Prey Attraction to the Carnivorous Plant *Genlisea*

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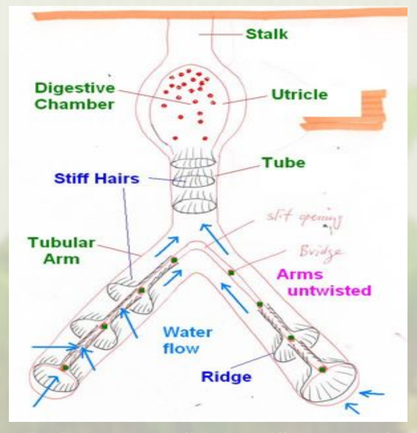
Abstract

The carnivorous plant, *Genlisea*, more commonly known as the corkscrew plant, is the least understood of the carnivores. Questions about the the interactions between *Genlisea* and its prey remain unanswered. Does this plant attract its prey actively; if so, how? How does it capture its prey? Does the prey passively wander into the plant's trap, or does it actively suck the organisms in? Does *Genlisea* prefer one type of prey over another? We found evidence of organisms inside of traps but did not observe active capture of the organisms. Rather the organisms seem to wander into the trap. There is no evidence of prey preference in this species. Prey seems to be limited only by the organisms in the ecosystem and the size of the organism – whether or not it can fit into the trap.

Background

Genlisea is an aquatic, rootless herb that grows from a branching rhizome (underground stem). It is found in South America, Africa, Madagascar, and the West Indies. *Genlisea* is closely related to the carnivorous plants *Pinguicula* and *Utricularia*, however the biology of this carnivorous plant is poorly understood. *Genlisea* forms a small, photosynthetic rosette of leaves above the soil surface. It captures small, aquatic organisms such as *Paramecium* using long, Y-shaped, root-like traps that grow underground or underwater (Fig. 1). A swollen cavity thought to be a digestion chamber, or stomach, forms below the soil surface above where the leaves fork to form two spiral-shaped branches. (Rice 2006). The branches are connected to the stomach by a segmented tube that is lined with hairs which point towards the stomach, encouraging prey to move toward the stomach rather than back out of the trap (Fig. 1). A few studies have looked at predator-prey relationships of various species with *Genlisea* (Plachno et al 2008; Plachno et al. 2013; Barthlott et al. 1998), but the evidence of their interactions is not conclusive. The purpose of this research is to focus on how the carnivorous plant consumes its prey and how the organisms interact around the traps. Is the prey wandering in by accident or being sucked in by the plant itself?

Figure 1 - *Genlisea* Anatomy



http://www.honda-e.com/IPW_4_Illustrations/Illustration_Genlisea_01.htm

http://www.pbase.com/image/108529994

Materials & Methods

A young *Genlisea* plant with the trap still attached was extracted by teasing it out with a dissecting pin. The trap was rinsed with distilled water and placed inside a 60 x 15mm petri plate. (In some cases, the trap was separated from the rest of the plant above the utricle using a scalpel). "Pond water" was obtained from the tray the traps are being acclimated in using a pipet and a droplet was placed inside a depression slide. The slide was viewed under the microscope at 40x to 100x to observe the organisms present in the water. Next the trap was placed in the lid of a petri plate filled with spring water. The microscope was focused in at the bifurcation (division of the two spiral arms). The "pond water" with organisms was added to the plate and the organisms were observed as they swam into the the trap and followed as they traveled up the tube towards the utricle. Additional treatments were done using *Paramecium caudatum* and *Daphnia*. Observations were filmed and photographed using a microscopic digital imaging camera.

Results

Figure 2 - Nematode

Figure 3 - Rotifer

Figure 4 – *Paramecium bursaria* (Green at bifurcation point)

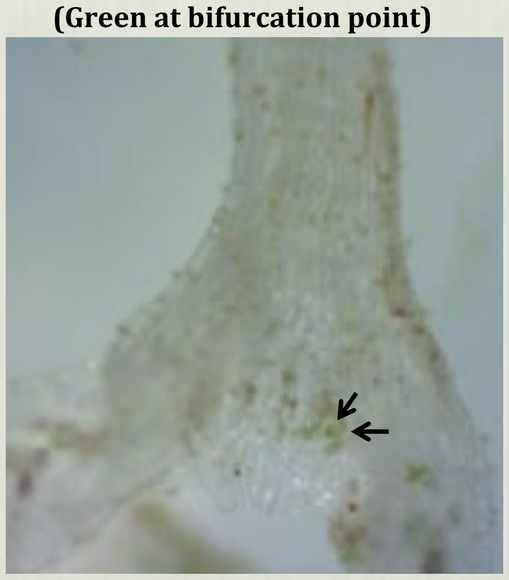


Figure 5 – Nematode inside the trap; hairs lining the tube are also visible

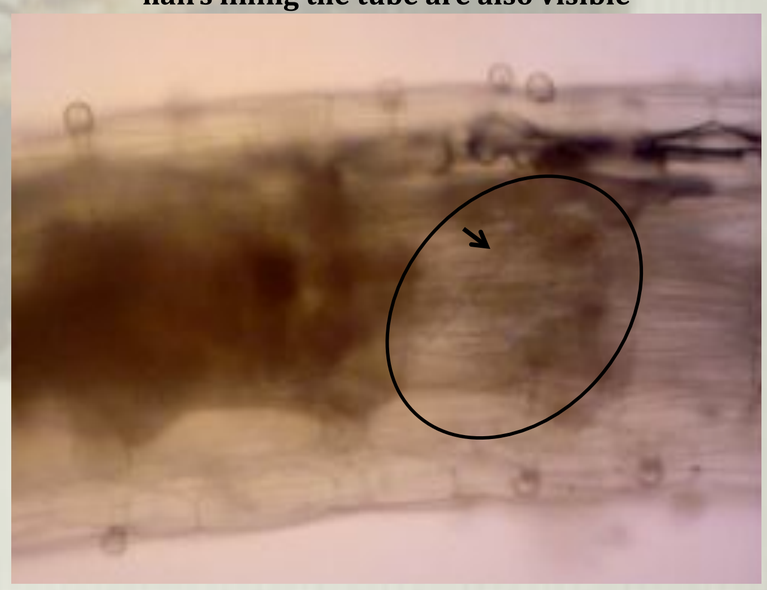


Figure 6 – *Daphnia pulex* feeding on algae on the outside of a trap

Conclusions

After running several experiments, we are able to conclude that *Genlisea* does not have a prey preference. Prey that is small enough to fit in the trap wanders into the trap either to feed on other organisms or for undetermined reasons. Once inside it is not able to turn around without getting poked by the hairs that line the inner walls of the trap. It is then when the prey has no other choice but to move forward towards the utricle. Furthermore, *Genlisea* does not appear to actively capture the organisms. They wander into the trap, often seemingly attracted by food such as algae growing on the trap, in a passive manner. Organisms that were present inside the traps were: Ciliates, *Paramecium bursaria* (appeared in the arms and the bifurcation point) (Fig. 4), Copepods, Nematodes (Fig. 2), and Rotifers (Fig. 3). We found that *Daphnia pulex* (Fig. 6) were too large to fit inside the trap.

References

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