

Learning the Secrets of the Cicindelidae

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INTRODUCTION

Tiger beetles (Family *Cicindelidae*) are an immensely interesting and vulnerable subfamily of carabid ground beetles that are found around the world. Due to their high species diversity, abundance, and habitat specialization, tiger beetles can be used as indicator species (Knisley & Schultz, 1997). Indicator species are species that can be used to monitor the health of habitats and biodiversity due to their diversity, abundance, vulnerability, and degree of habitat specialization. In the case of tiger beetles, they fit this criteria because of their high species diversity, vulnerability to change, and tendency to live in habitats that house other vulnerable species. Many species of cicindelids are threatened by habitat encroachment and destruction (Knisley & Schultz, 1997). There have been tiger beetle recovery efforts through captive breeding (Palmer & Klatt, 2014). For these reasons, I chose to investigate the general requirements for breeding these beetles in captivity.

The goal of this CAP project was to study the general and specific care and habitat requirements of several native species through captive breeding, then compile this information into a booklet to be used by scientists and enthusiasts studying these organisms. While there is information on captive care available, it is extremely limited in scope and rather vague in most cases.

METHODS

- First I collected breeding groups, soil from the sites, and recorded data on the sites and collection info. In order to collect them, I went to sites I was already familiar with, as well as looked for other suitable sites. Open spaces with sparse vegetation and sandy/clay soils are good indicators of habitat. Then I had to look for indicators that the habitat was in use, such as larval pits and adults on the surface. I used an insect sweep net and collection jars to catch them. Species collection took place between the months of May and July, and four species were collected (see Fig. 1). Multiple sites were used for the collection of each species. Specimens were collected during the early afternoon, when they were most active.
- Species collected: *Cicindela formosa generosa*, *C. scutellaris lecontei*, *C. sexguttata*, and *C. rufiventris*
- Breeding setups for the summer: Containers were rotated between the heat lamp and the shelf, every 3-4 hours during the day.
- I observed, cared for, and recorded information on each species, such as: the number of observed mating pairs, prey selection, captive lifespan, and oviposition and more.
- I analyzed the data and made comparisons, and compiled my information into booklets.

Tiger Beetle Collection



Fig. 1. The dunes where *C.formosa* and *C.scutellaris lecontei* were collected (Shown: site in the fall, not summer)

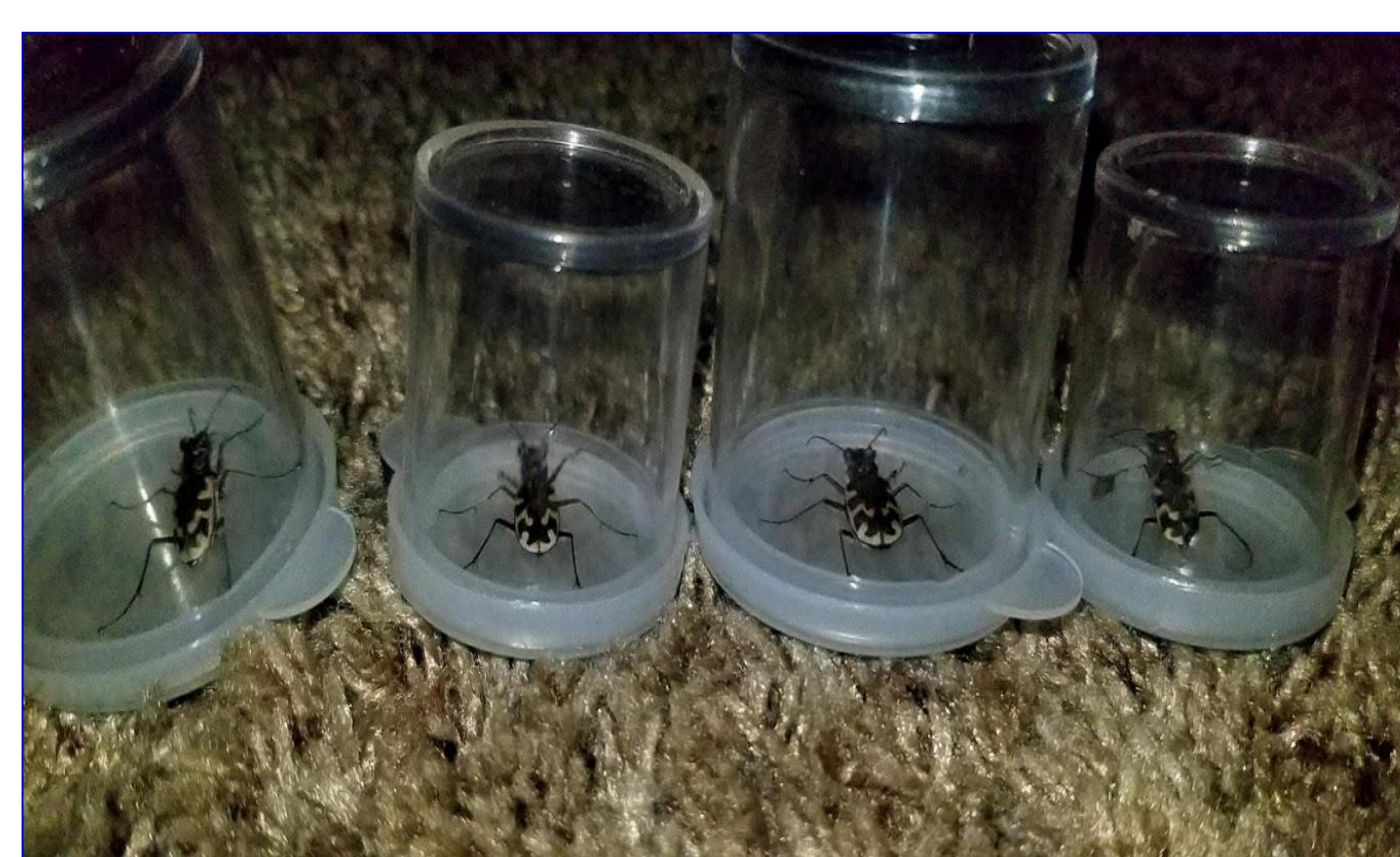


Fig. 2. The breeding group of *C. Formosa* in collection jars

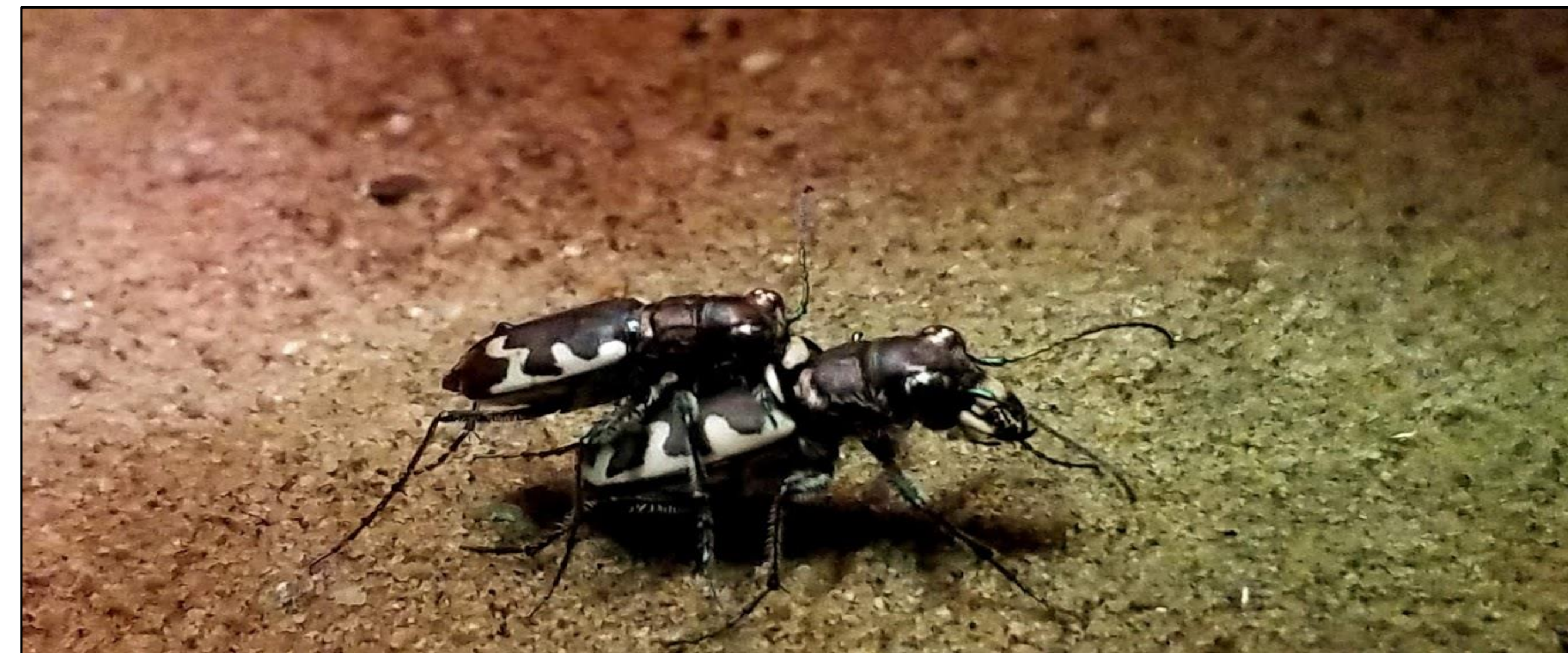


Fig. 3. Mate guarding behavior in Big Sand tiger beetles (*C. formosa*)

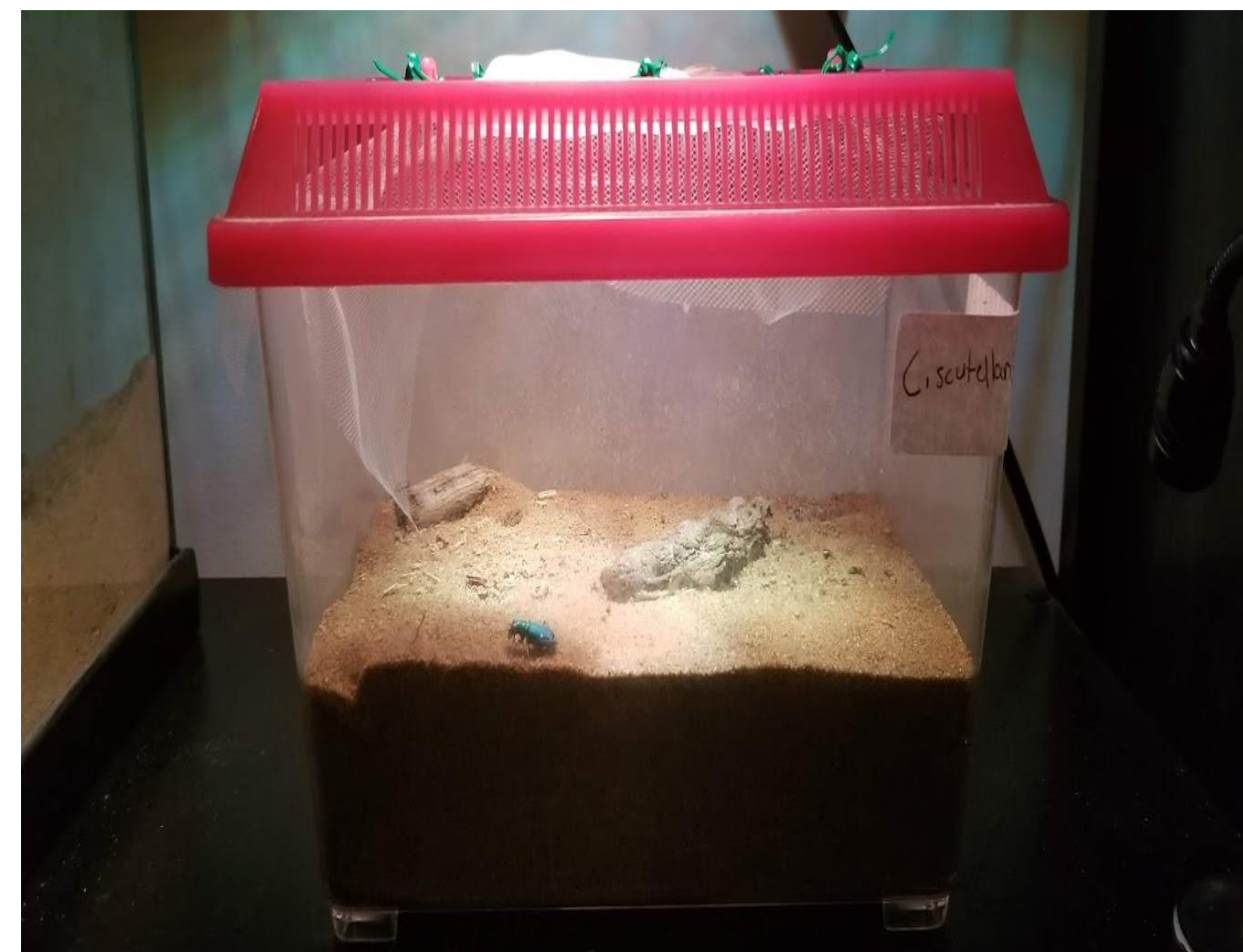


Fig. 4. *C.scutellaris lecontei* enclosure. A lone *C.sexguttata* can be seen, which was placed there temporarily while it's enclosure was searched for larvae.



Fig. 5. The journals used to catalog each species and location sites



Conservation Ambassador Program

RESULTS

General Adult Care Findings:

- High humidity, high ventilation, and daytime temperatures between 75 and 90° Fahrenheit are key to keeping adults.

General Larval Care Findings:

- Low humidity, high ventilation, temperatures between 70 and 90°, and 4-5 inches of substrate are required for most larvae.
- Red Flour Beetles (*Tribolium sp.*) and flightless fruit flies (*D.melanogaster*) work well as a captive larval diet

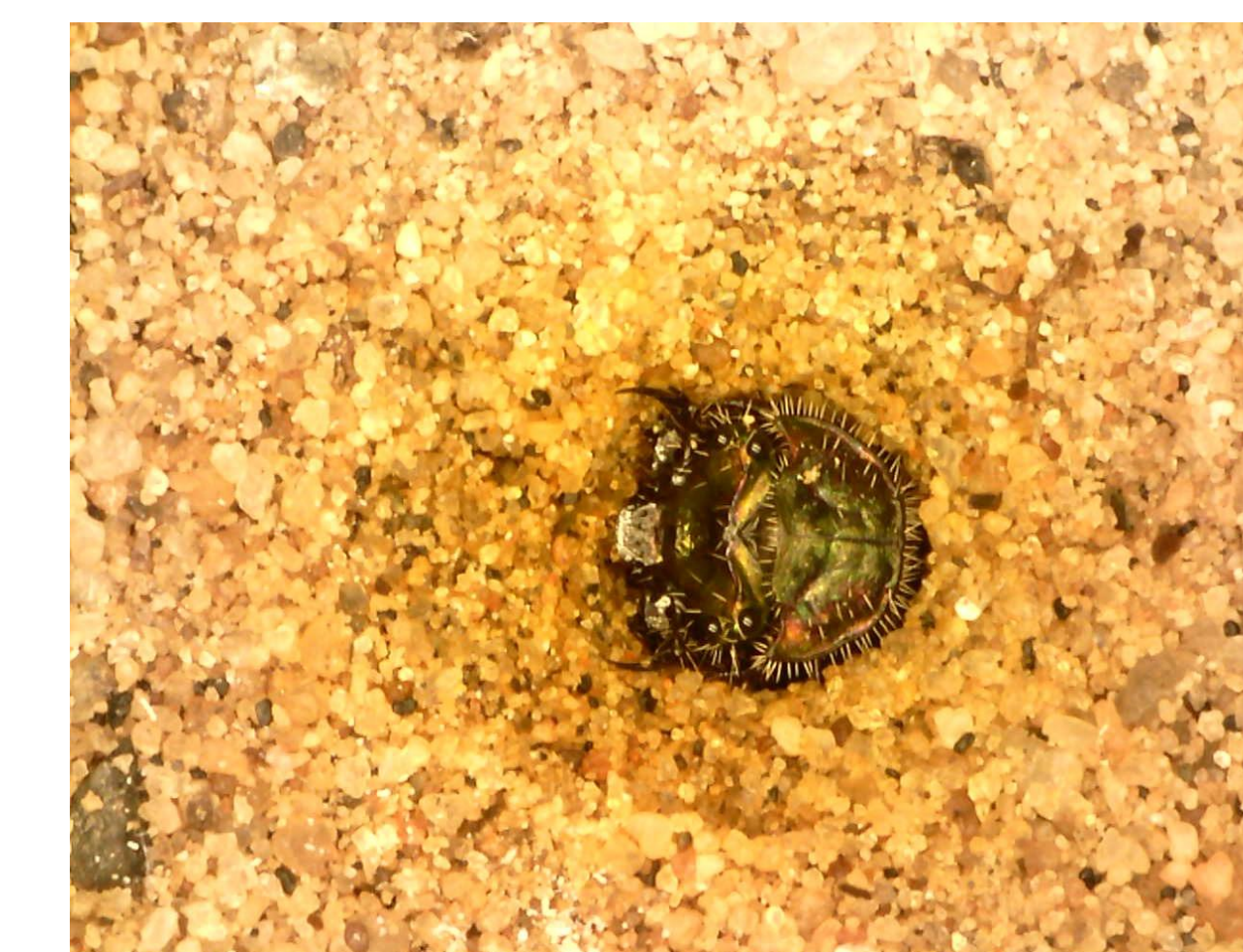


Fig. 6. Captive-bred *C.scutellaris lecontei* larva in its burrow

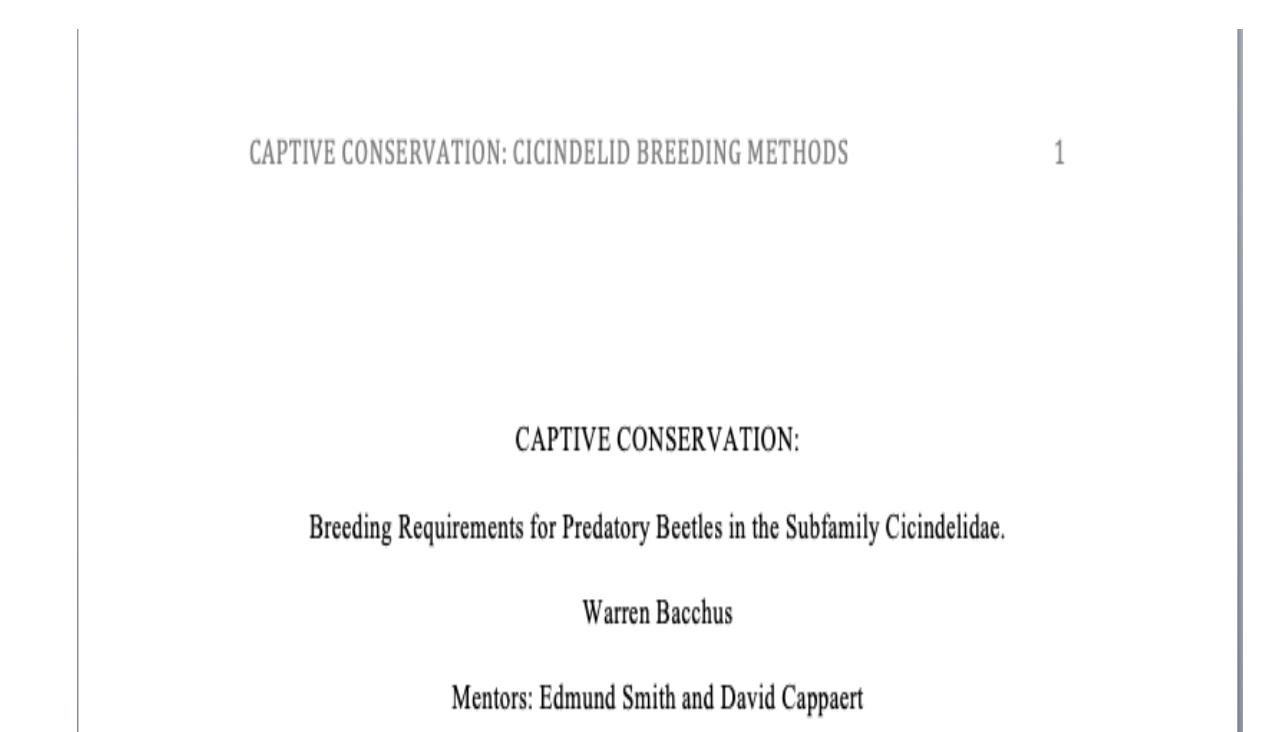


Fig. 7. Cover Page of my *Cicindelid Breeding Guide*

DISCUSSION

The findings from this project can be used to preserve the *Cicindelidae* in captivity in the hopes of transferring them to a new suitable habitat. It can also be used in order to learn more about the biology of lesser-studied species, as well as allow for scientists to breed their own populations for study.

Next season I plan to:

- Breed more tiger beetle species in captivity
- Answer more questions about rearing larvae (such as “why do larvae enter diapause randomly in captivity?” or “What conditions need to be provided for pupation?”)
- Identify soil types that each species uses

REFERENCES

- Knisley, C. B., & Schultz, T. D. (1997). *The Biology of Tiger Beetles and a Guide to the Species of the South Atlantic states*. Martinsville, VA: Virginia Museum of Natural History.
- Palmer, J.A. & Klatt, K. (2014). The Natural History and Captive Husbandry of the Salt Creek Tiger Beetle, *Cicindela* (= *Ellipsiptera*) *nevadica lincolniana* (Coleoptera: Carabidae). *Entomology Papers from Other Sources*, 123. (<http://www.titag.org/2014/2014papers/SALKCREEKTIGERTONYPALMER.pdf>)

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