This research focused on a Cynipid wasp, Amphibolips ilicifoleae found only on the scrub oak, Quercus ilicifolia. Nothing is known about the natural history of this gall maker and its gall. We explored the growth rate, histology, chemistry, and morphology of the galls. In addition, we are beginning to document the rate of mortality and the agents of mortality, which are mostly parasitic wasps of the Chalcidoidae. Twelve bushes with twenty incipient and small galls were selected randomly from previously located galls. To understand the cellular morphology of gall cells, cross-sections of the galls and oak leaves (for comparison) were observed under the microscope at 40X. The gall’s mesophyll tissue is much larger (35-100 µm) than the leaf mesophyll (3-8µm). The leaves have greater chlorophyll concentration than the galls (235.0±23.0 and 126.0±11.0 µg Chl-g FWt, 852.0±116 and 530.5±89 µg Chl-b-g FWt, respectively). By understanding the growth rate, morphology and development of the gall, we can begin to understand the life history traits that impact its success. Studying the gall system is an avenue to elucidating important biological concept such as plant-pest interactions. The Ecology of plant and insect interaction is fundamental to understanding plant community ecology and agriculture. In this study, we are beginning to understand the Biology and natural history of the galls. A major goal of this work is to develop testable hypotheses for the future about the ecology, evolution and physiology of the gall makers and their galls.

Materials and Methods
A total of twelve scrub oak bushes with incipient and small galls (twenty in total) were selected randomly, at 25 feet intervals, to measure the length and width to determine growth rate over a period of 32 days. A GPS eXplorist 200 series was used to plot the coordinates of the experimental site (40°05’23”-40°05’11”N; 72°39’17”-72°39’18”W; Elevation 89-104”). We measured the size twice a week using a caliper, and observed physically the morphology, the gall’s condition, whether it had an exit hole and whether it exhibited necrosis, sclerosis or both and its color. We also measured the growth rate, histology, chemistry, and morphology of the galls. In addition, we are beginning to document the rate of mortality of galls and excessive accumulation of certain elements such as K, Ca, Mn, Fe, Cu, Zn, Rb, and Sr in its tissues.

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CONCLUSIONS
1. Photosynthesis capability is not like that of the leaf, or is less than the leaf, for the following reasons: (a) No palisade layer in gall; (b) Less chlorophyll a & b; (c). Few, if any, stomata
2. Cells generally different in size and shape
3. Gall modification may be more directly related to structural housing of gall maker and vascular connections to other sources of photosynthetic
4. If gall photosynthesis were important to gall-maker development, expect positive correlation between gall size and insect size, but no correlation was observed
5. The s- shaped curve appears to be a robust description of gall growth
6. We present a measure of gall-maker vulnerability to parasitoids called the Critical Parasitoid Distance (the distance from the outer wall to the larva in the chamber). The ovipositor of the parasitoid must be greater than this distance to be effective for egg deposit into cynipid larva
7. When they are larger, there is a thick parenchyma layer, air chamber and a capsule separating them from a parasitoid, still a Torymidae might have access due to long ovipositor. Thus, the growth patterns we observed may directly influence the whether and how long galls fall under the CPD
8. Gall chemistry need to be further explored to identify interrelations between growth and development of galls and excessive accumulation of certain elements such as K, Mn, Ca, Fe, and Rb in its tissues.

References