Arpit M. Davé

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Dr. B. Sullender

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Trichome Preference of *H. aspersa*

The "common snail," *Helix aspersa*, was characterized in detail by T.H. Huxley in 1875 (Huxley and Martin 1875). *H. aspersa* feeds on a variety of foods. Consuming mostly plant matter, they are known to also ingest mosses, lichens, algae, and fungi (Speiser 2001). The common snail consumes its food through a rasping technique using a structure called a radula (Ashton 2001). The radula can have as many as 27,000 separate teeth and is located on the underside of the snail, toward the mouth region. The widespread presence of this snail is of great agricultural significance due to its tendency to aestivate in the winter and threaten crop contamination (Murphy 2001). Thus, much research has been performed on its feeding behaviors as well as those of gastropods in general (see review: Speiser 2001).

In response to the evolutionary pressures provided by natural enemies, plants have evolved a wide range of defense systems. One of these systems, the trichomes, or "hairs," has proven very effective against the herbivory of many insects (Levin 1973). Trichome density has been shown to create preferential feeding behavior in species of *Rhabdotalebra* (Ribeiro 1994). Such is not the case with gastropods, however. Some previous research has also suggested the possibility that gastropods, in particular, exhibit no preferential feeding behavior toward plants that have trichome defenses over those that do not (Dirzo 1980, Speiser 2001). However, this has not been extensively tested, and to the best of our knowledge, has been inferred from sporadic testing of various

gastropods on a variety of individual species. Little if any testing appears to have been done on hairy versus non-hairy varieties of plants within the same genus. Ascertaining this element will create a more distinct image of snail food preference in regards to trichomes as a plant defense system. We tested this further utilizing two species of the genus *Salvia* – *argentea* and *coccinea*. Also known as the silver sage, *Salvia argentea* is known for its large leaves covered with white trichomes that give the leaves a characteristic silvery sheen ("*Salvia argentea*" 1999). *Salvia coccinea*, "the lady in red," is better known for its scarlet colored flowers, giving it its other common name, "scarlet sage" ("Salvia"). The *coccinea* variety does not have hairy leaves.

This study attempts to shed light on the preferential feeding habits of *Helix aspersa* with regard to one pubescent and one non-pubescent member of the genus *Salvia*. The radula of the *H. aspersa* is required to come into direct contact with the hairs on the surface of the *argentea* variant in order to feed. We propose, thus, that trichomal defense mechanisms can (effectively deter feeding by H. aspersa) be effective feeding deterrent for *H. aspersa*. Both plants studied (*coccinea* and *argentea*) are of the same genus. This will likely reduce some of the confounding variables involved in genetic makeup. A number of methods have been proposed to study preferential feeding habits in gastropods (Speiser 2001). Palatability tests can be conducted with single plants, while preferences can be identified through the use of multiple species.

We first conducted a palatability study to determine whether *H. aspersa* ate either *Salvia* species at all. Five snails were placed in a 12" X 6" lidded, translucent plastic container with six 2cm X 2cm squares of each *Salvia* species and left for 13 hours. Simultaneously, 30 different snails were kept in three of the same containers without food

for the same period of time. Palatability was established and the starved snails were each transferred to individual containers containing six 2cm X 2cm square of each *Salvia* species and a small damp sponge cube to maintain humidity levels. To eliminate a container side preference (due to light availability, for example), the leaf squares of the same species were placed in opposite corners of the containers. Since the order in which foods are given to gastropod species may influence their feeding behavior (Keymer and Ellis 1978), the leaf squares were placed first, and then the snail was placed directly in the middle with the sponge to its rear. Snails were allowed to graze for 6 hours.

We calculated the amount eaten of each plant species by placing the remains of each square onto a sheet of graph paper and ascertaining how many square centimeters were eaten. To reduce the variability induced by each person making measurements, we calibrated ourselves by using one of the boxes and agreeing upon a measurement for each of the 12 total squares in the box.

Helix aspersa exhibited a strong preference to the non-hairy *Salvia coccinea* (ANOVA: $p < 0.01$). From this data, it seems that the common snail does exhibit a preference for the non-hairy variety of *Salvia*. Nevertheless, further inspection of data and confounding variables casts a shadow over this theory. The essential oils composition of *argentea* includes a number of alcohols, possible *attractants* for gastropods (Couladis 2001). Airborne hexanols are known to instigate preferential turning behavior in gastropods at close proximity (Speiser 2001). The closed space of the containers possibly created a type of volatile chemical equilibrium originating from each species. The possible effects of this are numerous, and each is a confounding variable that was not controlled for. One must also consider unknown “induced defenses” in both species

triggered by the cutting of the leaves (Speiser 2001). If these effects were more pronounced in the *argentea,* the snails should exhibit a preference for the less toxic of the two. Furthermore, from the boxes where the snails had at least sampled the *Salvia argentea*, the significance of the preference disappeared ($p > 0.1$). This may be due to the fact that 1) the snails, having consumed some of the *argentea,* would thus consume less of the *coccinea* because they have a finite food capacity; or 2) *argentea*'s trichomes did not significantly deter the snails who sampled them. This suggests that the hairs on *argentea* were not the only factor causing the entire studied population to exhibit a preference toward the non-hairy *Salvia coccinea.* Further study is clearly needed to distinguish the various elements that appear to make up the exhibited preference for *Salvia coccinea* by the common snail *Helix aspersa*.

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