO, WI
Gastrocopta ruidosensis	(Cockerell, 1899)	G1	KS, NE, NM, OK, TX
Gastrocopta rupicola	(Say, 1821)	G3G4	AL, FL, GA, LA, MS, NC, SC, TN, TX
Gastrocopta servilis	(Gould, 1843)	G3G4	FL, HI
Gastrocopta similis	(Sterki, 1909)	G5	IA, IL, IN, KS, KY, MI, MN, MO, ND, NY, OH, SD, WI; Canada: AB, ON
Gastrocopta sterkiana	Pilsbry, 1917	G2G3Q	AR, OK, TX
Gastrocopta tappaniana	(C.B. Adams, 1842)	G5	AL, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NJ, NY, OH, OK, PA, SC, SD, TN, TX, VA, WI, WV; Canada: AB, ON
Nearctula rowellii	(Rowell, 1861)	G3	CA
Pupilla blandi	E.S. Morse, 1865	G4	KS, MO, ND, NE, NM, SD, TX, UT
Pupilla hebes	(Ancey, 1881)	G5	AK, CA, ID, MT, NM, SD, TX, UT, WA, WY; Canada: AB, BC
Pupilla muscorum	(Linnaeus, 1758)	G5	IA, IL, KS, MA, MD, ME, MI, MN, MO, ND, NE, NJ, NM, NY, OH, OK, SD, TX, UT, VA, VT, WI, WV; Canada: AB, NF, NS, ON, QC
Pupilla sonorana	(Sterki, 1899)	G4G5	NM, TX
Pupilla syngenes	(Pilsbry, 1890)	G4	NM, TX, UT
Pupisoma dioscoricola	(C.B. Adams, 1845)	G3	AL, FL, GA, LA, MS, SC, TX
Pupisoma macneilli	(G.H. Clapp, 1918)	G3	AL, FL, GA, LA, MS, SC, TX
Pupisoma minus	Pilsbry, 1920	G2Q	FL
Pupoides albilabris	(C.B. Adams, 1841)	G5	AL, AR, CA, DE, FL, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MO, MS, NC, NE, NJ, NM, NY, OH, OK, PA, RI, SC, SD, TN, TX, UT, VA, VT, WI, WV; Canada: ON, QC
Pupoides hordaceus	(Gabb, 1866)	G4	AZ, CO, KS, NM, OK, TX, UT, WY
Pupoides inornatus	Vanatta, 1915	G2	KS, NE, NM, OK, SD, TX
Pupoides modicus	(Gould, 1848)	G3	FL, GA, LA
Sterkia clementina	(Sterki, 1890)	G2G3	CA
Sterkia eryiesii	(Pilsbry, 1899)	G1	FL
Sterkia hemphilli	(Sterki, 1890)	G2	CA

Vertigo alabamensis	G.H. Clapp, 1915	G3	AL, NC, SC
Vertigo allyniana	S.S Berry, 1919	G1	CA
Vertigo andrusiana	(Pilsbry, 1899)	G2G3	CA, OR, WA; Canada: BC
Vertigo arthuri	von Martens, 1882	G3Q	AK, MN, ND, SD, WY; Canada: AB, BC, MB, ON, YT
Vertigo berryi	Pilsbry, 1919	G1	AZ, CA
Vertigo binneyana	Sterki, 1890	G1	IA, KS, MT, NM, WI; Canada: AB, BC, MB, ON
Vertigo bollesiana	(E.S. Morse, 1865)	G4	IA, KY, MA, MD, ME, MI, MN, NC, NH, NY, OH, PA, TN, VA, VT, WI, WV; Canada: NS, ON, QC
Vertigo brierensis	(Leonard, 1972)	G1	IA, IL, MN, WI; Canada: MB
Vertigo clappi	Brooks and Hunt, 1936	G1G2	KY, TN, VA, WV
Vertigo columbiana	Pilsbry and Vanatta, 1900	G5	AK, OR, UT, WA; Canada: BC
Vertigo concinnula	Cockerell, 1897	G4G5	AZ, CO, ID, KS, NE, NM, UT, WA, WY
Vertigo conecuhensis	G.H. Clapp, 1915	G2	AL
Vertigo cristata	(Sterki in Pilsbry, 1919)	G5	MA, ME, MI, MN, NY, WI, WV; Canada: AB, BC, ON
Vertigo dalliana	Sterki, 1890	G1	CA, OR
Vertigo elatior	Sterki, 1894	G5	AZ, DE, IA, IL, IN, KS, MA, ME, MI, MN, MO, MT, ND, NE, NM, NY, OH, SD, TX, UT, VA, WI, WY; Canada: AB, BC, ON, NF
Vertigo gouldi	(A. Binney, 1843)	G5	AL, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, NC, NH, NJ, NM, NY, OH, PA, TN, TX, UT, VA, WI, WV; Canada: AB, BC, NB, NF, NS, ON, QC
Vertigo hannai	Pilsbry, 1919	G1	IL, KS; Canada: ON
Vertigo hebardi	Vanatta, 1912	G1	FL
Vertigo hinkleyi	Pilsbry, 1921	G3	AZ, NM
Vertigo hubrichti	Pilsbry, 1934	G3	IA, IL, IN, KY, MI, MN, MO, MS, NE, SD, WI; Canada: MB
Vertigo idahoensis	Pilsbry, 1934	G1G2	ID
Vertigo malleata	Coles and Nekola, 2007	G5	AL, FL, GA, MA, ME, NC, NJ, SC
Vertigo meramecensis	Van Devender, 1979	G2G3	IA, IL, LA, MN, MO; Canada: MB
Vertigo milium	(Gould, 1840)	G5	AL, AR, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NJ, NM, NY, OH, OK, PA, SC, SD, TN, TX, VA, VT, WI, WV; Canada: ON, QC
Vertigo modesta	(Say, 1824)	G5	AK, CA, IA, ID, IL, IN, KS, KY, ME, MI, MN, ND, NE, NM, SD, TX, UT, WA, WI; Canada: AB, BC, LB, NF, NS, ON
Vertigo morsei	Sterki, 1894	G3	IL, IN, MA, ME, MI, MN, NJ, NY, OH, WI; Canada: AB, MB, ON, QC
Vertigo nylanderi	Sterki, 1909	G3G4	ME, MI, MN, WI; Canada: MB, NS, ON
Vertigo occidentalis	Sterki, 1907	G1Q	CA
Vertigo occulta	Leonard, 1972	G2	IA, IL, MN, WI; Canada: MB
Vertigo oralis	Sterki, 1898	G5	AL, FL, GA, LA, MD, MS, NC, SC, TX, VA
Vertigo oscariana	Sterki, 1890	G4	AL, AR, FL, GA, KY, LA, MD, MO, MS, NC, TN, TX, VA, WV
Vertigo ovata	Say, 1822	G5	AK, AL, AR, CA, CT, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, ND, NE, NJ, NM, NY, OH, OK, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV,; Canada: AB, BC, LB, NS, ON, QC
Vertigo paradoxa	Sterki, 1900	G4G5Q	IN, ME, MI, MN, NY, SD, VT, WI, WY; Canada: AB, NF, NS, ON, QC
Vertigo parvula	Sterki, 1890	G3	KY, NC, OH, TN, VA
Vertigo perryi	Sterki, 1905	G3G4	CT, MA, ME, NH, RI
Vertigo pygmaea	(Draparnaud, 1801)	G5	DE, IA, IN, MA, MD, ME, MI, MN, MO, NJ, NY, OH, PA, TN, VA, WI, WV; Canada: NS, ON
Vertigo rugosula	Sterki, 1890	G4	AL, AR, FL, KY, LA, MS, OK, SC, TN, TX
Vertigo sterkii	Pilsbry, 1919	G2	CA
Vertigo teskeyae	Hubricht, 1961	G5	AL, DE, FL, GA, LA, MD, MS, NC, SC, TN, TX, VA
Vertigo tridentata	Wolf, 1870	G5	AR, DE, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MO, MS, NE, NJ, NY, OH, OK, PA, SD, TN, TX, VA, WI, WV; Canada: ON
Vertigo ventricosa	(E.S. Morse, 1865)	G5	IA, IL, IN, KY, MA, MD, ME, MI, MO, MS, NC, NY, OH, OK, PA, TN, VA, VT, WI, WV; Canada: NB, NS, ON, QC
Vertigo wheeleri	Pilsbry, 1928	G1	AL

Sagdidae

Jochen Gerber, Field Museum of Natural History

This family is distributed in Central America and the West Indies. A single species, *Lacteoluna selenina*, is found in North America (S. Florida). It has a small (ca. 5 mm), depressed, umbilicate, dull-white shell. The whorls are "shouldered". The outer lip of the aperture remaines straight and thin even in fully grown specimens.

They live in areas with some tree or shrub cover under rocks and plant debris.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Lacteoluna selenina	(Gould, 1848)	G2	FL

Spiraxidae

Kathryn E. Perez, Duke University

There are only 4 species of the carnivorous snails in this family in the U.S. and Canada, but several hundred species of several genera in Mexico, the Caribbean, Central and South America. *Euglandina rosea* is a large (up to 76 mm length, up to 30 mm width), common snail of the southeastern US and has been introduced to many places worldwide, often intentionally, into CA as well as numerous Pacific Islands. The introductions of *E. rosea* rate as one of the worst described cases of a failed attempt at biological pest control resulting in heavy predation pressure on native land snails of those areas (Cowie, 2001; Lydeard, *et al*. 2004). In Florida they can be found foraging for terrestrial snails on the ground, or in wet weather, climbing on the stems and leaves of small trees, ~1 m off the ground (Davis, Perez & Bennett, 2004). This

species has even been observed foraging underwater for aquatic snail in Hawaii (Kinzie, 1992). This species has been observed in a variety of habitats, in woods dominated by salt cedar (Davis, Perez & Bennett, 2004), roadsides, edges of marsh, and disturbed urban areas (Hubricht, 1985).

Euglandina singleyana (placed in the genus *Glandina* by Schileyko) is a large snail (up to 51 mm length) distributed across Central Texas ranging from Galveston County to Val Verde County with a few specimens collected in Mexico near the Texas border (Perez & Strenth, 2003). In the eastern part of its range this snail is found under rocks and logs in wooded stream valleys, in the western part of the range it is found under fallen *Yucca* and under rocks in desert shrub habitat dominated by *Lechugilla* (Fullington & Pratt, 1974). These snails are active on humid days, early morning, or after rain. They can be observed following the trails of prey snails and often leave small piles of empty shells of their favorite prey near rocky hiding places (KEP pers obs., *Humboldtiana* spp.). *E. texasiana* is a calciphile, found in much wetter places where it stays damp. This species can also be found crawling on buildings in urban areas. The range of this species is the Rio Grande Valley of Texas south throughTamaulipas and San Luis Potosi. *E. texasiana* is smaller than the other two U.S. *Euglandina* species reaching maximum of ~34 mm length (Pilsbry, 1946).

Pseudosubulina cheatumi is the northernmost respresentative of a largely tropical group. This species is restricted to leaf litter and stabilized talus in bottoms of canyons as well as in the Evergreen Zone in the Chisos Mountains, Big Bend National Park, Texas (Fullington & Pratt, 1974).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Euglandina rosea	(Ferussac, 1818)	G5	AL, CA, FL, GA, HI, LA, MS, NC, SC, TX
Euglandina singleyana	(W.G. Binney, 1892)	G3	TX
Euglandina texasiana	(Pfeiffer, 1857)	G1G2	TX
Pseudosubulina cheatumi	Pilsbry, 1950	G1	TX

Strobilopsidae

Jochen Gerber, Field Museum of Natural History

These snails are very small with uniformly brownish shells. Shells are usually low-conical or beehive-shaped with a narrow umbilicus, and usually sculptured with conspicuous transverse ribs. One North American species (*Strobilops hubbardi*) is depressed helicoid with a wide umbilicus; its shell surface has weakly developed, dense riblets. The aperture is dilated in all species and more or less thickened. As a family characteristic the strobilopsids possess a number of lamellae inside the last whorl. Number, shape and arrangement of these lamellae are

species-specific. The family is currently distributed in East and Southeast Asia, the Philippines, the eastern half of North America, and Central America.

The snails are found in moderately moist forests in leaf litter and under dead wood and bark.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Strobilops aeneus	Pilsbry, 1926	G5	AL, AR, DE, FL, GA, HI, IA, IL, IN, KY, LA, MA, MD, MI, MO, MS, NC, NJ, NY, OH, OK, PA, SC, TN, TX, VA, WI, WV; Canada: NS
Strobilops affinis	Pilsbry, 1893	G4G5	IL, IN, KY, MA, ME, MI, MN, MO, NJ, NY, OH, PA, RI, TN, WI; Canada: MB, ON, QC
Strobilops hubbardi	A.D. Brown, 1861	G3G4	AL, FL, GA, TX
Strobilops labyrinthicus	(Say, 1817)	G5	AL, AR, CT, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, SC, SD, TN, TX, VA, VT, WI, WV; Canada: NB, NS, ON, QC
Strobilops texasianus	Pilsbry and Ferriss, 1906	G5	AL, AR, DE, FL, GA, KS, LA, MD, MS, NC, NJ, OK, PA, SC, TN, TX, VA

Succineidae

John B. Burch, University of Michigan

The Succineidae are a land snail family nearly worldwide in distribution, whose shells are characteristically thin and amber-colored, the latter aspect the source of their common name, “amber shells.” The succineids are distinct enough from other stylommatophoran snails to be placed in their own separate suborder, Heterurethra Pilsbry 1900. Pertinent among their unusual characteristics are their heterurethrus kidney and ureter, and their elasmognathous jaw. Another unusual aspect of the Succineidae is the range of their chromosome numbers---the widest range known for any land snail family. Further, the lowest chromosome number known for the Mollusca is found in the Succineidae.

Four genera of Succineidae are recognized in North America (north of Mexico), *Succinea, Oxyloma, Novosuccinea* and *Catinella*. With some exceptions, the three genera can be recognized in many regions by characteristics of their shells. *Succinea* and *Oxyloma* have shells with large body whorls and short spires, whereas *Catinella* has a proportionately longer spire, approaching that of the aperture in length. *Succinea* generally has a more oval shell, while the shell of *Oxyloma* is more elongate and narrow. However, the most important characters for assigning North American species to genera are aspects of genital anatomy; these are more important than shell characters.

The taxonomy of the North American Succineidae is in need of studies using modern techniques to determine taxon validity and relationships.

TAXON	AUTHOR	G-RANK	LISTED	DISTRIBUTION
Catinella aprica	Hubricht, 1968	G2		AL, MS; Canada: ON
Catinella baldwini	(Ancey, 1889)	GNR		HI
Catinella exile	(Leonard, 1972)	G2		DE, IL, IN, ME, MI, MN, WI; Canada: ON
Catinella explanata	(Gould, 1852)	GNR		HI
Catinella gabbi	(Tryon, 1866)	G1G2		CA, ID, WA
Catinella gelida	(F.C. Baker, 1927)	G1		IA, IL, IN, KY, MI, MO, MS, OH, SD, WI
Catinella hubrichti	Grimm, 1960	G3		DE, MD, NC, SC, VA
Catinella oklahomarum	(Webb, 1953)	G5		AL, AR, DE, FL, GA, KY, LA, MD, MO, MS, NC, OK, PA, SC, TN, VA, WV
Catinella parallela	Franzen, 1979	G3		IL, IN, WI
Catinella paropsis	Cooke, 1921	GNR		HI
Catinella pinicola	Grimm, 1960	G5		MD
Catinella protracta	Franzen, 1983	G2Q		MI
Catinella pugilator	Hubricht, 1961	G1G2		AL, GA, NC, SC
Catinella rehderi	(Pilsbry, 1948)	G3		CA, ID, MT, WA
Catinella rotundata	(Gould, 1846)	G1G3		HI
Catinella rubida	Pease, 1870	GNR		HI
Catinella stretchiana	Bland, 1865	G3		CA, SD, UT, WY
Catinella texana	Hubricht, 1961	G1Q		LA, TX
Catinella tuberculata	Cooke, 1921	GNR		HI
Catinella vagans	(Pilsbry, 1900)	G3Q		KS, NJ
Catinella vermeta	(Say, 1829)	G5		AL, AR, CA, FL, GA, IA, ID, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, ND, NH, NJ, NM, NY, OH, OK, PA, SC, TX, UT, VT, WA, WI, WV, IL, TN, VA; Canada: AB, BC, NB, NF, NS, ON, QC
Catinella waccamawensis	Franzen, 1981	G1Q		NC
Catinella wandae	(Webb, 1953)	G2		AR, IA, KS, OK, WY
Novisuccinea chittenangoensis	(Pilsbry, 1908)	G1	LT	AR, IA, IL, MO, NY, VA
Novisuccinea ovalis	(Say, 1817)	G5		AR, CA, CT, DE, GA, IA, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, ND, NE, NH, NJ, NY, OH, OR, PA, RI, SC, SD, VT, WI, WV, IL, TN, VA; Canada: NB, NF, NS, ON, QC
Oxyloma chasmodes	Pilsbry, 1948	G1G3		CA
Oxyloma decampi	(Tryon, 1866)	G5Q		KY, NJ, WY
Oxyloma deprimidum	Franzen, 1973	G2		IL
Oxyloma effusum	(Pfeiffer, 1853)	G3		DE, FL, MD, NC, NJ, NY, VA; Canada: ON
Oxyloma groenlandicum	(Moller, 1842)	G3G4		NY; Canada: BC, NS, QC, NF, YT
Oxyloma hawkinsi	(Baird, 1863)	G3G4		AK, ID, UT, WA; Canada: AB, BC, MB
Oxyloma haydeni	(W.G. Binney, 1858)	G2G3		AZ, NE, UT, WA, WY; Canada: AB, MB, NT
Oxyloma kanabense	Pilsbry, 1948	G1	LE	AZ, UT; Canada: AB
Oxyloma missoula	Hubricht, 1982	G2G4		
Oxyloma nuttallianum	(I. Lea, 1841)	G2G4		AK, CA, ID, MT, OR, UT, WA; Canada: BC
Oxyloma peoriense	(Wolf, 1894)	G4G5		IL, IN, MI, NY, OH; Canada: NF, ON
Oxyloma retusum	(I. Lea, 1834)	G5		CA, CT, IA, IL, IN, KS, KY, MA, ME, MI, MN, ND, NE, NH, NJ, NM, NY, OH, PA, SD, TN, UT, VA, VT, WI; Canada: AB, NS, QC
Oxyloma salleanum	(Pfeiffer, 1849)	G3		AR, IL, LA, MO, MS, TN, TX, WI
Oxyloma sillimani	(Bland, 1865)	G2		CA, NV, UT
Oxyloma subeffusum	Pilsbry, 1948	G3		MD, NJ, PA, VA
Oxyloma verrilli	(Bland, 1865)	G1G2		Canada: NF, QC
Succinea bakeri	Hubricht, 1963	GH		IL, KY, MS, WI
Succinea barberi	(W. B. Marshall, 1926)	G2		FL

Succinea californica	P. Fischer and Crosse, 1878	G1G2		CA
Succinea campestris	Say, 1817	G4		FL, GA, LA, MD, ME, NC, NJ, SC, VA
Succinea floridana	Pilsbry, 1905	G2G3		FL
Succinea forsheyi	I.Lea, 1864	G4		AL, AR, FL, IA, IL, KS, KY, LA, MO, NC, NE, NM, OK, TN, TX, WI
Succinea greerii	Tryon, 1866	G3		AL, LA, MS, OK, TN, TX
Succinea grosvenori	I. Lea, 1864	G5		AL, AR, AZ, FL, KS, KY, LA, MO, MS, NM, OK, TN, TX, UT, WY; Canada: AB, MB, NT, ON, SK
Succinea indiana	Pilsbry, 1905	G5		AL, AR, DE, FL, GA, IN, KS, MD, ME, MO, NC, ND, NE, NJ, NY, OK, SC, SD; Canada: ON
Succinea luteola	Gould, 1848	G4		AR, AZ, CA, FL, LA, MS, NM, SD, TX
Succinea oregonensis	I. Lea, 1841	G2G4		CA, ID, OR, UT, WA; Canada: AB, BC
Succinea paralia	Hubricht, 1983	G2		AL, FL, TX
Succinea pennsylvanica	Pilsbry, 1848	G1G2		NY, PA
Succinea rusticana	Gould, 1846	G2G3		AK, CA, ID, OR, UT, WA; Canada: BC
Succinea solastra	Hubricht, 1961	G2G3		TX
Succinea strigata	Pfeiffer, 1855	G4		AK; Canada: BC, SK, YT
Succinea unicolor	Tryon, 1866	G3G4		AL, AR, FL, GA, LA, MI, MS, NC, SC, TX
Succinea urbana	Hubricht, 1961	G2G3		AL, MS
Succinea vaginacontorta	C.B. Lee, 1951	G2G3Q		KS, NM, TX
Succinea wilsonii	I. Lea, 1864	G4		DE, GA, MD, ME, NC, NJ, NY, SC, VA; Canada: NS, PE

Thysanophoridae

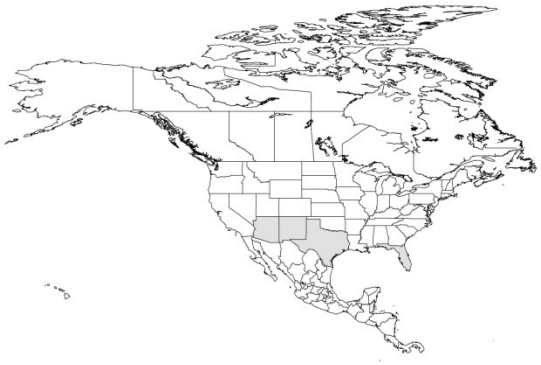
Kathryn E. Perez, Duke University

Hojeda inaguensis is found in moist leaf litter in hammocks in Florida. Its range also includes the Bahamas. The *Thysanophora* species are small, helicoid to flattened snails typically found under logs, dead palm fronds in woods, and rocks, but are also found in open scrublands. *T. plagioptycha* is usually found in wet places (Hubricht, 1985). Individuals of *Microphysula cookei* prefer wet montane coniferous forest, usually in wet places under vegetated rocks (Forsyth, 2004). *M. ingersolii* prefers subalpine meadows, spruce forests, and Trembling Aspen groves (Forsyth, 2004).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Hojeda inaguensis	(Weinland, 1880)	GH	FL
Microphysula cookei	(Pilsbry, 1922)	G4	AK, AZ, WA; Canada: BC
Microphysula ingersolli	(Bland, 1875)	G5	AZ, ID, MT, NM, OR, TX, UT, WA, WY; Canada: AB, BC
Thysanophora hornii	(Gabb, 1866)	G5	AZ, NM, TX
Thysanophora plagioptycha	(Shuttleworth, 1854)	G5	FL, TX

Urocoptidae

Kathryn E. Perez, Duke University



Urocoptidae is a large family related to the Bulimulidae and Achatinidae. The shells of snails in this family tend to be elongate with a tapering spire and an expanded apertural lip. The two genera (and species) found in Florida are similarly elongate, but *Cochlodinella poeyana* is smaller with wider whorls and typically has a decollate spire in contrast with *Microceramus pontificus* which is somewhat larger with a wider shell. The shape of the aperture is also very different.

The majority of U.S. Urocoptids are in the genus *Holospira*. These are snails of the limestone terrain of the arid southwestern U.S. *Holospira* and related genera found in Mexico are very species-rich. Important characteristics for identification of *Holospira* species are the length and width of the shell, the number of whorls, the smoothness or ribbing of the shell, and the shape (angulate, ovate, or oblong) and folding of the aperture. For final identification the shell must be opened, usually by cutting or grinding away the penultimate whorl to look at the central axis of the shell. Lamellae are associated with the central axis of the shell, especially in the final whorl. These lamellae are variously developed and shaped in different species.

Species of *Holospira* tend to live in isolated large colonies and be very restricted in geographic location, for example, found only in single mountain ranges. One exception to this is *Metastoma roemeri* which is found throughout central Texas to the Rio Grande Valley of New Mexico. It is most abundant around New Braunfels, Texas. Other *Holospira* species are found hanging attached to or under limestone ledges, a few species in West Texas are associated with *Selaginella* (Resurrection plant). They can also be found along canyon walls, under stones, dead *Yucca* stems, dead stems of *Sotol* and in limestone talus (Metcalf & Smartt, 1997). Specific localities and habitat discussions of each New Mexico *Holospira* species can be found in Land Snails of New Mexico (Metcalf & Smartt, 1997).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Cochlodinella poeyana	(d'Orbigny, 1841)	G1G2	FL
Coelostemma pyrgonasta	F. G. Thompson, 1989	G1	NM
Holospira animasensis	Gilbertson and Worthington, 2003	G1G2	NM
Holospira arizonensis	Stearns, 1890	G2	AZ
Holospira campestris	Pilsbry and Ferriss, 1915	G3Q	AZ
Holospira chiricahuana	Pilsbry, 1905	G2G3	AZ
Holospira cionella	Pilsbry, 1905	G3Q	AZ
Holospira cockerelli	Dall, 1897	G1	NM
Holospira crossei	Dall, 1895	G2	NM

Holospira danielsi	Pilsbry and Ferriss, 1915	G3G4	AZ, TX
Holospira ferrissi	Pilsbry, 1905	G2	AZ
Holospira goldfussi	(Menke, 1847)	G2G3	TX
Holospira hamiltoni	Dall, 1897	G1	TX
Holospira mesolia	Pilsbry, 1912	G1	TX
Holospira metcalfi	F.G. Thompson, 1974	G1	NM
Holospira millestriata	Pilsbry and Ferriss, 1915	G1G2Q	AZ
Holospira montivaga	Pilsbry, 1946	G2	AZ, NM, TX
Holospira oritis	Pilsbry and Cheatum, 1951	G1	TX
Holospira pasonis	Dall, 1895	G1	TX
Holospira pityis	Pilsbry and Cheatum, 1951	G1	TX
Holospira riograndensis	Pilsbry, 1946	G1	TX
Holospira sherbrookei	Gilbertson, 1989	G1	AZ
Holospira tantalus	Bartsch, 1906	G1G2	AZ
Holospira whetstonensis	Pilsbry and Ferriss, 1923	G1G2	AZ, NM
Holospira yucatanensis	Bartsch, 1906	G1	TX
Metastoma roemeri	(Pfeiffer, 1848)	G4	NM, TX
Microceramus pontificus	(Gould, 1848)	G2G3	FL
Microceramus texanus	(Pilsbry, 1898)	G2	TX

Valloniidae

Jochen Gerber, Field Museum of Natural History

The valloniids are minute snails (ca. 1.5-4 mm in diameter) of uniformly white, greyish or brown shell color. Their shells are mostly depressed-helicoid, but some species are more globular. Many species have an ornamentation of transverse ribs and sometimes spiral lines. The aperture is either simple (*Planogyra*, *Zoogenetes*) or expanded (*Vallonia*). In some *Vallonia* species there is a threshold-like callus within the aperture, however, all valloniids lack apertural teeth or lamellae. The umbilicus is wide to very wide, with the exception of the tall-helicoid *Zoogenetes* which has a merely perforate shell.

The distribution of the family is holarctic. In North America they have a mainly northern distribution, with some *Vallonia* species extending further southward in the Western mountain ranges and into Northern Mexico. Some *Vallonia* species (*V. costata, V. excentrica, V. pulchella*) have been accidentally introduced in many areas outside their natural range.

Vallonia species live usually in open habitats, such as meadows, lawns, and on exposed rock outcrops, occasionally extending into more open forest vegetation, but they avoid dense woods. Moisture requirements differ by species. The two *Planogyra* species live in leaf litter in moist forests and swampy areas. *Zoogenetes* is a snail of boreal forests of NE North America and of high-mountain forest habitats in the Rockies.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Planogyra asteriscus	(E.S. Morse, 1857)	G4	IL, MA, ME, MI, MN, NH, NY, OH, VT, WI; Canada: NF, NS, ON, QC
Planogyra clappi	(Pilsbry, 1898)	G3G4	BC, AK, CA, ID, OR, WA
Vallonia albula	Sterki, 1893	G4Q	CA, CO, ID, MA, ME, MI, NM, OR, UT, WA, WY; Canada: AB, BC, MB, NF, ON, QC
Vallonia costata	(Muller, 1774)	G5	CA, DE, IA, IL, IN, KY, MA, MD, ME, MI, MN, NC, NE, NJ, NY, OH, PA, SD, VA, WI, WV; Canada: ON, QC
Vallonia cyclophorella	Sterki, 1892	G5	AK, AZ, CA, CO, IA, ID, MT, ND, NM, OR, SD, TX, UT, VT, WA, WI, WY; Canada: AB, BC, MB, ON, SK
Vallonia excentrica	Sterki, 1893	G5	CA, GA, IL, IN, KY, MA, MD, ME, MI, MO, NC, NJ, NY, OH, PA, RI, TN, VA, VT, WI, WV; Canada: AB, BC, NF, NS, ON, QC
Vallonia gracilicosta	Reinhardt, 1883	G5Q	AZ, CA, CO, IA, ID, IL, IN, KS, KY, MA, ME, MN, MO, MT, ND, NE, NM, NY, OK, RI, SD, TX, UT, WI, WY; Canada: AB, BC, MB, NF, NU, ON, QC
Vallonia parvula	Sterki, 1893	G4	IA, IL, KS, KY, MI, MN, MO, NE, NM, NY, OH, OK, SD, TN, TX, VA, WI; Canada: ON
Vallonia perspectiva	Sterki, 1893	G4G5	AL, AR, IA, IL, KY, MD, MN, MO, MS, NC, ND, NE, NJ, NM, SD, TN, TX, UT, VA, WI, WV; Canada: AB
Vallonia pulchella	(Muller, 1774)	G5	CA, CT, DE, IA, IL, IN, KY, MA, MD, ME, MI, MN, MO, NC, NE, NJ, NY, OH, PA, SD, TX, UT, VA, WA, WI, WV; Canada: AB, BC, NB, NF, NS, ON, QC
Vallonia terraenovae	Gerber, 1996	G1	Canada: NF
Zoogenetes harpa	(Say, 1824)	G5	AK, MA, ME, MI, MN, NH, RI, WI; Canada: AB, BC, NB, NF, NS, ON, QC

Veronicellidae

Megan E. Paustian, University of Maryland

Only one species of Veronicellidae, *Leidyula floridana*, is native to the U.S.

In contrast to the majority of slugs, *L. floridana* belongs to the order Systellommatophora instead of Stylommatophora. *L. floridana* is easily distinguished from most slugs by the presence of contractile instead of invaginable tentacles, the absence of a pneumostome, an anus at the end of the foot (due to detorsion of the gut), and a wide mantle covering the entire dorsum.

This species is 50-70 mm long.

L. floridana occupies any habitats with sufficient shelter, including woods, roadsides, and gardens.

L. floridana is native to southern Florida and was introduced to Louisiana. Several non-native Veronicellids overlap in range with *L. floridana*.

Information summarized from Burch (1962), Hubricht (1985).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Leidyula floridana	(Leidy, 1851)	G2G4	FL, LA

Vitrinidae

Barry Roth, San Francisco, CA

Vitrinids are snails or semislugs with the shell small to medium sized, very thin, glassy, transparent, helicoid to ear shaped, with few, rapidly expanding whorls. The body whorl is capacious, the aperture large, strongly oblique, and broader than high. The umbilicus is narrow or absent. In most cases the animal is unable to retract completely within its shell. One or more lobes of the mantle sometimes lap onto the shell. The radular teeth have long cusps; with two or more cusps present on marginal teeth. The foot is narrow, with a tripartite sole. There is no caudal mucus pit. The anterior cephalic tentacles are inconspicuous.
Vitrinidae is a Holarctic clade, also extending to central Africa and some Atlantic islands. Only the semislug genus *Vitrina* occurs in North America.

In Europe and western North America, vitrinids are found in a variety of moderately humid places, including woods and grassland. In the southern part of their range, such as the Sierra Nevada, California, and the southern Rocky Mountains, they occupy higher elevations and are found in habitats such as moist montane meadows, stream banks in moss and grasses, on bases of plants such as corn lily (*Veratrum californicum*), under pine bark, logs, and sticks on ground; in aspen thickets, and under willows at edges of meadows.

Information summarized from Pilsbry (1946), Forcart (1955), Hubricht (1985).

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Vitrina angelicae	Beck, 1837	G5	MA, MD, ME, MI, MN, NH, NY, PA, RI, VT, WI; Canada: NB, NF, NS, ON, QC
Vitrina pellucida	(Muller, 1774)	G5	AK, CA, CO, ID, MT, NM, OR, SD, TX, UT; Canada: AB, BC, QC
Vitrina pellucida alaskana	Dall, 1905	G5T5	AK, AZ, CA, NM, OR, WA; Canada: BC

Zonitidae

Amy S. Van Devender, Boone, NC

Taxonomic note: The genera traditionally included in the family Zonitidae have been re-classified (Bouchet & Rocroi, 2005). Following this new arrangement, the genera occuring in the U.S. and Canada can be assigned to several families as follows: Gastrodontidae: *Gastrodonta, Striatura, Ventridens, Zonitoides*; Oxychilidae: *Glyphyalinia, Mesomphix, *Nesovitrea*, Ortizius, Oxychilus, Paravitrea, Pilsbryna, Vitrinizonites*; Pristilomatidae: *Hawaiia, Ogaridiscus, Pristiloma, Vitrea*.

The Zonitidae are considered to be a difficult group to identify. They are found in nearly every place in the world but probably originated and had their initial radiation of species in the Appalachain Mountains of the Eastern U. S. At present the family contains about 147 species assorted among 14 genera. It is interesting to note that Hubricht described or changed our understanding of over 1/5 of the species in this family.

The family consists of moderate to minute snails which have shells with 3 to 9 whorls that are usually shiny in a dazzling array of subtle colors ranging from yellow to green, copper to pink. Their shells tend to be wider than high and may have a variety of incised lines or patterns of micro dots as ornamentation. Younger shells especially may have teeth in various patterns. The lip of the shell is sharp and thin; and though it may fold back on itself at the umbilical insertion, it is never reflected. Like its allies in the Aulacopoda (the slugs and discids) these animals have noticeable pedal grooves lying well above the sole of the foot.

Most of these species seem to love leaf litter of mature woods and the deep coves of the mountains often harbor a dozen species. Little is known about how they divvy up the microhabitats but prying apart wet layers of compacted leaves usually turns up live animals. Some species especially in the *Paravitrea* and *Mesomphix* are found in talus. Some like *Hawaiia minuscula* and *Zonitoides arboreus* (even *Ventridens demissus*) act like tramp snails turning up in all kinds of strange places.

TAXON	AUTHOR	G-RANK	DISTRIBUTION
Gastrodonta fonticula	Wurtz, 1948	G3G4	KY, VA, WV, TN
Gastrodonta interna	(Say, 1822)	G5	AL, GA, IN, KY, MS, NC, OH, PA, SC, TN, VA, WV
Glyphyalinia carolinensis	(Cockerell, 1890)	G4	AL, KY, NC, TN, VA
Glyphyalinia clingmani	(Dall, 1890)	G1	NC
Glyphyalinia cryptomphala	(G.H. Clapp, 1915)	G5	AL, GA, KY, MO, TN, VA
Glyphyalinia cumberlandiana	(G.H. Clapp, 1919)	G4	AL, KY, MD, NC, TN, VA, WV
Glyphyalinia floridana	(Morrison, 1937)	GH	FL

Glyphyalinia indentata	(Say, 1823)	G5	AL, AR, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, NJ, NM, NY, OH, OK, PA, SC, TN, TX, UT, VA, VT, WI, WV; Canada: NS, ON, QC
Glyphyalinia junaluskana	(Clench and Banks, 1932)	G2	GA, NC, TN
Glyphyalinia latebricola	Hubricht, 1968	G1G2	AL, IN
Glyphyalinia lewisiana	(G.H. Clapp, 1908)	G4	AL, AR, IN, KY, LA, MO, MS, NC, TN, VA, WV
Glyphyalinia luticola	Hubricht, 1966	G4	AL, AR, FL, GA, LA, MD, MS, NC, NJ, OH, OK, SC, TN, VA; Canada: ON
Glyphyalinia ocoae	Hubricht, 1978	G1	NC, TN
Glyphyalinia pecki	Hubricht, 1966	G1G2	AL
Glyphyalinia pentadelphia	(Pilsbry, 1900)	G2G3	GA, NC, TN
Glyphyalinia picea	Hubricht, 1976	G3	DE, MD, VA, WV
Glyphyalinia praecox	(H.B. Baker, 1930)	G4	AL, GA, KY, LA, MS, NC, SC, TN, VA, WV
Glyphyalinia raderi	(Dall, 1898)	G2	KY, MD, PA, VA, WV
Glyphyalinia rhoadsi	(Pilsbry, 1899)	G5	CT, DE, GA, IL, KY, MA, MD, ME, MI, NC, NH, NJ, NY, OH, PA, SC, TN, VA, VT, WI, WV; Canada: ON
Glyphyalinia rimula	Hubricht, 1968	G3	IN, KY, TN, WV
Glyphyalinia roemeri	(Pilsbry and Ferriss, 1906)	G3	LA, TX
Glyphyalinia sculptilis	(Bland, 1858)	G4	AL, GA, KY, LA, MS, NC, SC, TN, VA
Glyphyalinia solida	(H.B. Baker, 1930)	G5	AL, AR, FL, GA, IL, IN, KY, MD, MI, MO, MS, NC, NJ, OK, SC, TN, VA, WV
Glyphyalinia specus	Hubricht, 1965	G4	AL, GA, KY, TN, WV
Glyphyalinia umbilicata	(Cockerell, 1893)	G5	FL, GA, LA, NC, SC, TX, UT
Glyphyalinia virginica	(Morrison, 1937)	G3	KY, VA
Glyphyalinia wheatleyi	(Bland, 1883)	G5	AL, AR, CT, DE, FL, GA, IL, IN, KY, LA, MA, MD, MI, MO, MS, NC, NJ, NY, OH, OK, PA, TN, VA, WI, WV; Canada: ON
Godwinia caperata	(Gould, 1846)	GNR	HI
Godwinia haupuensis	Cooke, 1921	GNR	HI
Godwinia newcombi	(Reeve, 1854)	GNR	HI
Hawaiia alachuana	(Dall, 1885)	G4G5Q	AR, FL, IL, IN, KY, LA, MD, MI, MO, MS, NC, NJ, NY, OH, OK, PA, SC, TN, TX, VA, WV; Canada: ON
Hawaiia minuscula	(A. Binney, 1841)	G5	AL, AR, CA, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, NE, NJ, NM, NY, OH, OK, PA, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV; Canada: AB, NF, NS, ON, QC
Hawaiia neomexicana	(Cockerell and Pilsbry, 1900)	G2	UT, NM
Mesomphix andrewsae	(Pilsbry, 1895)	G3N4	NC, TN
Mesomphix anurus	Hubricht, 1962	G4N5	AL, GA, KY, MS, NC, TN
Mesomphix capnodes	(W.G. Binney, 1857)	G5	AL, AR, GA, KS, KY, LA, MO, MS, NC, OK, TN, VA, WV
Mesomphix cupreus	(Rafinesque, 1831)	G5	CT, DE, IL, IN, KS, KY, MD, MI, NC, NJ, NY, OH, OK, PA, TN, VA, VT, WV; Canada: ON
Mesomphix friabilis	(W.G Binney, 1857)	G5	AL, AR, IL, IN, KY, LA, MO, MS, OH, OK, TN, TX
Mesomphix globosus	(MacMillan, 1940)	G5	AL, AR, FL, GA, IL, IN, KY, LA, MS, SC, TN, TX
Mesomphix inornatus	(Say, 1821)	G5	IN, KY, MA, MD, NJ, NY, OH, PA, TN, VA, VT, WV; Canada: ON, QC
Mesomphix latior	(Pilsbry, 1900)	G3G4	AL, GA, KY, NC, TN
Mesomphix perfragilis	(Wetherby, 1894)	G1	TN
Mesomphix perlaevis	(Pilsbry, 1900)	G4G5	GA, IL, KY, MD, NC, OH, PA, TN, VA, WV
Mesomphix pilsbryi	(G.H. Clapp, 1904)	G4	AL, FL, GA, MS, NC, SC
Mesomphix rugeli	(W.G. Binney, 1879)	G4	GA, KY, NC, TN, VA
Mesomphix subplanus	(A. Binney, 1842)	G3G4	GA, NC, TN, VA
Mesomphix vulgatus	H.B. Baker, 1933	G4	IN, KY, LA, OH, TN, WI
Nesovitrea binneyana	(E.S. Morse, 1864)	G5	CA, CO, IA, ID, IN, KY, MA, ME, MI, MN, MT, ND, NE, NH, NY, OH, OR, PA, SD, UT, WA, WI, WY; Canada: AB, BC, MB, NS, ON, QC
Nesovitrea dalliana	(Pilsbry and Simpson, 1889)	G3G4	FL, GA, SC
Nesovitrea electrina	(Gould, 1841)	G5	IL, AK, AR, AZ, CT, DE, IA, ID, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, NE, NH, NJ, NM, NY, OH, OK, PA, SD, TN, TX, UT, VA, VT, WA, WI, WV; Canada: AB, BC, LB, NB, NF, NS, ON, QC

Nesovitrea hawaiiensis	(Ancey, 1904)	GNR	HI
Nesovitrea molokaiensis	(Sykes, 1897)	GNR	HI
Nesovitrea pauxilla	(Gould, 1852)	GNR	HI
Nesovitrea suzannae	Pratt, 1978	G1	TX
Ogaridiscus subrupicola	(Dall, 1877)	G1	ID, OR, UT
Paravitrea alethia	Hubricht, 1978	G1	TN, TX
Paravitrea amicalola	Hubricht, 1976	G1	GA
Paravitrea andrewsae	(W.G Binney, 1879)	G2	KY, NC, TN
Paravitrea aulacogyra	(Pilsbry and Ferriss, 1906)	GHQ	AR
Paravitrea bellona	Hubricht, 1978	G1	NC, WV
Paravitrea bidens	Hubricht, 1963	G1	AL
Paravitrea blarina	Hubricht, 1963	G3	KY, TN, VA
Paravitrea calcicola	H.B. Baker, 1931	G1	TN, VA
Paravitrea capsella	(Gould, 1851)	G4	AL, GA, IL, IN, KS, KY, NC, OH, PA, TN, VA, WI, WV
Paravitrea ceres	Hubricht, 1978	G1	WV
Paravitrea clappi	(Pilsbry, 1898)	G2G3	NC, TN
Paravitrea conecuhensis	(G.H. Clapp, 1917)	G3	AL, FL, LA, MS, TX
Paravitrea dentilla	Hubricht, 1978	G1	VA
Paravitrea diana	Hubricht, 1983	G1	GA
Paravitrea grimmi	Hubricht, 1968	G1G3Q	VA
Paravitrea hera	Hubricht, 1983	G1	VA
Paravitrea lacteodens	(Pilsbry, 1903)	G1	NC, PA
Paravitrea lamellidens	(Pilsbry, 1898)	G2	ME, NC, TN
Paravitrea lapilla	Hubricht, 1965	G2	KY, TN
Paravitrea metallacta	Hubricht, 1963	G3	TN
Paravitrea mira	Hubricht, 1975	G2	KY, VA
Paravitrea multidentata	(A. Binney, 1840)	G5	AL, AR, CT, IN, KY, LA, MA, MD, ME, MI, MS, NC, NH, NY, OH, PA, TN, VA, VT, WI, WV; Canada: NB, NS, ON
Paravitrea petrophila	(Bland, 1883)	G4	AL, AR, KY, OK, TN, WV
Paravitrea pilsbryana	(G.H. Clapp, 1919)	G2	AL, TN
Paravitrea placentula	(Shuttleworth, 1852)	G3	GA, KY, NC, TN, VA
Paravitrea pontis	H.B. Baker, 1931	G3	KY, MD, VA, WV
Paravitrea reesei	Morrison, 1937	G3	KY, NC, TN, VA, WV
Paravitrea septadens	Hubricht, 1978	G1	KY, VA
Paravitrea seradens	Hubricht, 1972	G3	KY, VA, WV
Paravitrea significans	(Bland, 1866)	G3	AR, IL, KS, LA, MO, MS, OK, TN, WI
Paravitrea simpsoni	(Pilsbry, 1889)	G4	AR, KS, MO, OK, TX
Paravitrea subtilis	Hubricht, 1978	G2	KY, TN, VA
Paravitrea tantilla	Hubricht, 1963	G3	AL, KY, TN
Paravitrea ternaria	Hubricht, 1978	G1G2	NC, TN
Paravitrea tiara	Hubricht, 1978	G1G2	AL
Paravitrea toma	Hubricht, 1975	G1	AL
Paravitrea tridens	Pilsbry, 1946	G2	TN, VA
Paravitrea umbilicaris	(Ancey, 1887)	G2	AL, GA, NC, TN
Paravitrea variabilis	H.B. Baker, 1929	G2G3	AL, TN
Paravitrea varidens	Hubricht, 1978	G1G2	NC, TN
Pilsbryna aurea	H.B. Baker, 1929	G1	TN
Pilsbryna castanea	H.B. Baker, 1931	G2	TN
Pilsbryna nodopalma	Slapcinsky and Coles, 2004	G1G2	NC, TN
Pilsbryna quadrilamellata	Slapcinsky and Coles, 2004	G1	TN
Pilsbryna vanattai	(Walker and Pilsbry, 1902)	G2G3	NC, TN
Pristiloma arcticum	(Lehnert, 1884)	G3G4	AK, ID, OR, WA; Canada: BC, YT
Pristiloma cavator	Roth, 1998	G1G2	CA
Pristiloma chersinella	(Dall, 1886)	G3G4	CA, ID, MT, NV, OR, WA; Canada: BC
Pristiloma gabrielinum	(S.S. Berry, 1924)	G1G2	CA

Pristiloma idahoense	Pilsbry, 1902	G2G3	ID, OR, WA
Pristiloma johnsoni	(Dall, 1895)	G2G3	OR, WA; Canada: BC
Pristiloma juniperum	A.G. Smith, 1957	G1G2	CA
Pristiloma lansingi	(Bland, 1875)	G5	CA, OR, WA; Canada: BC
Pristiloma nicholsoni	H.B. Baker, 1930	G1G2	CA
Pristiloma orotis	(S.S. Berry, 1930)	G1G2	CA
Pristiloma pilsbryi	Vanatta, 1899	G1	OR, WA
Pristiloma shepardae	(Hemphill, 1892)	G1	CA
Pristiloma stearnsi	(Bland, 1875)	G4G5	AK, CA, OR, WA; Canada: BC
Pristiloma wascoense	(Hemphill, 1911)	G2	ID, MT, OR, WA
Striatura exigua	(Stimpson, 1850)	G5	CT, IA, KY, LA, MA, MD, ME, MI, MN, MS, NC, NH, NJ, NY, OH, OR, PA, TN, VA, VT, WI, WV; Canada: NB, NF, NS, ON, QC
Striatura ferrea	E.S. Morse, 1864	G5	KY, MA, MD, ME, MI, MN, NC, NH, NY, OH, PA, TN, VA, VT, WI; Canada: AB, NS, ON, QC
Striatura meridionalis	(Pilsbry and Ferriss, 1906)	G5	AL, AR, DE, FL, GA, IL, IN, KS, KY, LA, MD, MI, MO, MS, NC, NJ, NM, OH, OK, PA, SC, TN, TX, VA, WV
Striatura milium	(E.S. Morse, 1859)	G5	CT, DE, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, NE, NJ, NY, OH, OK, PA, VA, VT, WI, WV; Canada: NF, NS, ON, QC
Striatura pugetensis	(Dall, 1895)	G5	AK, CA, HI, ID, MT, OR, WA; Canada: BC
Ventridens acerra	(J. Lewis, 1870)	G4	AL, GA, KY, NC, TN, VA, WV
Ventridens arcellus	Hubricht, 1976	G4	GA, MD, NC, TN, VA, WV
Ventridens brittsi	(Pilsbry, 1892)	G3	AR, MO, OK
Ventridens cerinoideus	(Anthony, 1865)	G4	AL, DE, FL, GA, MD, NC, SC, VA
Ventridens coelaxis	(Pilsbry, 1899)	G3	KY, NC, TN, VA
Ventridens collisella	(Pilsbry, 1896)	G4	AL, GA, KY, NC, TN, VA, WV
Ventridens decussatus	(Walker and Pilsbry, 1902)	G3	GA, NC, SC, TN, VA
Ventridens demissus	(A. Binney, 1843)	G5	AL, AR, FL, GA, IL, IN, KY, LA, MD, MO, MS, NC, OK, PA, TN, TX, VA, WV; Canada: ON
Ventridens eutropis	Pilsbry, 1946	G2G3	TN
Ventridens gularis	(Say, 1822)	G5	AL, GA, IN, KY, LA, MS, NC, OH, PA, SC, TN, VA, WV
Ventridens intertextus	(A. Binney, 1843)	G5	AL, AR, DE, FL, GA, IN, KY, LA, MD, MI, MS, NC, NY, OH, PA, SC, TN, TX, VA, WV; Canada: ON
Ventridens lasmodon	(Phillips, 1841)	G4	AL, KY, NC, TN, VA, WV
Ventridens lawae	(W.G. Binney, 1892)	G4	AL, GA, KY, NC, TN, VA
Ventridens ligera	(Say, 1821)	G5	AL, AR, DE, IL, IN, KS, KY, LA, MD, MI, MO, MS, NC, NJ, NY, OH, OK, PA, TN, VA, WV; Canada: ON
Ventridens monodon	Hubricht, 1964	G2	AL
Ventridens percallosus	(Pilsbry, 1898)	G3	KY, TN
Ventridens pilsbryi	Hubricht, 1964	G4	AL, GA, KY, LA, MS, NC, SC, TN, VA
Ventridens suppressus	(Say, 1829)	G5	DE, KY, MD, MI, NC, NJ, NY, OH, PA, TN, VA, WV; Canada: ON
Ventridens theloides	(Walker and Pilsbry, 1902)	G4G5	AL, GA, KY, NC, SC, TN, VA, WV
Ventridens virginicus	(Vanatta, 1936)	G4	IL, MD, NY, PA, VA, WV
Ventridens volusiae	(Pilsbry, 1900)	G2G3	FL
Vitrinizonites latissimus	(J. Lewis, 1875)	G4	AL, GA, KY, NC, TN, VA
Zonitoides arboreus	(Say, 1816)	G5	AL, AR, AZ, CA, CO, CT, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV, WY; Canada: AB, BC, NB, NF, NS, ON, QC
Zonitoides elliotti	(Redfield, 1856)	G4	AL, GA, KY, NC, SC, TN, VA, WV
Zonitoides kirbyi	R.W. Fullington, 1974	G2	IN, MO, OK, TX
Zonitoides lateumbilicatus	(Pilsbry, 1895)	G3G4	AL, KY, MS, TN
Zonitoides limatulus	(A. Binney, 1840)	G4G5	IA, IL, IN, KY, ME, MI, MN, MO, NY, OH, VT, WI
Zonitoides nitidus	(Muller, 1774)	G5	AK, DE, IA, IL, IN, KY, LA, MA, MD, ME, MI, MN, NE, NJ, NY, OH, OK, OR, PA, SD, TN, UT, VT, WA, WI, WV; Canada: AB, BC, NF, NS, ON, QC
Zonitoides patuloides	(Pilsbry, 1895)	G3	GA, NC, SC, TN

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Appendix

Species Synonymy for Burch's (1962) "How to Know the Eastern Land Snails Compiled by James (Jay) R. Cordeiro, NatureServe

Listed with each name is the authority (usually the most recent) on which the synonymic placement is based. Names alphabetical by species and not italicized for readability.

albolabris (Say, 1816), Triodopsis = Neohelix albolabris (Say, 1816) (fide Emberton, 1988)
aldrichianus (G.H. Clapp, 1907), Clappiella = Helicodiscus aldrichianus (G.H. Clapp, 1907) (fide Hubricht, 1985)
alticola (Ingersoll, 1875), Columella = Columella columella alticola (Ingersoll, 1875) (fide Turgeon et al., 1998)
appressus (Say, 1821), Mesodon = Patera appressa (Say, 1821) (fide Emberton, 1991)
approxima (Walker and Pilsbry, 1902), Retinella = Glyphyalinia clingmani (Dall, 1890) (fide Hubricht, 1985)
archeri Pilsbry, 1940, Mesodon = Fumonelix archeri (Pilsbry, 1940) (fide Emberton, 1991)
auriculata Say, 1818, Polygyra = Daedalochila auriculata (Say, 1818) (fide Emberton, 1994)
auriformis (Bland, 1859), Polygyra = Daedalochila auriformis (Bland, 1859) (fide Emberton, 1994)
avara Say, 1818, Polygyra = Daedalochila avara (Say, 1818) (fide Emberton, 1994)
avara (Say, 1824), Catinella = *nomen dubium*; most occurrences attributed to Catinella vermeta (Say, 1829) (fide Hoagland and Davis, 1987)
bicolor (Hutton, 1834), Gulella = Huttonella bicolor (Hutton, 1834) (there is no consensus in assigning this species to Gulella nor in the status of the subgenus Huttonella, of which it is the type species (Naggs, 1989), however Turgeon et al. (1998) list it in Huttonella)
binneyana (E.S. Morse, 1864), Retinella = Nesovitrea binneyana (E.S. Morse, 1864) (fide Hubricht, 1985)
binneyanus (Pilsbry, 1899), Mesodon = Patera binneyana (Pilsbry, 1899) (fide Emberton, 1991)
burringtoni (Pilsbry, 1928) Retinella = Glyphyalinia wheatleyi (Bland, 1883) (fide Hubricht, 1985)
campi G.H. Clapp and Ferriss, 1919, Praticolella = Praticolella taeniata Pilsbry, 1940 (fide Hubricht, 1985)
clenchi (Rehder, 1932), Mesodon = Patera clenchi (Rehder, 1932) (fide Emberton, 1991)
carolinensis (Cockerell, 1890), Retinella = Glyphyalinia carolinensis (Cockerell, 1890) (fide Hubricht, 1985)
caroliniensis (I. Lea, 1834), Triodopsis = Xolotrema carolinense (I. Lea, 1834) (fide Emberton, 1988)
catskillensis (Pilsbry, 1896), Discus cronkhitei = Discus catskillensis (Pilsbry, 1896) (fide Hubricht, 1985)
chilhoweensis (J. Lewis, 1870), Mesodon = Appalachina chilhoweensis (J. Lewis, 1870) (fide Emberton, 1994)
chisosensis Pilsbry, 1936, Polygyra = Daedalochila chisosensis (Pilsbry, 1936) (fide Emberton, 1994)
christyi (Bland, 1860), Mesodon = Fumonelix christyi (Bland, 1860) (fide Emberton, 1991)
circumstriata (Taylor, 1908), Retinella = Glyphyalinia wheatleyi (Bland, 1883) (fide Hubricht, 1985)
clarki (Vanatta, 1924), Anguispira = Anguispira alternata (Say, 1816) (fide Hubricht, 1985)
clarki (I. Lea, 1858), Mesodon = Patera clarki (I. Lea, 1858) (fide Emberton, 1991)
clavulinus (Potiez and Michaud, 1838), Lamellaxis = Allopeas clavulinum (Potiez and Michaud, 1838) (fide Turgeon et al., 1998, who follow Naggs, 1994, and Cowie et al., 1995)
clingmani (Dall, 1890), Retinella = Glyphyalinia clingmani (Dall, 1890) (fide Hubricht, 1985)
cronkhitei (Newcomb, 1865), Discus = Discus whitneyi (Newcomb, 1864) (fide Roth, 1987)
cumberlandiana (G.H. Clapp, 1919), Retinella = Glyphyalinia cumberlandiana (G.H. Clapp, 1919) (fide Hubricht, 1985)
cryptomphala (G.H. Clapp, 1915), Retinella = Glyphyalinia cryptomphala (G.H. Clapp, 1915) (fide Hubricht, 1985)
dalliana (Pilsbry and Simpson, 1889), Retinella = Nesovitrea dalliana (Pilsbry and Simpson, 1889) (fide Hubricht, 1985)
dealbatus (Say, 1830), Bulimulus = Rabdotus dealbatus (Say, 1830) (fide Hubricht, 1985)
denotata (Ferussac, 1821), Triodopsis = Xolotrema denotatum (Ferussac, 1821) (fide Emberton, 1988)
dentifera (A. Binney, 1837), Triodopsis = Neohelix dentifera (A. Binney, 1837) (fide Emberton, 1988)

divesta (Gould, 1848), Triodopsis = Neohelix divesta (Gould, 1848) (fide Emberton, 1988)
dorfeuilliana I. Lea, 1838, Polygyra = Daedalochila dorfeuilliana (I. Lea, 1838) (fide Walsh and Coles, 2006)
downieanus (Bland, 1861), Mesodon = Inflectarius downieanus (Bland, 1861) (fide Emberton, 1991)
electrina (Gould, 1841), Retinella = Nesovitrea electrina (Gould, 1841) (fide Hubricht, 1985)
elegans (Gmelin, 1791), Helicella = Trochoidea elegans (Gmelin, 1791) (fide Gude and Woodward, 1921)
elliotti (Redfield, 1856), Ventridens = Zonitoides elliotti (Redfield, 1856) (fide Hubricht, 1985)
fatigiata Say, 1829, Polygyra = Daedalochila fatiagata (Say, 1829) (fide Coles and Walsh, 2006)
ferrissi (Pilsbry, 1897), Mesodon = Inflectarius ferrissi (Pilsbry, 1897) (fide Emberton, 1991)
floridana (Leidy, 1851), Veronicella = Leidyula floridana (Leidy, 1851) (fide Thome, 1975)
floridana (Morrison, 1937), Retinella = Glyphyalinia floridana (Morrison, 1937) (fide Hubricht, 1985)
floridana Pilsbry, 1907, Varicella gracillima = Melaniella gracillima floridana (Pilsbry, 1907) (fide Turgeon et al., 1998, who place this taxon in the family Oleacinidae fide Burch and Pearce, 1990, but provide no explanation for their inclusion in the genus Melaniella Pfeiffer, 1859, instead of Varicella Pfeiffer, 1855; note Pilsbry, 1946, lists Melaniella as a subgenus of Varicella)
floridanus (Pilsbry, 1898), Microceramus = Microceramus pontificus (Gould, 1848) (fide Hubricht, 1978)
floridanum G.H. Clapp, 1918, Carychium = Carychium mexicanum Pilsbry, 1891 (fide Hubricht, 1985)
fosteri (F.C. Baker, 1921), Triodopsis = Xolotrema fosteri (F.C. Baker, 1921) (fide Emberton, 1988)
fraternum (Say, 1824), Stenotrema = Euchemotrema fraternum (Say, 1824) (fide Turgeon et al., 1998 who elevated the genus Euchemotrema from subgenus without providing justification, however fide Emberton (1994) for monophyletic support of genus Euchemotrema)
gracilis (Hutton, 1834), Lamellaxis = Allopeas gracilis (Hutton, 1834) (fide Turgeon et al., 1998 who follow Naggs, 1994, and Cowie et al., 1995)
gularis theloides (Walker and Pilsbry, 1902), Ventridens = Ventridens theloides (Walker and Pilsbry, 1902) (fide Hubricht, 1985)
hippocrepis (Pfeiffer, 1848), Polygyra = Daedalochila hippocrepis (Pfeiffer, 1848) (fide Emberton, 1994)
hispida (Linnaeus, 1758), Hygromia = Trochulus hispida (Linnaeus, 1758) (fide Dundee, 1974 for synonymy with Trichia striolata (Pfeiffer, 1828) and ICZN, 2004 for retention of Trochulus over Trichia)
hubrichti Pilsbry, 1940, Stenotrema = Euchemotrema hubrichti (Pilsbry, 1940) (fide Turgeon et al., 1998 who elevated the genus Euchemotrema from subgenus without providing justification, however fide Emberton (1994) for monophyletic support of genus Euchemotrema)
indentata (Say, 1823), Retinella = Glyphyalinia indentata (Say, 1823) (fide Hubricht, 1985)
inflectus (Say, 1821), Mesodon = Inflectarius inflectus (Say, 1821) (fide Emberton, 1991)
indianorum (Pilsbry, 1899), Mesodon = Patera indianorum (Pilsbry, 1899) (fide Emberton, 1991)
leai (A. Binney, 1821), Stenotrema = Euchemotrema leai (A. Binney, 1821) (fide Turgeon et al., 1998 who elevated the genus Euchemotrema from subgenus without providing justification, however fide Emberton (1994) for monophyletic support of genus Euchemotrema)
leporina (Gould, 1848), Polygyra = Daedalochila leporina (Gould, 1848) (fide Emberton, 1994)
jacksoni (Bland, 1866), Polygyra = Daedalochila jacksoni (Bland, 1866) (fide Coles and Walsh, 2006)
jonesianus (Archer, 1938), Mesodon = Fumonelix jonesiana (Archer, 1938) (fide Emberton, 1991)
kiowaensis (Simpson, 1888), Mesodon = Patera kiowaensis (Simpson, 1888) (fide Emberton, 1991)
lewisiana (G.H. Clapp, 1908), Retinella = Glyphyalinia lewisiana (G.H. Clapp, 1908) (fide Hubricht, 1985)
latispira Pilsbry, 1896, Polygyra = Triodopsis vultuosa (Gould, 1848) (fide Hubricht, 1985)
limpida Gould, 1850, Vitrina = Vitrina angelicae limpida Gould, 1850 (fide Forcart, 1955)
lubrica (Müller, 1774), Cionella = Cochlicopa lubrica (Müller, 1774) (fide Roth, 2003)
magazinensis (Pilsbry and Ferriss, 1907), Mesodon = Inflectarius magazinensis (Pilsbry and Ferriss, 1907) (fide Emberton, 1991)
mariae (Albers, 1850), Bulimulus alternatus = Rabdotus alternatus (Say, 1830) (fide Hubricht, 1985)
mauritianum (Pfeiffer, 1852), Lamellaxis = Allopeas mauritianum (Pfeiffer, 1852) (fide Turgeon et al., 1998 who follow Naggs, 1994, and Cowie et al., 1995)
mooreana (W.G. Binney, 1857), Polygyra = Daedalochila mooreana (W.G. Binney, 1857) (fide Coles and Walsh, 2006)
multilineata (Say, 1821), Triodopsis = Webbhelix multilineata (Say, 1821) (fide Emberton, 1988)
mutabilis Hubricht, 1951, Pallifera = Megapallifera mutabilis (Hubricht, 1951) (fide Hubricht, 1985)
obstricta (Say, 1821), Triodopsis = Xolotrema obstrictum (Say, 1821) (fide Emberton, 1988)
orbiculata (Say, 1818), Helicina = Oligyra orbiculata Say, 1818 (fide Turgeon et al., 1998, who apparently follow Baker, 1922)

pennsylvanicus (Green, 1827), Mesodon = Patera pennsylvanica (Green, 1827) (fide Emberton, 1991)
pentadelphia (Pilsbry, 1900), Retinella = Glyphyalinia pentadelphia (Pilsbry, 1900) (fide Hubricht, 1985)
peregrina Rehder, 1932, Polygyra = Daedalochila peregrina (Rehder, 1932) (fide Coles and Walsh, 2006)
perigraptus Pilsbry, 1894, Mesodon = Patera perigrapta (Pilsbry, 1894) (fide Emberton, 1991)
plicata Say, 1821, Polygyra = Daedalochila plicata (Say, 1821) (fide Coles and Walsh, 2006)
poirieri (Mabille, 1883), Lehmannia = Limax marginatus Müller, 1774, however U.S. specimens often are mis-identified introductions of Lehmannia valentiana (Ferussac, 1821) (fide Branson, 1980) with which it has often been mistakenly synonymized (e.g. Dundee, 1974)
praecox H.B. Baker, 1930, Retinella = Glyphyalinia praecox (H.B. Baker, 1930) (fide Hubricht, 1985)
pustuloides (Bland, 1858), Polygyra = Lobosculum pustuloides (Bland, 1858) (fide Emberton, 1994)
pustula (Ferussac, 1832), Polygyra = Lobosculum pustula (Ferussac, 1832) (fide Emberton, 1994)
raderi (Dall, 1898), Retinella = Glyphyalinia raderi (Dall, 1898) (fide Hubricht, 1985)
rhoadsi (Pilsbry, 1899), Retinella = Glyphyalinia rhoadsi (Pilsbry, 1899) (fide Hubricht, 1985)roundyi Morrison, 1935, Paravitrea = Helicodiscus roundyi (Morrison, 1935) (fide Hubricht, 1985)
roemeri (Pilsbry and Ferriss, 1906), Retinella = Glyphyalinia roemeri (Pilsbry and Ferriss, 1906) (fide Hubricht, 1985)
roemeri (Pfeiffer, 1848), Holospira = Metastoma roemeri (Pfeiffer, 1848) (fide Hubricht, 1985)
roemeri (Pfeiffer, 1848), Mesodon = Patera roemeri (Pfeiffer, 1848) (fide Emberton, 1991)
sayanus (Pilsbry, 1906), Mesodon = Appalachina sayana (Pilsbry, 1906) (fide Emberton, 1994)
saludensis (Morrison, 1937), Clappiella = Helicodiscus saludensis (Morrison, 1937) (fide Hubricht, 1985)
sargentianus (C.W. Johnson and Pilsbry, 1892), Mesodon = Patera sargentianus (C.W. Johnson and Pilsbry, 1892) (fide Emberton, 1991)
schiedeanus (Pfeiffer, 1841), Bulimulus = Rabdotus mooreanus (Pfeiffer, 1868) (fide Hubricht, 1985)
sculptilis (Bland, 1858), Retinella = Glyphyalinia sculptilis (Bland, 1858) (fide Hubricht, 1985)
smithi (G.H. Clapp, 1905), Mesodon = Inflectarius smithi (G.H. Clapp, 1905) (fide Emberton, 1991)
striolata (Pfeiffer, 1828), Hygromia = Trochulus striolata (Pfeiffer, 1828) (fide Dundee, 1974 for synonymy with Trichia striolata (Pfeiffer, 1828) and ICZN, 2004 for retention of Trochulus over Trichia)
subpalliatus (Pilsbry, 1893), Mesodon = Inflectarius subpalliatus (Pilsbry, 1893) (fide Emberton, 1991)
texasiana (Moricand, 1833), Polygyra = Linisa texasiana (Moricand, 1833) (fide Emberton, 1995)
tholus (W.G. Binney, 1857), Polygyra = Daedalochila mooreana (W.G. Binney, 1857) (fide Pilsbry, 1940)
tridens Morrison, 1985, Pilsbryna = Helicodiscus tridens (Morrison, 1935) (fide Hubricht, 1985)
tridens Morrison, 1935, Pilsbryna = Helicodiscus tridens (Morrison, 1935) (fide Hubricht, 1985)
triodontoides (Bland, 1861), Polygyra = Daedalochila triodontoides (Bland, 1861) (fide Emberton, 1994)
troostiana I. Lea, 1839, Polygyra = Daedalochila troostiana (I. Lea, 1839) (fide Coles and Walsh, 2006)
uvidermis Pilsbry, 1890, Vitrinizonites = Vitrinizonites latissimus (J. Lewis, 1875) (fide Hubricht, 1985)
uvulifera (Shuttleworth, 1852), Polygyra = Daedalochila uvulifera (Shuttleworth, 1852) (fide Emberton, 1994)
vanattai (Walker and Pilsbry, 1902), Retinella = Pilsbryna vanattai (Walker and Pilsbry, 1902) (fide Slapcinsky and Coles, 2004)
varians (Menke, 1829), Cepolis = Hemitrochus varians (Menke, 1829) (fide Emberton, 1991b; Miller and Naranjo-Garcia, 1991)
virginica Morrison, 1937, Retinella = Glyphyalinia virginica (Morrison, 1937) (fide Hubricht, 1985)
vermiculata Müller, 1774, Otala = Eobania vermiculata (Müller, 1774) (type of genus Eobania Hesse, 1913, fide Richardson, 1980)
walkeri (Pilsbry, 1900), Paravitrea = Paravitrea umbilicaris (Ancey, 1887) (fide Hubricht, 1985)
weatherbyi W.G. Binney, 1874, Pallifera = Megapallifera weatherbyi (W.G. Binney, 1874) (fide Hubricht, 1985)
wetherbyi (Bland, 1873), Mesodon = Fumonelix wetherbyi (Bland, 1873) (fide Emberton, 1991)
wheatleyi (Bland, 1883), Retinella = Glyphyalinia wheatleyi (Bland, 1883) (fide Hubricht, 1985)
wheatleyi (Bland, 1860), Mesodon = Fumonelix wheatleyi (Bland, 1860) (fide Emberton, 1991)