

Collection and Digital Catalog Development of NEON's Domain 10.13 Carabid Beetles

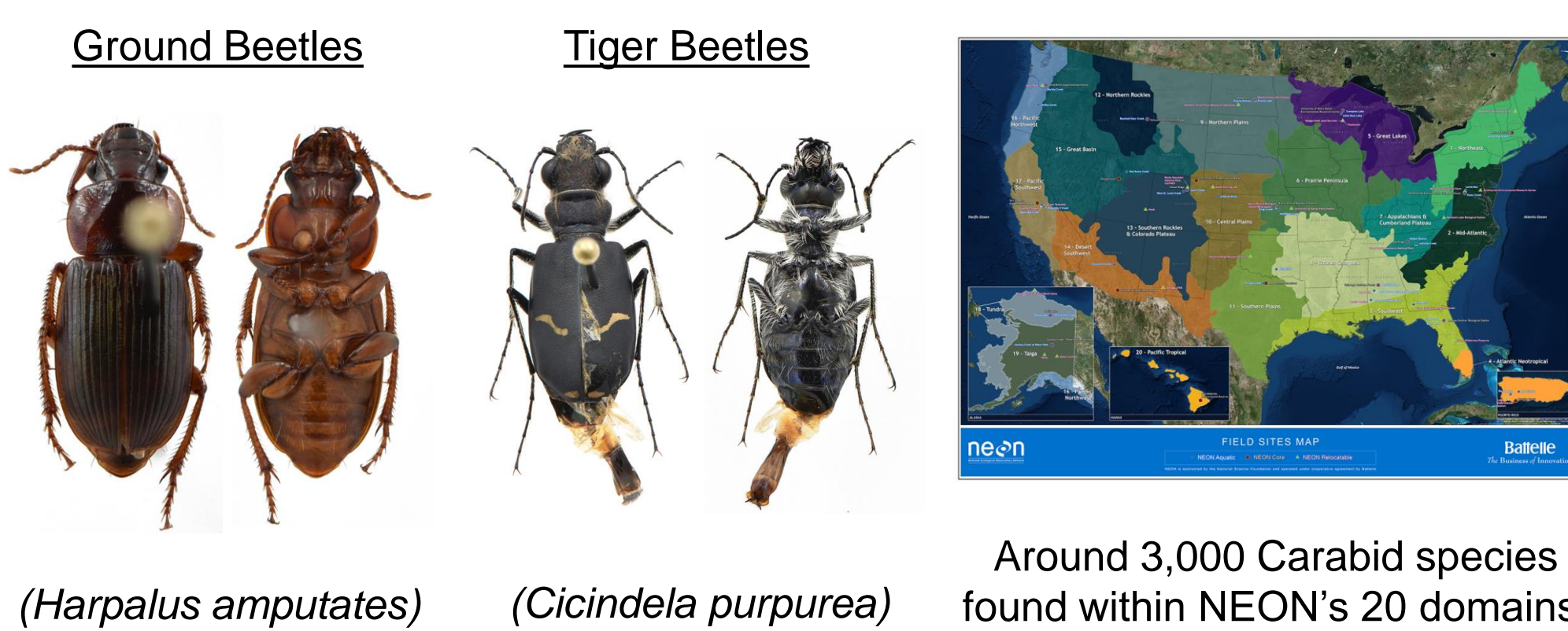


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Internship Project

Field ecology and beetle taxonomy were the two components of my NEON internship. I joined field technicians bi-weekly at the Central Plains Experimental Range (CPER) site near Nunn, Colorado. Specimens were collected and beetle pitfall traps were reset. Additionally, I photographed 40 of the most common beetle species (family Carabidae) collected at NEON sites within Colorado focusing on taxonomic features. A digital catalog of the specimens with photographic keys were created, along with user documentation. This resource will be used by future field technicians identifying local Carabid beetles and provides a digital catalog template for other NEON domains to develop their own catalogs in the future.

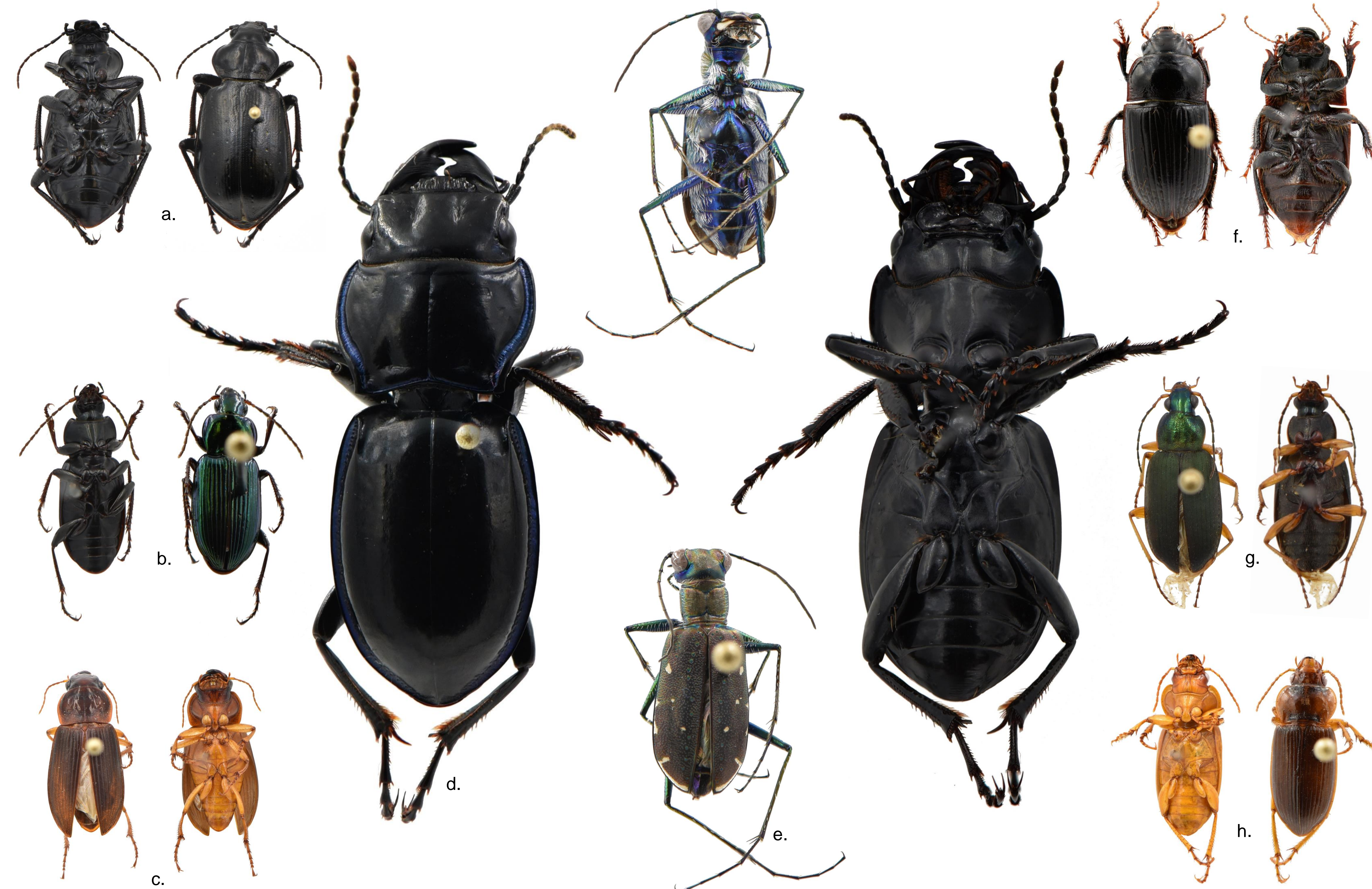
Beetle family: Carabidae



Carabids as Bioindicators

Carabid beetles have characteristics that make them useful biological indicators; their taxonomy is well known, they inhabit nearly every accessible habitat, and are easy to sample through pitfall trapping. Sensitivity to environmental conditions make them excellent indicators of arthropod diversity, changes in the environment, and modified land use. Carabids influence food webs by consuming other arthropods and related organisms, agricultural pests, and plant materials. Beetles are often a food source for higher trophic levels such as lizards, amphibians, birds, and small mammals.

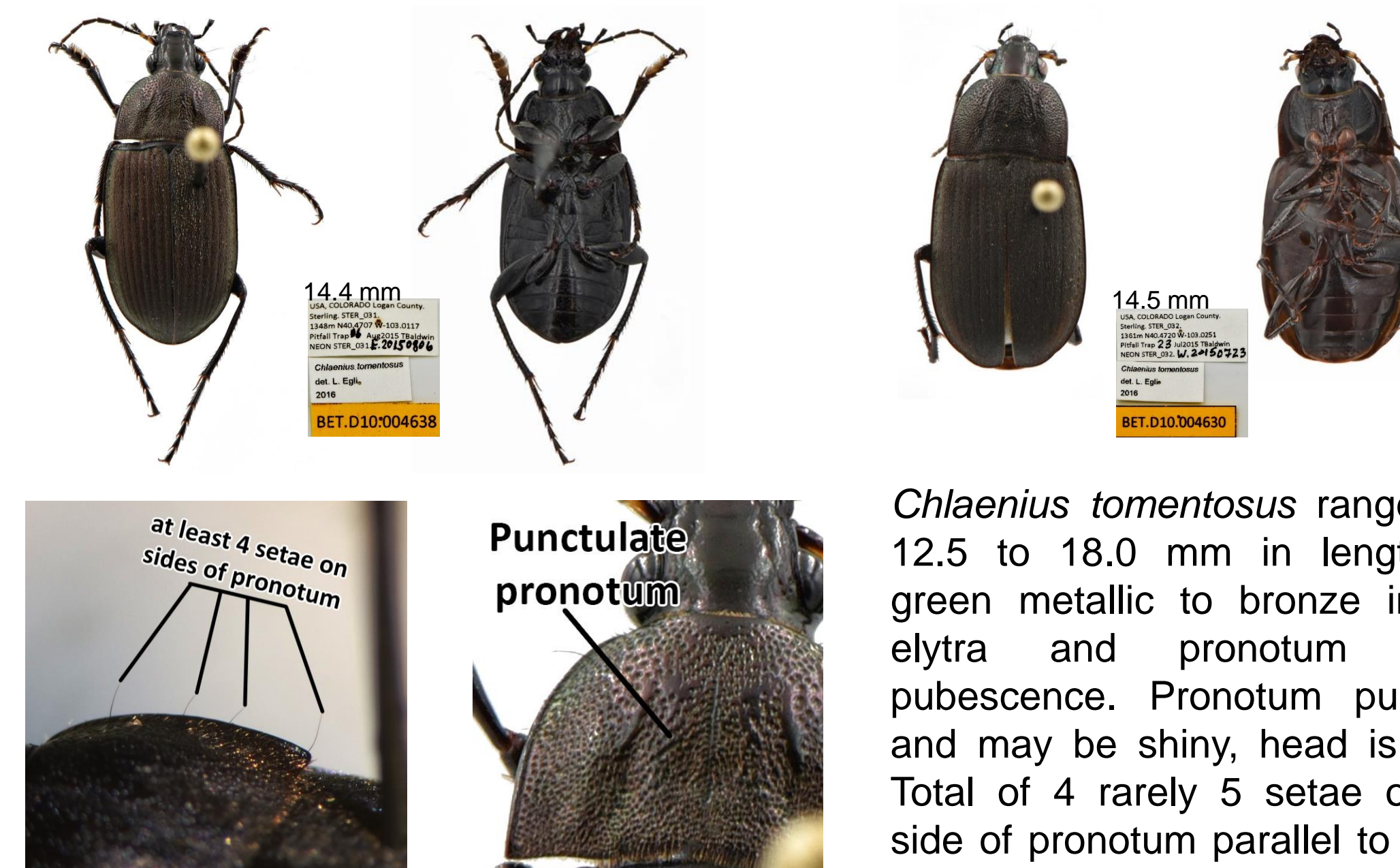
Colorado Carabidae Specimens



a. *Calosoma affine*, b. *Poecilus scitulus*, c. *Harpalus pensylvanicus*, d. *Pasimachus elongates*, e. *Cicindela punctulata*, f. *Euryderus grossus*, g. *Chlaenius nebraskensis*, h. *Amara carinata*

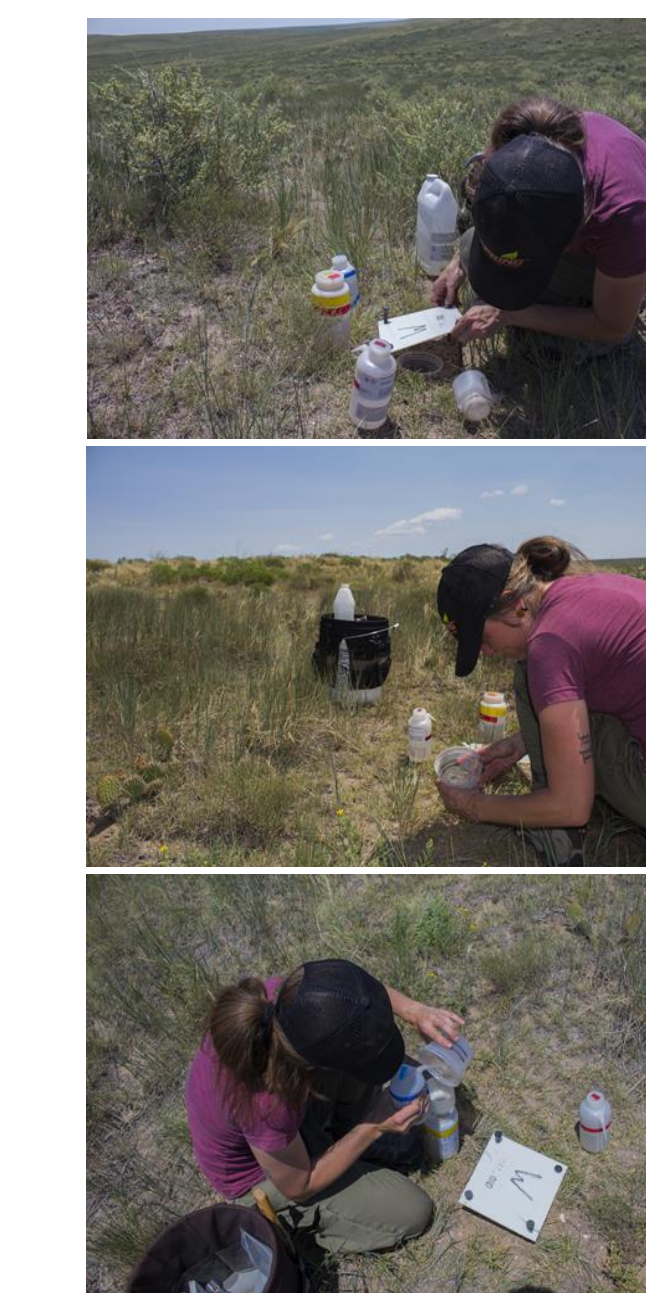
Digital Catalog Components and Example

Chlaenius tomentosus



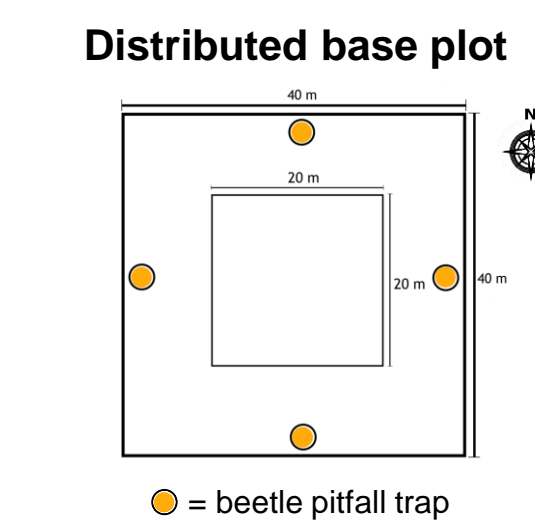
- Genus and species name
- Dorsal and ventral images of specimen
- Measurement of specimen
- Image of locality and descriptive labels
- Description of species
- Photographic keys illustrating significant characteristics

Carabid Beetle Collection Protocol



Plastic cups filled with a solution of 1:1 propylene glycol and deionized water are placed in a hole dug into the ground. Pitfall traps are installed flush and level to the ground to allow beetle entry. Trap covers with a small gap are secured above the cups to prevent unintended bycatch and rain from entering.

Four traps per plot are placed in each cardinal direction from center at 10 distributed plots at every site. Trap contents are collected and preserved in ethanol for later processing in the lab, including identification and pinning or preservation in ethanol. Traps are reset every two weeks during the growing season.



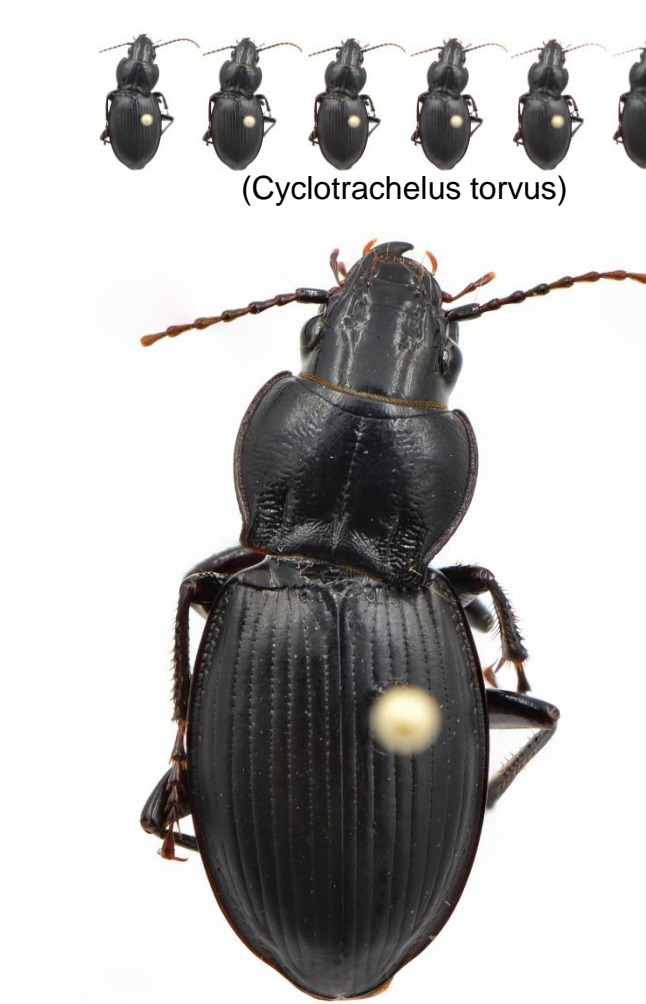
Photographing the specimens



A Nikon D750 camera with a 105 mm macro lens were used to photograph most of the beetles. A tripod aided camera stability and a light box provided bright white LED light. The pinned specimens were secured on a foam structure inside the light box.

Smaller specimens were photographed through a microscope using an Apple iPhone.

Images post-processing



The depth of field is extremely shallow in macrophotography. Two to twelve images of each view were taken to capture all focal planes. The photos were processed using a technique called focus stacking, which blends the images together to form a single focused image in Adobe Photoshop.

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