Highlights from Nearly 20 Years of Chasing Tiger Beetles in Missouri

Chris Brown & Ted MacRae

WGNSS Entomology Group

21 January 2019

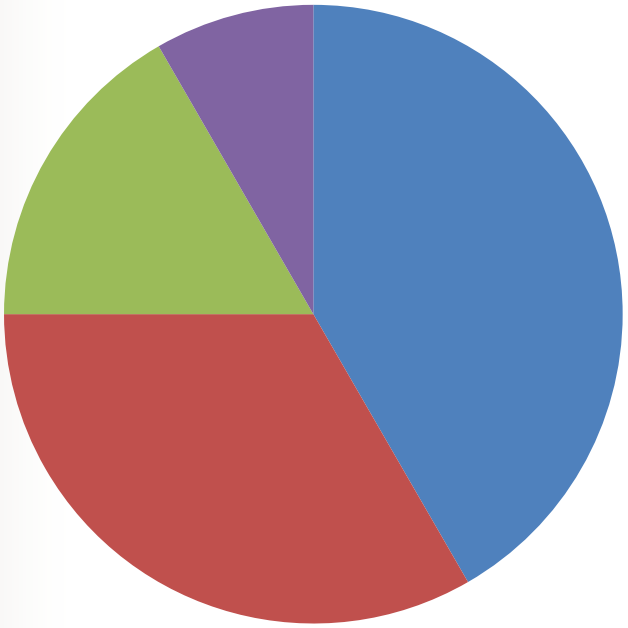
Toothy mandibles and rapid running capabilities
make tiger beetles formidable predators.

Field Identification of Tiger Beetles

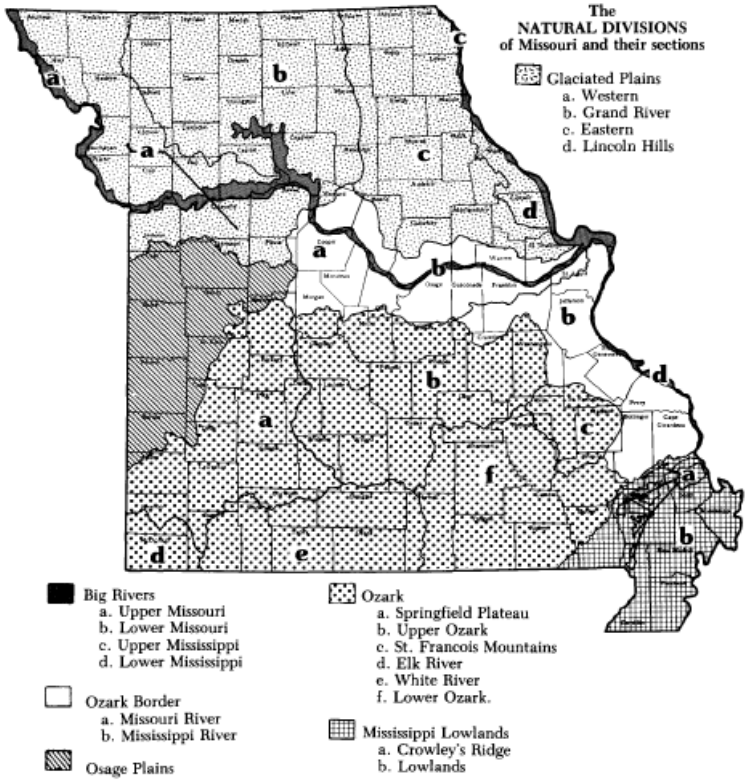
- Ground color
- Relative size/shape
- Elytral markings
  - Humeral lunule
  - Middle band
  - Apical lunule

Other features include shoulder angle, leg length, face length and color, “hairiness”, etc.

Faunal Affinities of Missouri Tiger Beetles



- East of Rocky Mountains
- Great Plains / Central U.S.
- Transcontinental
- Southern U.S.



Map Source: R. H. Thom & J. H. Wilson. 1980. The Natural Divisions of Missouri. Trans. MO Acad. Sci. 14:9–23.

Where do tiger beetles live?

Roadsides

Sand/gravel bars

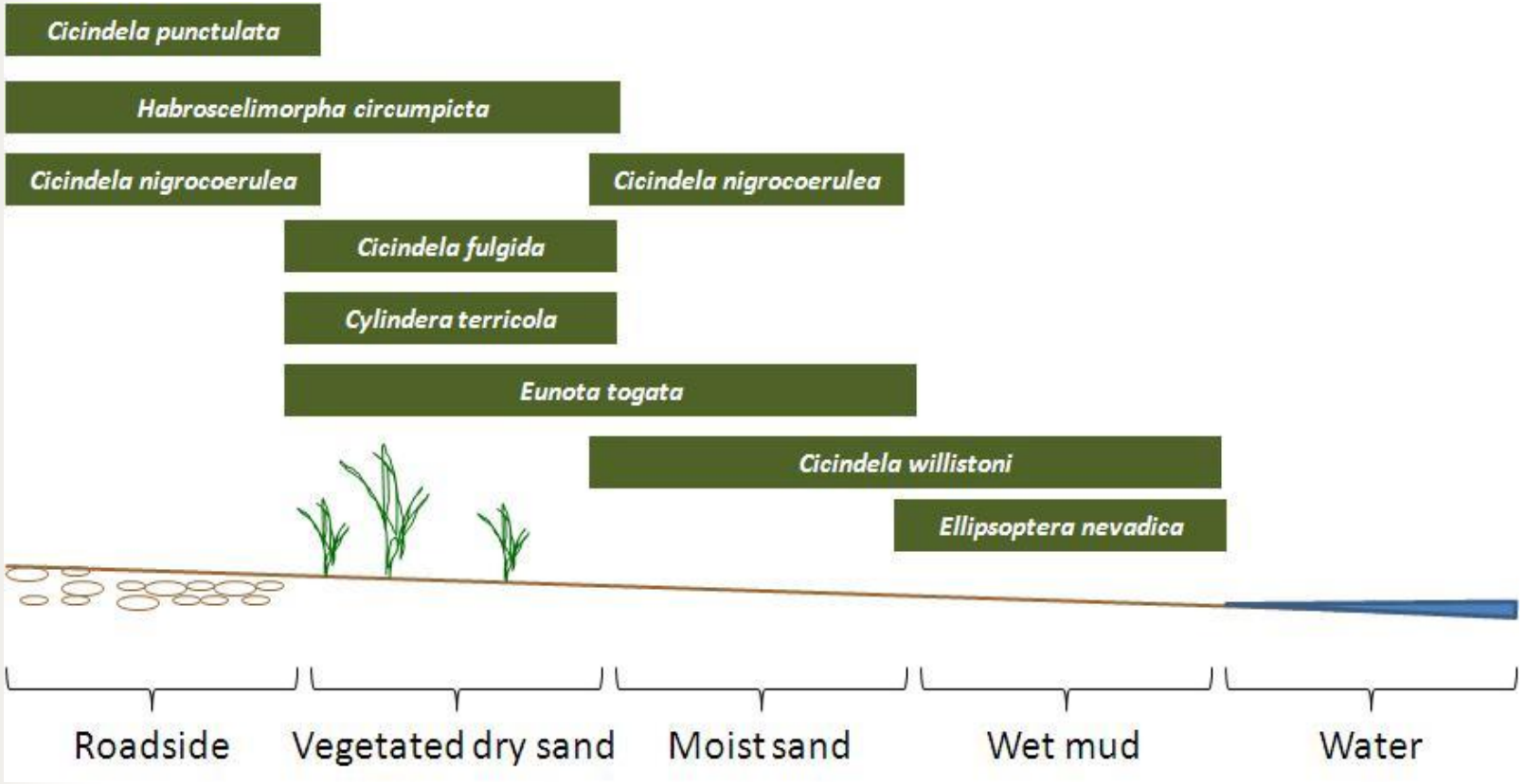
Open Woodlands

Glades

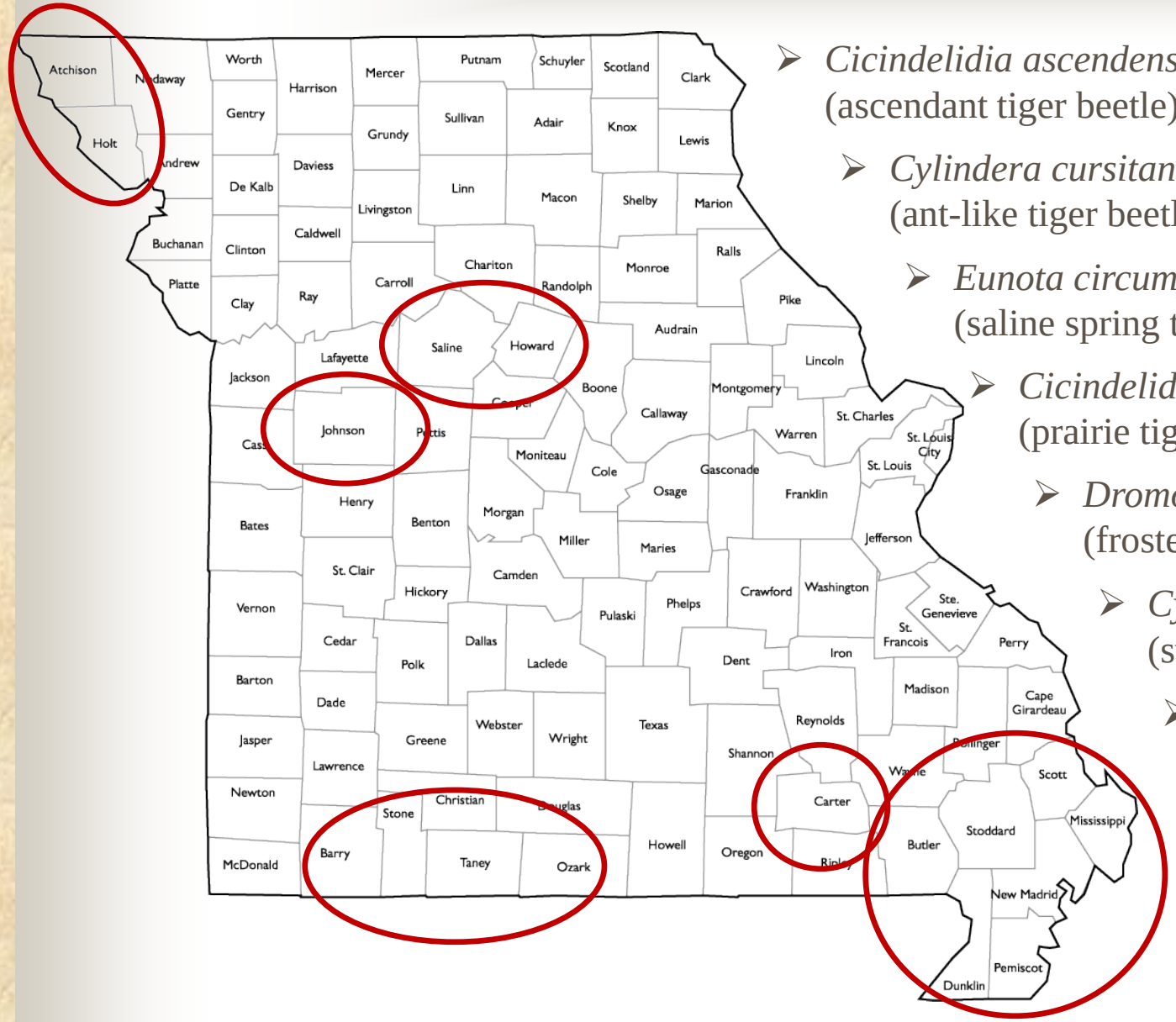
Sand Prairies

Loess Hills

Habitat partitioning by tiger beetles



Missouri Tiger Beetles



- *Cicindelidia ascendens trifasciata* (ascendant tiger beetle)
- *Cylindera cursitans* (ant-like tiger beetle)
- *Eunota circumpicta johnsonii* (saline spring tiger beetle)
- *Cicindelidia obsoleta vulturina* (prairie tiger beetle)
- *Dromochorus pruinina* (frosted dromo tiger beetle)
- *Cylindera celeripes* (swift tiger beetle)
- *Ellipsoptera lepida*[*] (ghost tiger beetle)

[*]widespread

Tiger beetle photography progression

Tiger beetle photography progression: first try at “set-up” shots

Tiger beetle photography progression: field shots revisited

Tiger beetle photography progression: field shots revisited

Tiger beetle photography progression: set-up shots revisited

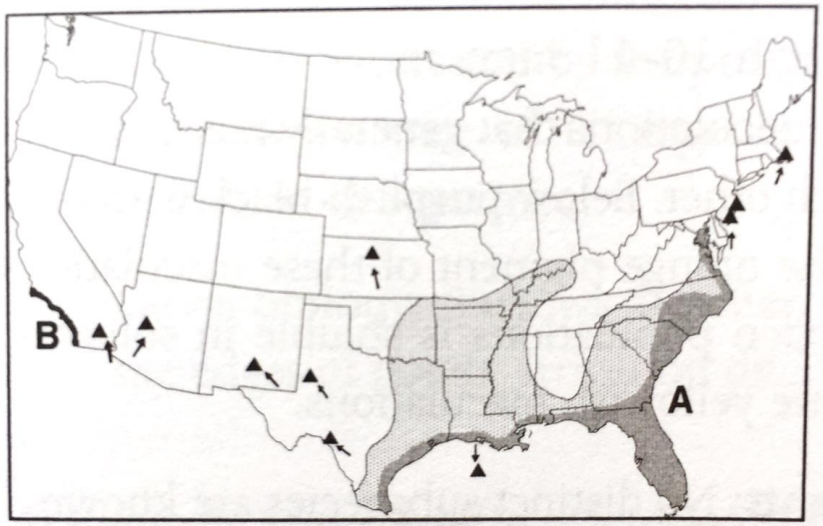
Direct flash lighting

“white box” flash lighting

Tiger beetle photography progression: set-up shots revisited


c.r.brown

Cicindelidia trifasciata ascendens



Map 73 S-banded Tiger Beetle, *Cicindelidia trifasciata*; **A**, *C. t. ascendens* (darkly stippled = regular occurrence, lightly stippled = irregular but not unexpected, triangle with arrow = unexpected occurrence; **B**, *C. t. sigmoidea*.

from A Field Guide to the Tiger Beetles of the US and Canada, second edition

C. t. ascendens: A prolific disperser

C. Brown, T MacRae. 2005. Occurrence of Cicindela (Cicindelidia) trifasciata ascendens LeConte in Missouri. *Cicindela* 37: 17-18

Cicindelidia trifasciata from Florida panhandle showing S-curved middle band

Cicindelidia obsoleta vulturina – prairie tiger beetle

Cicindelidia obsoleta – Prairie Tiger Beetle

Map 55 Large Grassland Tiger Beetle, *Cicindela (Cicindelidia) obsoleta;* A, *C. o. obsoleta;* B, *C. o. neojuvenilis;* C, *C. o. santaclarae;* D, *C. o. vulturina.*

- Main population in southwestern Great Plains
- Large species – only *Tetracha virginica* is larger.
- Upland species – never found near water. Prefers grasslands and hillsides with exposed soil.
- Small disjunct population in White River Hills of SW Missouri and NC Arkansas – on dolomite/sandstone glades.
- Main population is a "summer species", but MO/AR adults emerge in late summer and fall after seasonal rains.
- Powerful fliers

Image source: Pearson et al. (2006) *Tiger Beetles of the United States and Canada.*

Cicindelidia obsoleta – nominotypical form in western Oklahoma (Wichita Mountains National Wildlife Refuge). Individuals are mostly black.

Dolimite glade (technically “xeric limestone prairie”)
Blackjack Knob, Taney Co., southwest Missouri

Rocky exposures of Cotter-Jefferson City dolomite amidst little bluestem.

This large, powerful flier occurs only in glades in the White River Hills

Most individuals are dark olive-green, but some such as this one have brown highlights.

Other individuals show incomplete markings.


C. obsoleta vulturina

This male from Merriam Woods (northernmost site) typifies the population at this location – brown, marginal band incomplete, median band complete.

Tiger beetle aficionados – Steve Spomer (left) and Ted MacRae (right)
Near Hilda, Hwy 160 at Cane Creek Road.

White River near Calico Rock, Arkansas

Sandstone glade near Calico Rock, Arkansas
Habitat for *Cicindelidia obsoleta vulturina* (MO/AR disjunct)

Beetle's-eye view of sandstone glade habitat.

Coloration likely functions in crypsis, as shown by this individual nestled in amongst moss and lichens.

The beetle is more visible on more open ground and from a lower angle.

A rather greenish individual tries to hide amongst lichens and shortleaf pine duff.

A very weakly maculate individual.

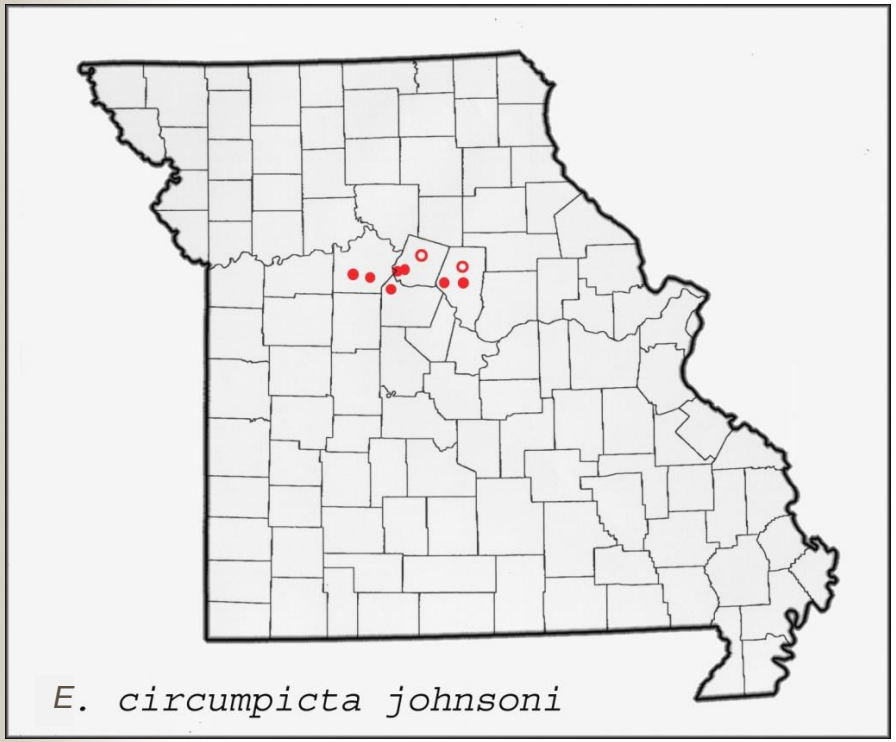
A dark, almost blackish female.

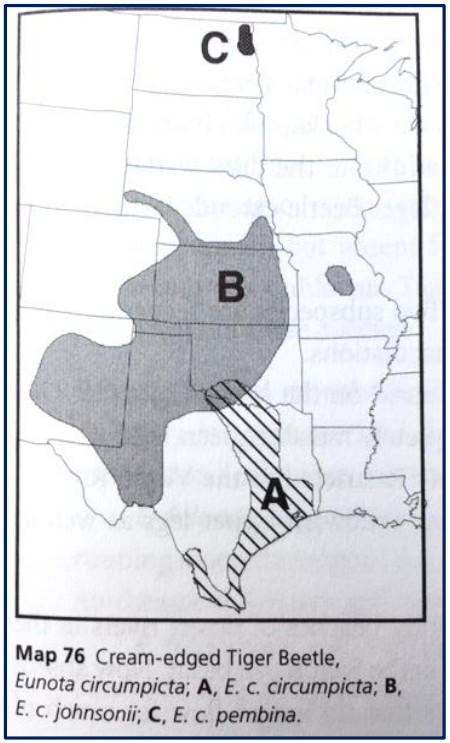
Unlike true spring-fall species, mating occurs in fall instead of spring.

The last sight that their prey sees.

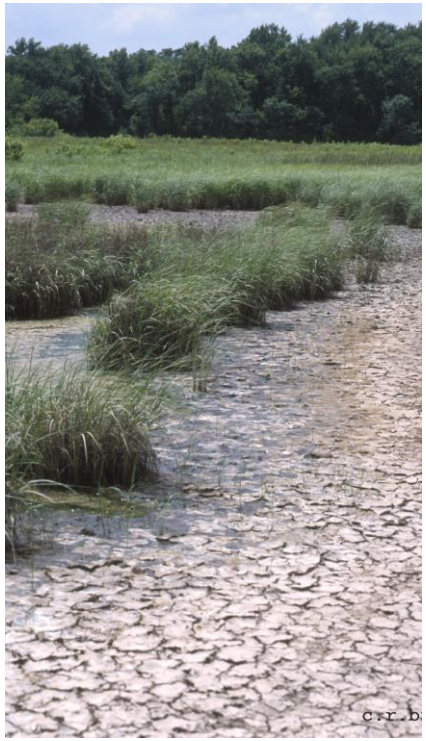
Eunota circumpicta johnsonii

Eunota circumpicta johnsoni: *A* species with extreme habitat specificity





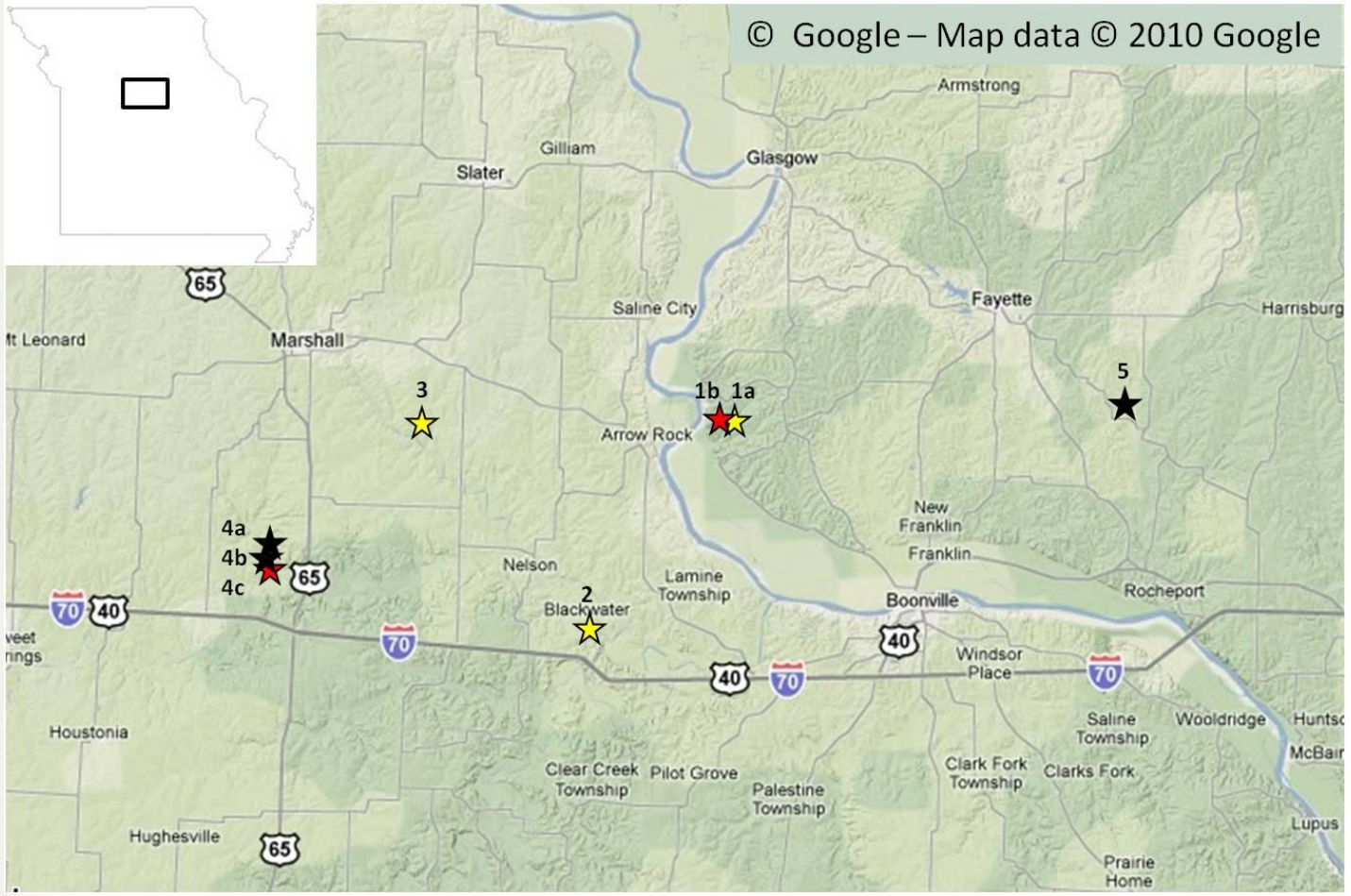
Map 76 Cream-edged Tiger Beetle, *Eunota circumpicta*; **A**, *E. c. circumpicta*; **B**, *E. c. johnsonii*; **C**, *E. c. pembina*.



Disjunct nature of Missouri *E. c. johnsoni* population and differences in coloration may warrant subspecific status for this population

North America distribution map from A Field Guide to the Tiger Beetles of the US and Canada, second edition

Saline seep/spring survey sites



Red stars indicate sites where *E. c. johnsonii* was observed during this survey,
Yellow stars indicate sites where the species has been recorded historically but was not seen during this survey
Black stars indicate sites from which the beetle has not been recorded at any time

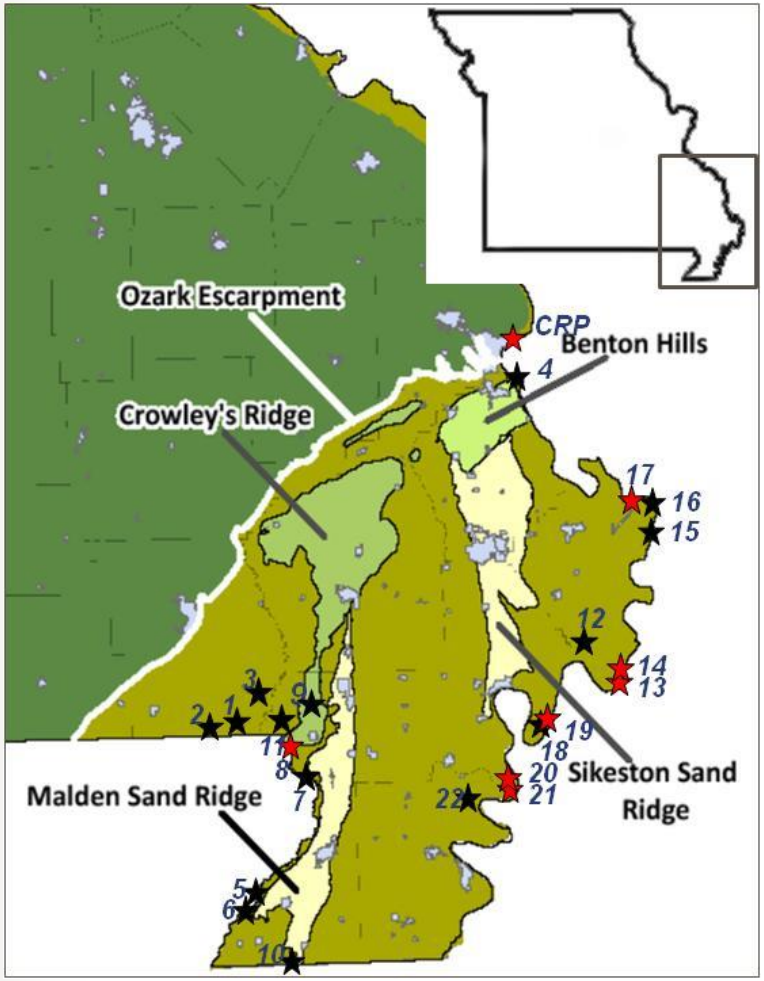

c.r.brown

Cylindera cursitans – ant-like tiger beetle. Resembles *C. celeripes* (swift tiger beetle) but with the marking connected and the legs not metallic.

Cylindera cursitans in Missouri

- Until recently, known from Missouri by a single specimen in the UMC collection labeled “nr. Portageville”
- Discovered in 2007 by Kent Fothergill at sites along the Mississippi River in New Madrid Co.
- 4-year survey initiated in 2007.
- Adults found at six sites in southeast Missouri along the Mississippi River and one site along the St. Francois River.

Cylindera cursitans survey



2011. September *CICINDELA* 43(3):59

DISTRIBUTION, SEASONAL OCCURRENCE, AND CONSERVATION STATUS OF *CYLINDERA* (S. STR.) *CURSITANS* (LECONTE) IN MISSOURI

Ted C. MacRae[1], Christopher R. Brown[2], and Kent Fothergill[3]

ABSTRACT

Cylindera (s. str.) *cursitans* (LeConte) (Coleoptera: Cicindelidae) is a small tiger beetle known from Missouri until now by only a single specimen collected "nr. Portageville" in extreme southeastern Missouri. Beginning in 2007, pitfall traps and direct observations were employed at multiple sites in a 4-season study to more fully characterize its distribution and seasonal occurrence in the area. Adults were observed at seven sites, all of which border the Mississippi or St. Francis Rivers (Dunklin, Mississippi, and New Madrid Counties) and support wet bottomland forest. Population size at each site ranged from one to many observed individuals; however, no adults were taken in pitfall traps at any site. In addition to these surveys, two specimens collected in 2001 further north along the Mississippi River in Cape Girardeau Co. and two collected in 2006 near one of the subsequent study sites in New Madrid County were found in the collections of Mike Smart (Cape Girardeau, Missouri), Peter Messer (Mequon, Wisconsin), and Southeast Missouri State University (Cape Girardeau). Dates of occurrence ranged from 24 May to 13 July, with adults most active during late morning and early afternoon. The inability of pitfall traps to detect robust populations of this species is puzzling and contrasts with its successful use to detect populations of other tiger beetle species in Missouri. The results of this study suggest that *C. cursitans* is secure in suitable bottomland forest habitats along the Mississippi River and St. Francis Rivers in southeast Missouri, and that no special conservation measures are required at this time to ensure its continued presence in the state. However, additional surveys are warranted to determine the full extent of the species distribution within Missouri, especially at more northern locations along the Mississippi and St. Francis Rivers and possibly also along the Missouri River.

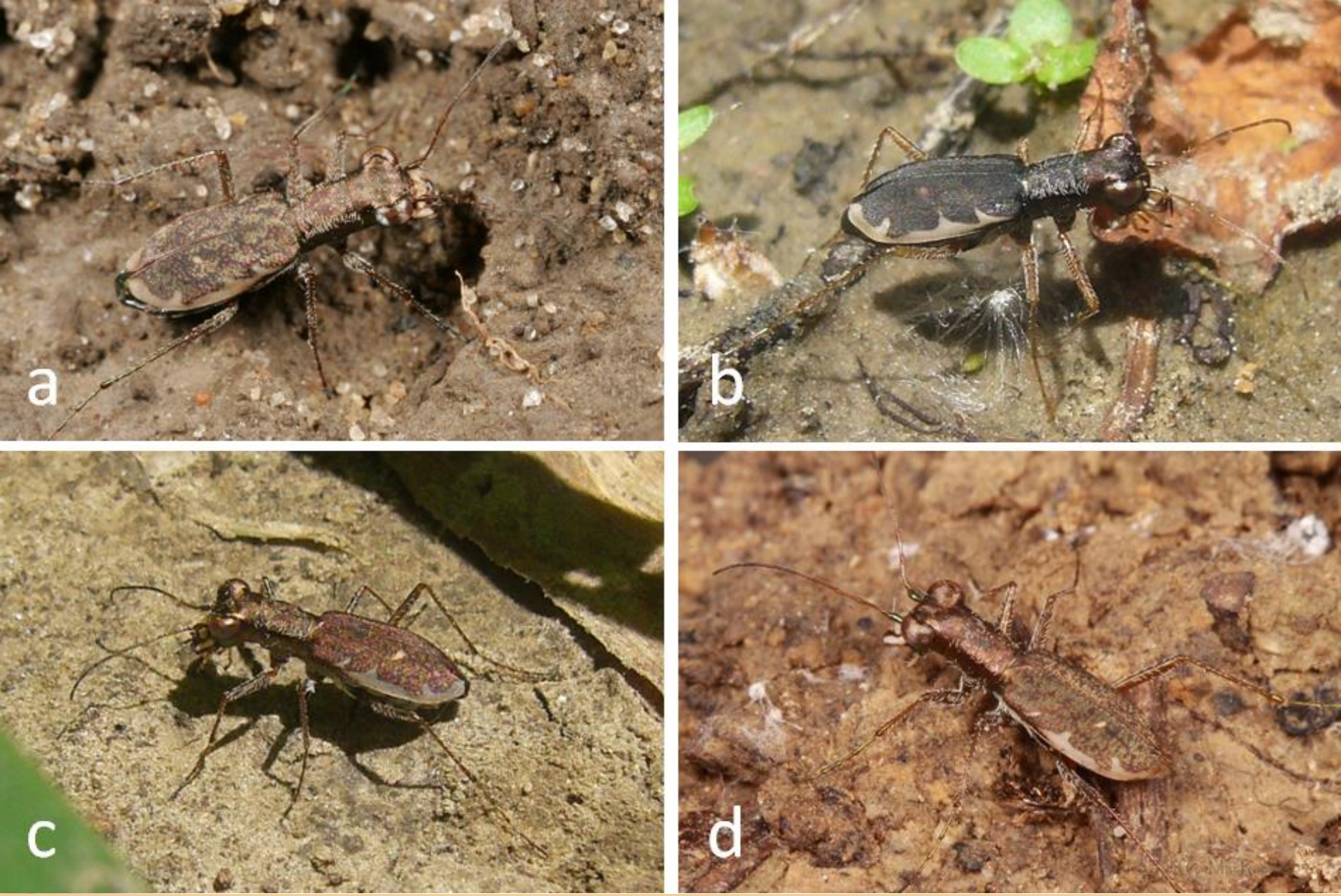


Figure 2. *Cylindera cursitans* in southeast Missouri: a) New Madrid Co., Girvin Memorial Conservation Area, 6.vii.2007; b-c) Mississippi Co., Dorena Ferry Landing, 6.vii.2008; d) Mississippi Co., Hwy 60 at Mississippi River bridge, 20.vi.2009. Photos by CRB (a) and TCM (b-d).

Cylindera cursitans habitat

- Restricted to wet bottomland forests
- Cottonwood (*Populus deltoides*)/silver maple (*Acer saccharinum*) canopy
- Understory of poison ivy (*Toxicodendron radicans*) and trumpet creeper (*Campsis radicans*)—"radical" understory ☺
- "Sandy ridge/swale topography
- Occurrence of this species in Missouri outside of Mississippi Alluvial Plain uncertain

Cylindera cursitans – Chalk Bluffs Natural Area, Arkansas

“But, grandmother, what big eyes you have.”

“The better to see you with, my dear.”

“Oh, but, grandmother, what a terrible big mouth you have.”

Dromochorus pruinina, frosted tiger beetle

Johnson Co., 10 mi [16 km] W Warrensburg on Co. Rd. DD, June 26, 1975, B. Cutler

July 15, 2005 (trap checking trip)

Oh, persistence is the thing ya gotta have…

KNOB NOSTER SP

At some point while I was at Blue Lick I considered the possibility of again checking for priinina around Knob Noster SP since I would be roughly going by there on the way down to Osceola. The prospect of checking the spot was hopeful only b/c I would be arriving late evening when priinina is known to be more active. However, there was much more reason to think that I would be again spinning my wheels since I had searched the area numerous times at appropriate times of the day on 2 trips a couple of summers ago.

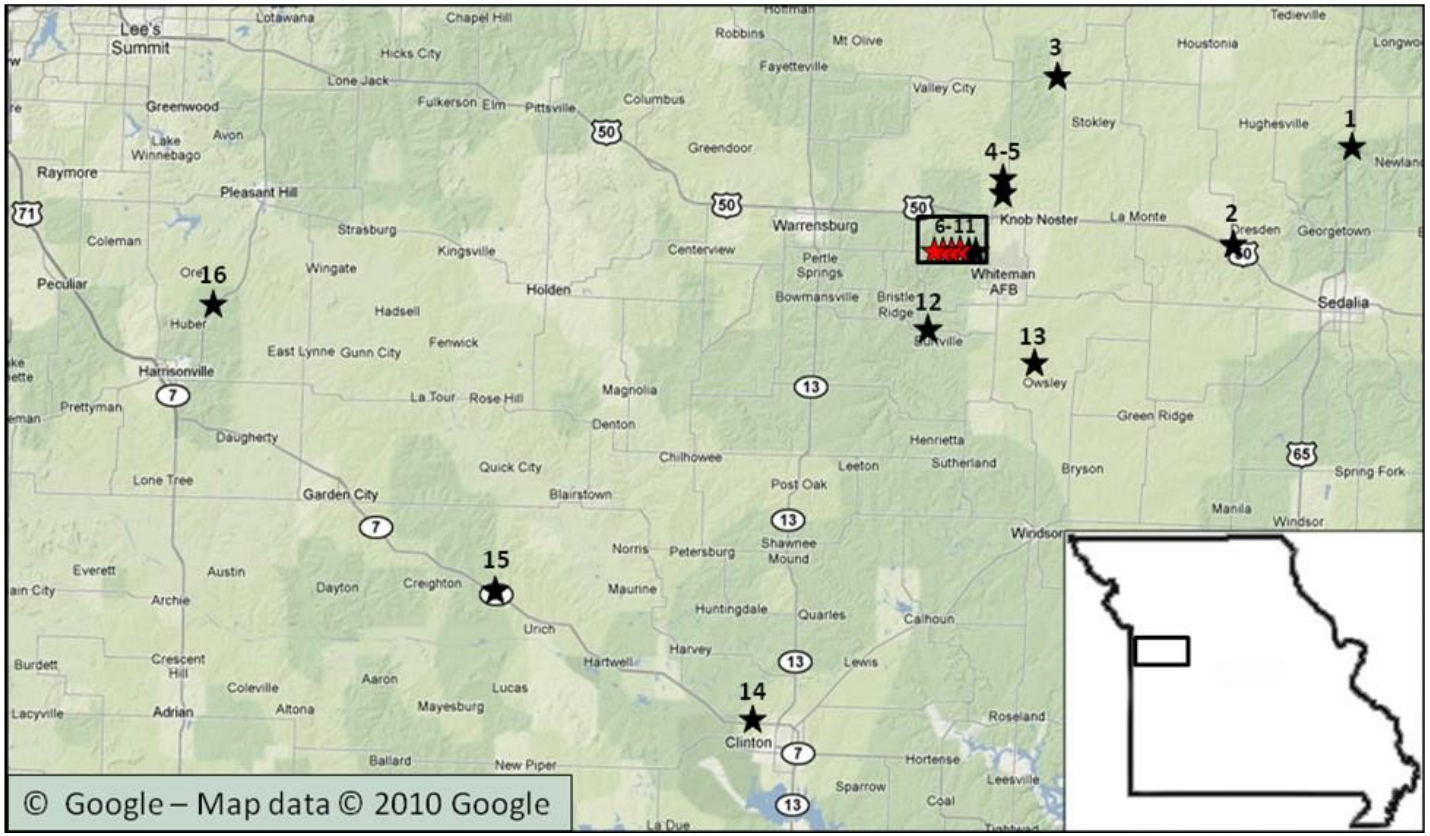
There wouldn't be much time since nightfall would keep my search short. So, I decided to stop at a spot on the south end of the park (roadside off hwy DD) that had seemed to match the description where Brue Cutler had found some in the 70's north of Hwy 50 (ie. rock outcrop w/ varying amounts of vegetation surrounding) I took Hwy 23 south of 50, then ~~East~~ WEST on DD for a mile where I parked in a drive on the south side of the road (1.0 miles from Hwy 23). I walked the north side of the road eastwards towards the rock outcrops 60m distant. The area was fairly well vegetated alternating w/ some more barren sections (quite a bit more barren near the outcrop). I hadn't searched for more than 10 minutes before I saw what looked like priinina scurry into an opening b/w clumps of vegetation. I quickly dropped to my knees and covered the beetle w/ my hand. It was indeed Cicindela priinina !!!! I realized that I hadn't even brought a vial (Oh, ye of little faith) so I went back to the car, grabbed a vial, and returned to the search. I found a captured 2 more in fairly open areas down by the rock outcrop before it became too dark to search anymore. To have found 3 in the 40 minutes that I searched is a good indication that beetles are quite common in the area.

I was walking on air as I headed back to the car. pure elation.

NOTE: 2 other records exist from the 1930's from the Columbia area though they were from April & May ??? Ted thinks highly incredible

D. pruinina trapping locations 2006

- Surveyed widely in 2006 but found only at original and nearby locations
- Focused survey around park in 2007

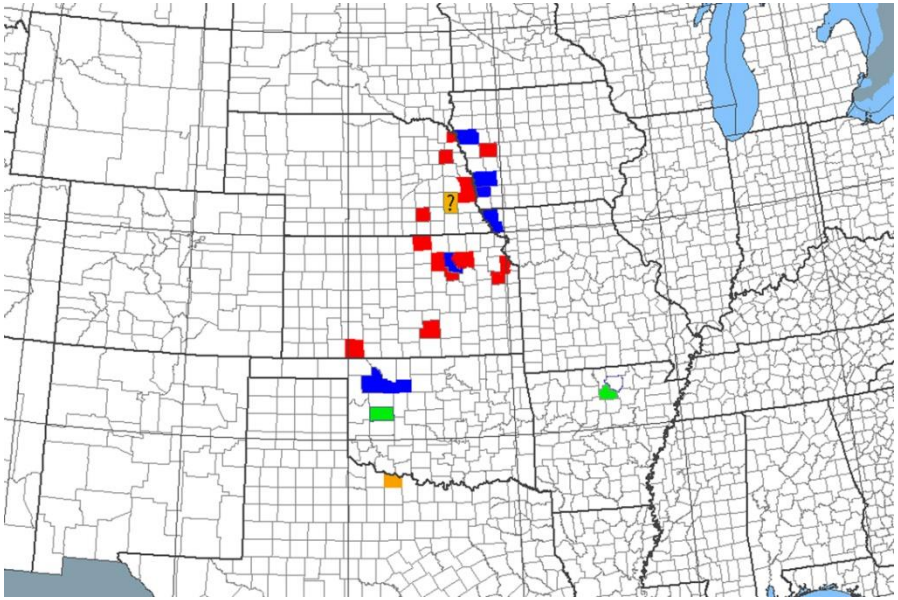


2018

Cylindera celerips – swift tiger beetle. Resembles *C. cursitans* (ant-like tiger beetle) but with the elytral marking disconnected and the legs metallic.

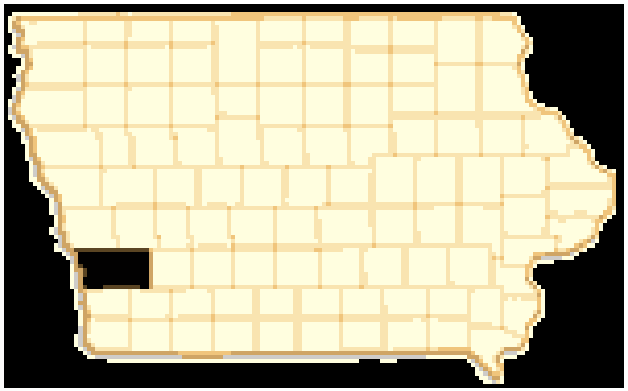
Cicindela celeripes – swift tiger beetle

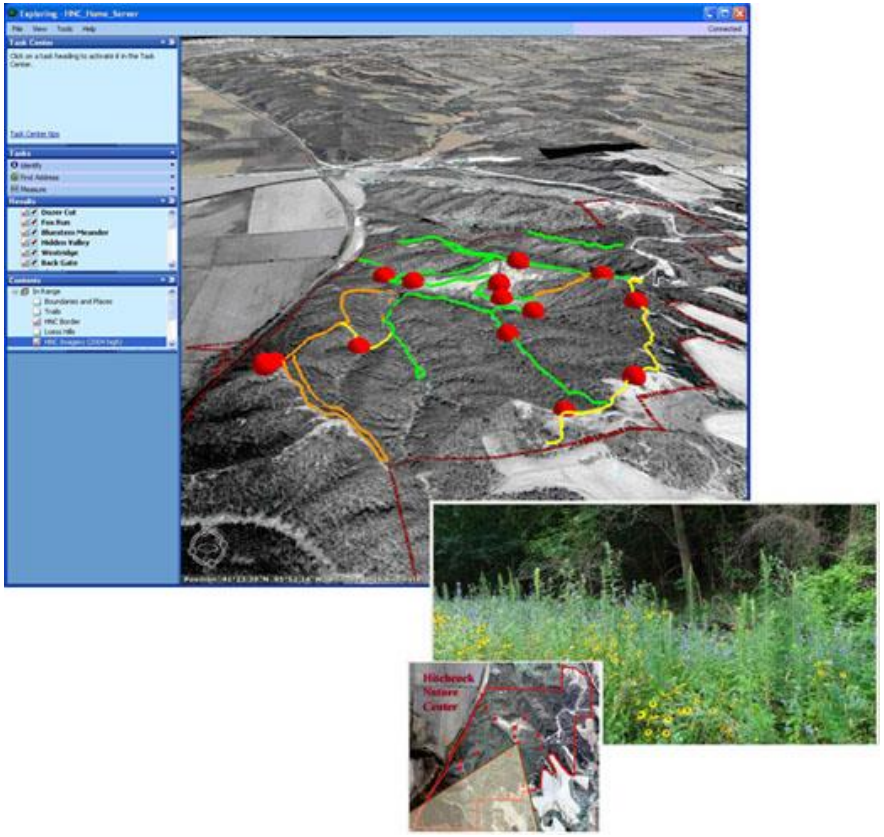
- One of North America's rarest tiger beetles
- Recorded only from the eastern and southern Great Plains
- Adults are flightless
- Flint Hills population remains strong, other populations have suffered severe declines
- Apparently extirpated from Nebraska
- Recently found in the Loess Hills in Iowa
- New populations found Oklahoma & Missouri



Hitchcock Nature Center

- *Cicindela celeripes* discovered at Hitchcock in early July 2008





Hitchcock Nature Center

- Acquired by Pottawattamie County in 1991
- Harbors some of the largest remaining prairie remnants in Iowa
- Previously grazed
- Woody growth removed using mechanical removal and rotational burns

Cicindela celeripes habitat

"That's tiger beetle land down there!"

"I thought I saw something flash across a bare patch out of the corner of my eye - was that it?"

Cicindela celeripes

"Within a few more minutes I saw the flash again - this time there was no doubt as to what it was"

"I started slapping the ground frantically as the little guy darted erratically under, around, and over my hands."

Cicindela celeripes adult female with egg

"I was simultaneously exuberant at having succeeded in finding it, utterly astounded by its speed and evasiveness, and desperately afraid that it was getting away - swift tiger beetle, indeed!"

Finding *C. celeripes* in Missouri

- Intensive surveys conducted in northwest Missouri during June 2009
- Apparent need for large expanses of open habitat
  - Flightlessness limits dispersal capabilities and increases chances of localized extinctions in small parcels
  - Needs disturbance?
- Found at three localities:
  - Brickyard Hill
  - Star School Hill Prairie
  - McCormack Loess Mounds
- Used Google Maps to identify most suitable microhabitats within parcels
- Repeated visual searches by day

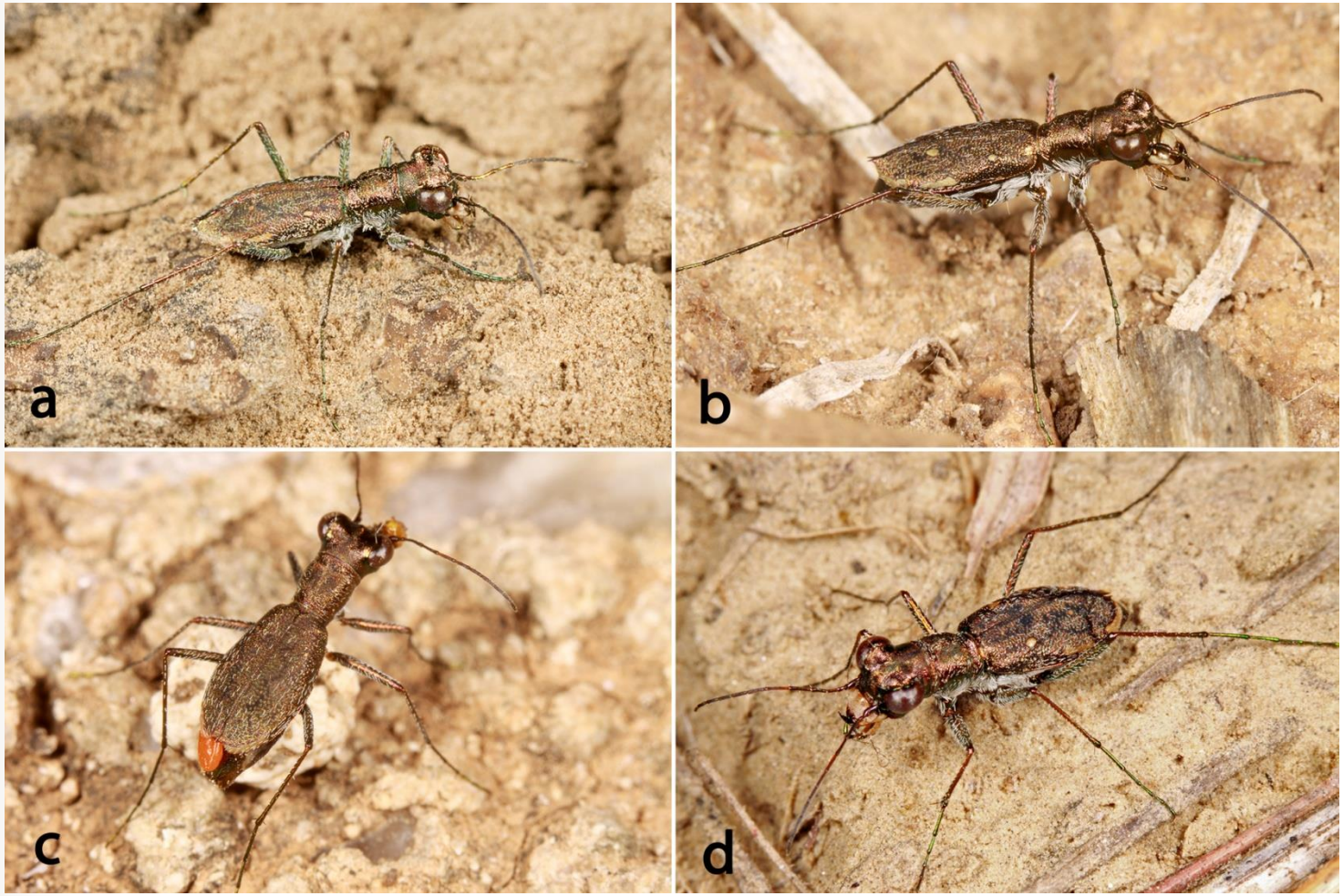
Photo © Christopher R. Brown 2008

Missouri Habitats for *C. celerpes*

- Brickyard Hill Loess Mounds Natural Area
- Star School Hill Prairie Natural Area
- McCormack Loess Mounds Natural Area

Not all Loess Hilltop Prairies support *C. celeripes*!

A sampling of *C. celeripes* populations



a. Iowa (Hitchcock Preserve); b–c. Oklahoma (Alabaster Caverns); d. Missouri (Brickyard Hill).

P1030244.MOV

Photo#8174

Swift Tiger Beetle - *Cylindera celeripes*

Alabaster Caverns, Western, Oklahoma, USA
May 23, 2003

Cicindela celeripes
7mm
This tiger beetle is flightless.

tag · login or register to post comments

Contributed by Charles Schurch Lewallen on 23 October, 2004 - 7:53pm
Last updated 30 March, 2016 - 1:21pm

Neat, moved to guide

Nice photo. I jotted off a quick guide and moved the image there.

Calendar

Upcoming Events

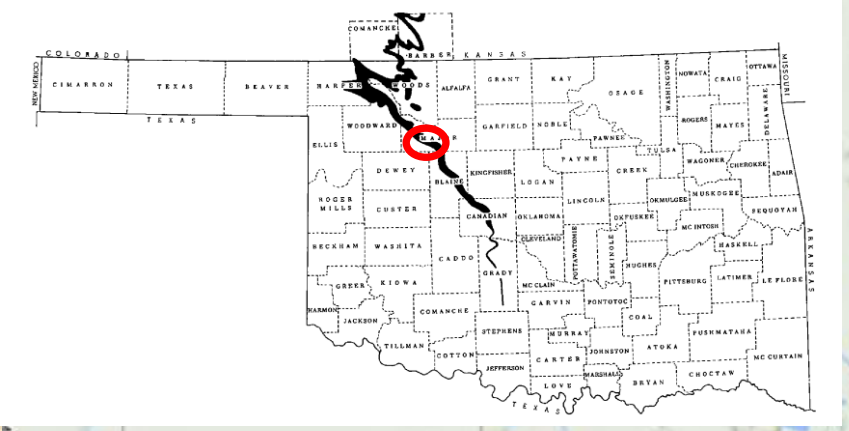
Discussion, insects and people from the 2018 BugGuide Gathering in Virginia, July 27-29

Photos of insects and people from the 2015 gathering in Wisconsin, July 10-12

Photos of insects and people from the 2014 gathering in Virginia, June 4-7.

Photos of insects and people from the 2013

Alabaster Caverns State Park, Oklahoma. Swift tiger beetles were abundant in the rocky exposures amongst the clumps of vegetation.



Glass Mountains State Park

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Gloss Mountain State Park is at the northernmost end of the range.

The Gloss Mountains are a system of buttes and mesas with gypsum caps over red clays laid down in the Permian (230–280 mya).

The beetles dart between clumps of vegetation in the gypsum exposures.

Swift tiger beetle larval burrow

Swift tiger beetle 3rd-instar larva

Swift tiger beetle abdominal hump

Rearing the swift tiger beetle

Swift tiger beetle larvae sitting in their burrows

The first ever “reared” swift tiger beetle

The Coleopterists Bulletin, 65(3): 230–241. 2011.

Historical and Contemporary Occurrence of *Cylindera* (*s. str.*) *celeripes* (LeConte) (Coleoptera: Carabidae: Cicindelinae) and Implications for its Conservation

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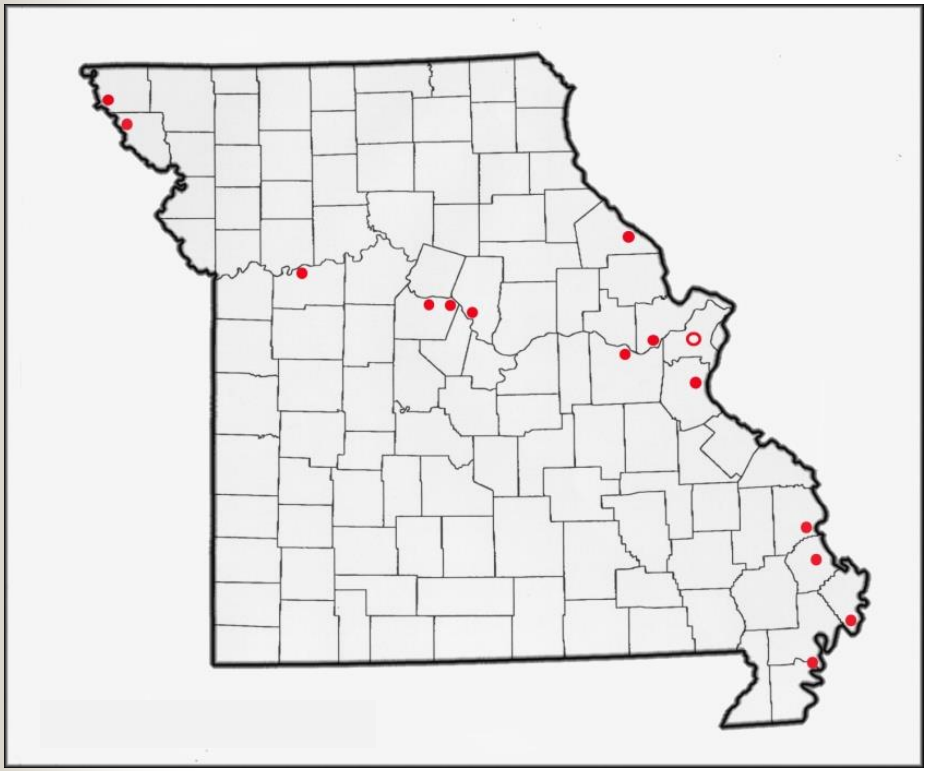
Abstract

New observations of *Cylindera* (*s. str.*) *celeripes* (LeConte) (Coleoptera: Carabidae: Cicindelinae) are presented from Arkansas, Iowa, Missouri, and Oklahoma and discussed in the context of its historical occurrence in the eastern and central Great Plains. Once abundant in eastern Kansas and Nebraska and western Iowa, the species has declined below detectable levels in much of this area during the past century due to loss of its preferred native grassland habitats. On the other hand, robust populations have been found recently in the Red Hills of western Oklahoma, and the species is also reported in Missouri for the first time and confirmed from Arkansas (White River Hills). These recent observations suggest that the Oklahoma Red Hills population is healthy and not under immediate threat, while those in the Flint Hills and Loess Hills are vulnerable due to their small size and low numbers. The White River Hills population is documented by only a single specimen, thus its status currently cannot be assessed. Conservation measures to protect these populations may be warranted.

Key Words: distribution, endangered species, Great Plains, survey, tiger beetles

Ghost tiger beetle, *Ellipsoptera lepida*



Ellipsoptera lepida records in Missouri

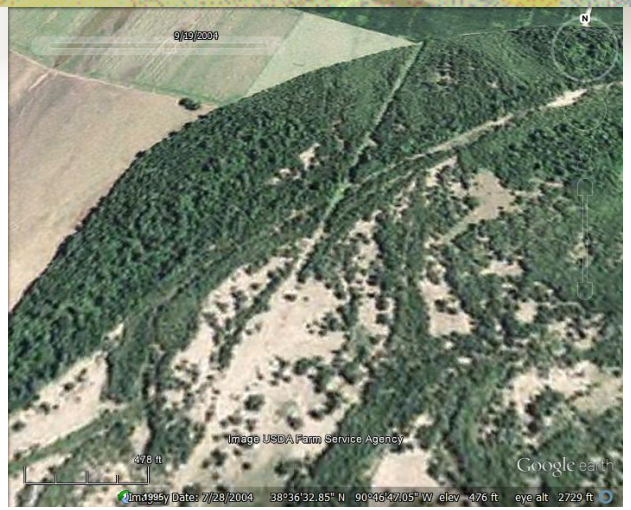
E. lepida habitat: Flood Dependent

Key points 1) These areas are “ephemeral”

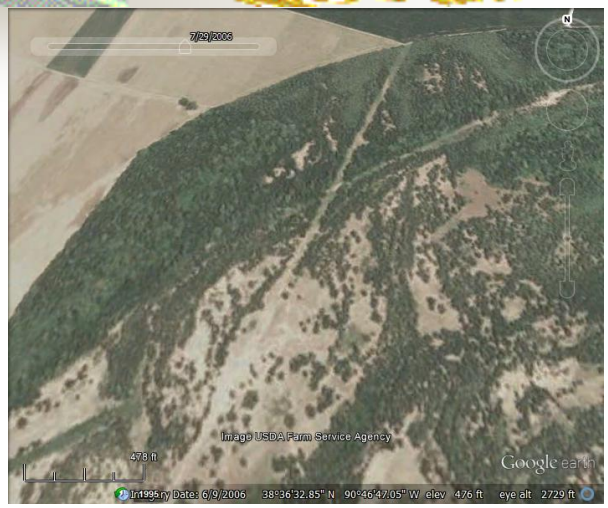
2) Prime sites created by 1993 flood

Habitat Persistence Assessment: Darst Bottoms CA

5 April 1995



28 July 2004



9 June 2006

15 August 2006

15 June 2009

1 September 2011

Source: Google Earth

Key elements for status *E. lepida* in Missouri

- Habitat persistence
- Habitat formation
  - Flood frequency and intensity
  - Flood control efforts
- Conservation efforts

Habitat Persistence: Darst Bottoms CA

2014 *E. lepida* still present

Habitat formation

Thurnau Conservation Area 2015

Citizen science and tiger beetles

- Diary of a citizen scientist: Chasing tiger beetles and other new ways of engaging the world

  --Sharman Apt Russell

- Growing our knowledge of the natural world depends more and more on this
- Becoming better at general natural history through specialization

Thank You!

Beetles in the Bush

See more of Ted's photographs at:

Beetles in the Bush

http://beetlesinthebush.wordpress.com

(just Google it!)