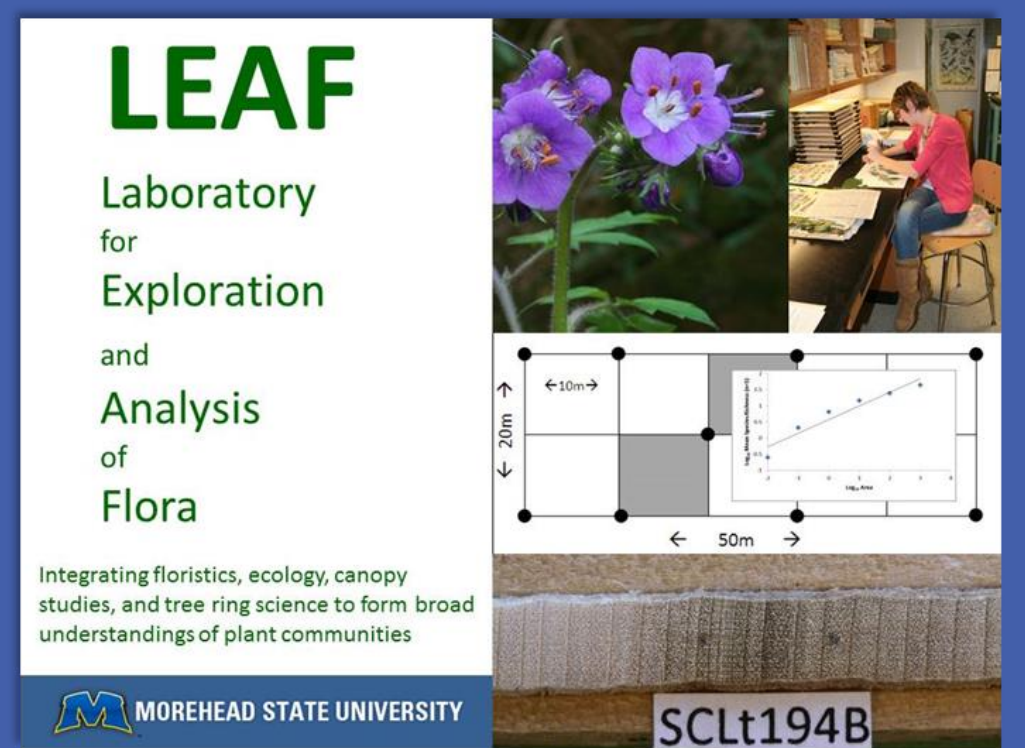




Features of Land Snail Shell Morphology that Aid in Identification

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Abstract

Land snails are members of the Phylum Mollusca and the Class Gastropoda. The importance of land snails to their native ecosystems has been greatly underestimated and understudied. For example, land snails play a huge role in the cycling of micronutrients in their ecosystems, they are active in the dispersal of plant seeds and fungal spores, and they have been shown to be bioindicators for vertebrates of conservation concern. They also contribute to the ecosystem by leaving their shells behind when they die, which is then used as a source of calcium carbonate by many species, and used in the formation of limestone. There are approximately 194 native species of snails in Kentucky, not including the 10 introduced species. The purpose of this investigation was to learn the morphology of land snail shells in order to improve identification skills. Important shell features used to identify land snails include the shape, the diameter/height, the aperture lip, the umbilicus, the teeth associated with the aperture, and the number of whorls. Several local genera such as *Punctum*, *Discus*, and *Haplotrema* have a distinctly wide umbilicus, while genera such as *Glyphalinia*, *Stenotrema*, and *Mesodon* are considered perforate to imperforate, or without an open umbilicus. The genera *Triodopsis*, *Euchemotrema*, *Inflectarius*, and *Xolotrema* all have large teeth in the aperture that can be used to identify the species based on the size and position of the teeth. This research was supported by a Morehead State University Undergraduate Research Fellowship.

Introduction

Land snails are a very important part of their native ecosystems. They decompose and recycle organic materials in forests, recycle nutrients, provide food and calcium for a variety of species, and contribute to the geological structure of forest soils (Jordan and Black, 2012).

Land snails vary greatly in their shell morphology. Their various shell features include: shape, diameter, height, whorl count, umbilicus, lip structure, and number of teeth in the aperture. Snail species that are local to Morehead, Kentucky, show great variety of these features. For example, *Neohelix albolabris* has a widely reflected lip, imperforate umbilicus, and a defined heliciform shape; while *Mesomphix cupreus* has a simple lip, perforate umbilicus, and a depressed heliciform shape. These shell features can be useful when trying to identify snails.

Features Used in Identification

The first shell feature utilized in the identification of snail species is the shape of the shell. The shapes seen in the local snail species include: heliciform, depressed heliciform, pupa, dome, pill, and succiniform. Shapes such as pupa are mainly seen in "microsnail" species, while the other forms can be seen in a variety of sizes (Figures 1 and 2).



Figure 1. Dome (left), pill (right), and pupa (bottom) shaped snail shells from *Euconulus fulvus*, *Stenotrema edwardsi*, and *Cochlicopa morseana*, respectively.

Heliciform and depressed heliciform are commonly seen shell shapes in the local area, while succiniform is less commonly seen (Figure 2).



Figure 2. Succiniform (left), heliciform (top), and depressed heliciform (right) shaped snail shells from *Novisuccinea ovalis*, *Ventridens ligera*, and *Anguispira alternata*, respectively.

Additional features include the diameter and height of the shell. Shell diameters can range from under 2 mm to over 45 mm depending on the species. *Glyphalinia* is a genus with one of the smallest shell diameters (Figure 3). The largest species in the area is *Neohelix albolabris* (Figure 4).



Figure 3. Shell of *Glyphalinia*, a local microsnail. Each gradation on the scale equals 1 mm.



Figure 4. Shells of *Neohelix albolabris*, *Triodopsis tennesseensis*, and *Stenotrema stenotrema* demonstrate the variation in shell diameter among land snail species.

Height is another factor that is useful in identifying snail species. For example, *Novisuccinea ovalis* is a more elongate species than *Anguispira alternata* (Figure 5). *Novisuccinea* species can get as tall as 20 mm.



Figure 5. *Novisuccinea ovalis* and *Anguispira alternata* show the variation in height among shells of different land snail species.

Whorls are an important feature of the shell used to identify species, especially within a single genus. Whorls can be tightly or loosely formed, and the amount of whorls from the embryonic whorl to the aperture can range from about 2 to 8.5 whorls. *Triodopsis notata* is an example of a species with nearly 5 tightly coiled whorls (Figure 6).

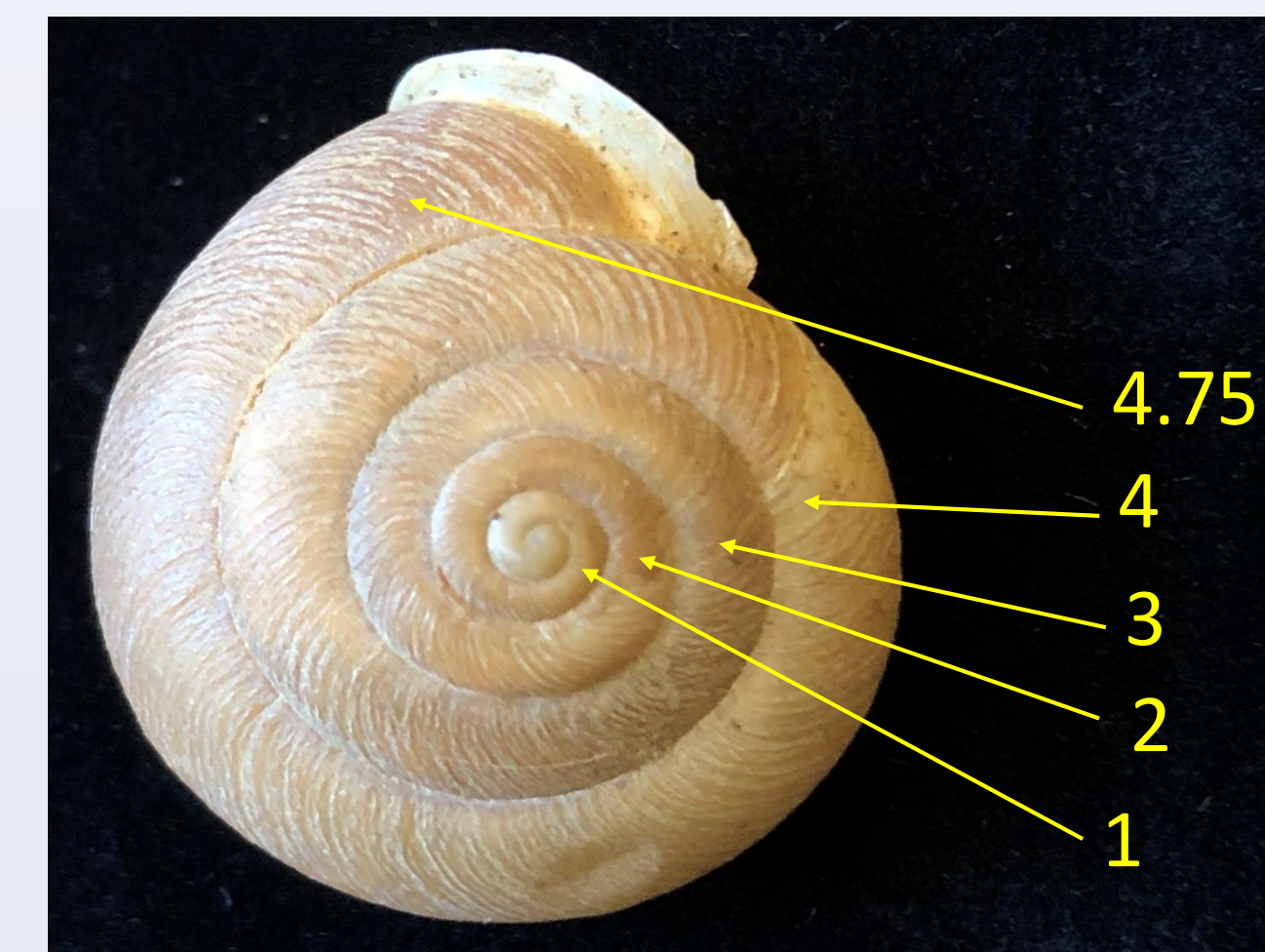


Figure 6. A shell of *Triodopsis notata* with a guide on how to count whorls.

The umbilicus is the opening, or lack thereof, on the bottom of the shell where the whorls form an internal column due to the spire increasing in height. The umbilicus can come in a variety of forms such as imperforate, perforate, umbilicate, or rimate. An imperforate shell has a closed umbilicus, a perforate shell has a small opening, an umbilicate shell has a wide opening, and a rimate shell has a partially closed umbilicus. Genera like *Haplotrema* are notable for having a large umbilicus. Some genera, like *Mesodon*, can have species that range from umbilicate to rimate (Figure 7).



Figure 7. From left to right, *Neohelix albolabris*, *Mesomphix cupreus*, *Haplotrema concavum*, and *Mesodon sayanus* with imperforate, perforate, umbilicate, and rimate umbilicus types, respectively.

Another feature that can be used in snail identification is the structure of the lip. The lip is the edge of the aperture and can be simple or reflected. A reflected lip is when the aperture margin folds over to make a wider and thicker edge. Species like *Neohelix albolabris* have a widely reflected lip, while *Mesomphix cupreus* shells have a simple lip (Figure 8).

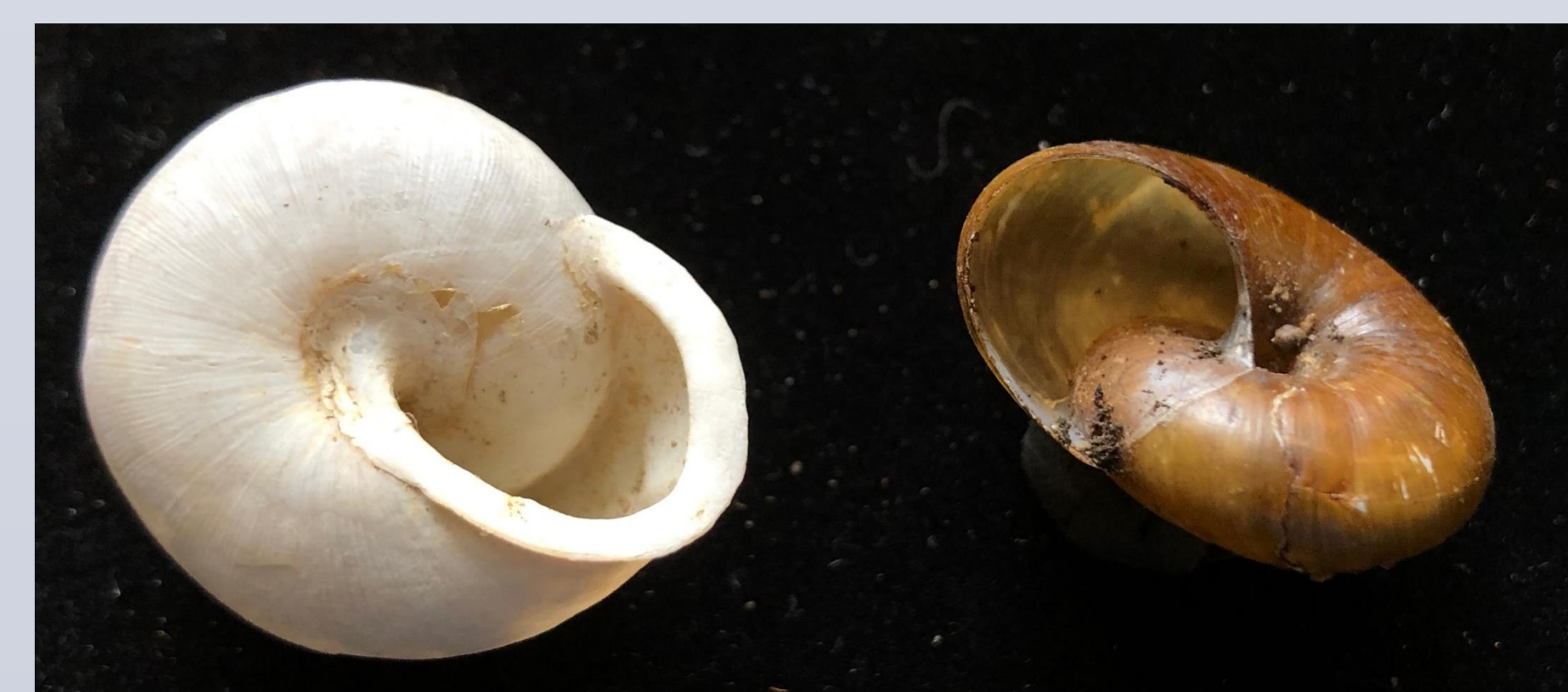


Figure 8. *Neohelix albolabris* (left) and *Mesomphix cupreus* (right), examples of a reflected and a simple lip, respectively.

The final feature that can be used in snail identification is the presence or absence of teeth within the aperture of the shell. There are 3 main types of teeth: parietal, palatal, and basal. Parietal teeth are located on the top of the aperture, palatal teeth are across from the parietal teeth near the lip, and basal teeth are on the bottom of the aperture near the lip. *Triodopsis* is a common genus that has all three types of teeth present, *Mesodon* is a genus that generally has one small parietal tooth, and many genera have no teeth present (Figure 9).



Figure 9. *Triodopsis tridentata* (left), an example of a shell with a parietal, palatal, and basal tooth and *Mesodon zaletus*, an example of a shell with only a small parietal tooth.



References

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