

*Nine days, ten states, 4,300 miles:
My peripatetic quest for North America's
rarest tiger beetles*

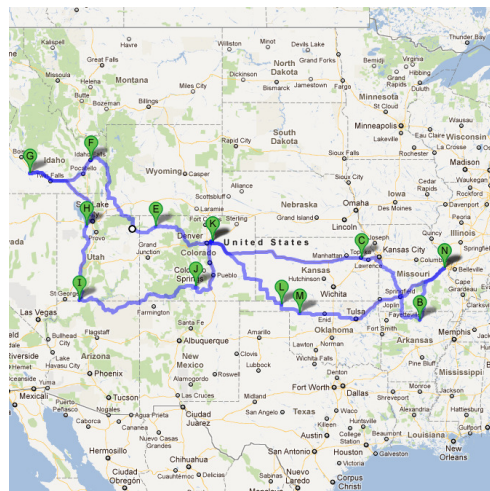


Ted C. MacRae

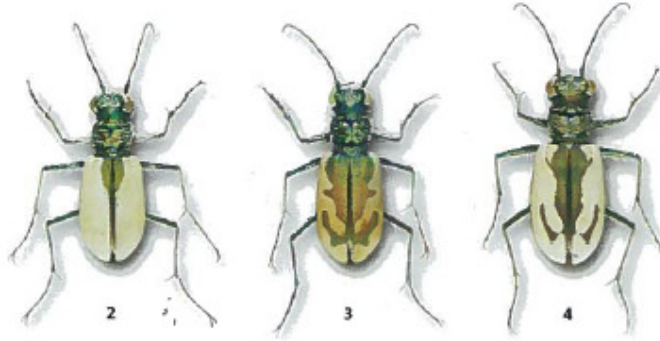
WGSS Entomology Meeting – January 2012

2011 Annual Fall Tiger Beetle Trip

- **B – Calico Rock**
north-central Arkansas
- **E – Yampa Valley**
northwestern Colorado
- **F – St. Anthony Dune**
southeastern Idaho
- **G – Bruneau Dune**
southwestern Idaho
- **H – Clover Reservoir**
northwestern Utah
- **I – Coral Pink Sand Dune**
southwestern Utah
- **J – Great Sand Dune**
south-central Colorado
- **L – Beaver Sand Dune**
northwestern Oklahoma
- **M – Glass Mountains**
northwestern Oklahoma



Western Sand Dune Endemics - Species



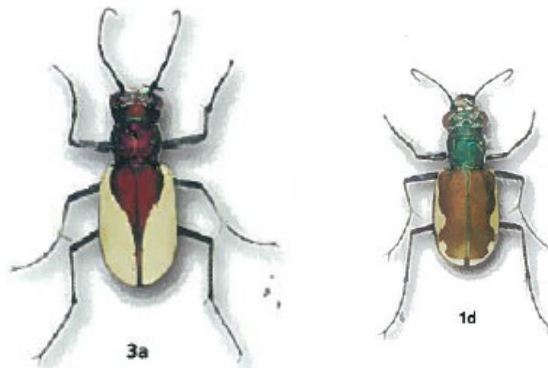
Cicindela albissima
Coral Pink Dune
Tiger Beetle

Cicindela theatina
Colorado Great Sand Dune
Tiger Beetle

Cicindela arenicola
St. Anthony Dune
Tiger Beetle
(includes *C. waynei*,
Bruneau Dune Tiger Beetle)

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

Western Sand Dune Endemics - Subspecies

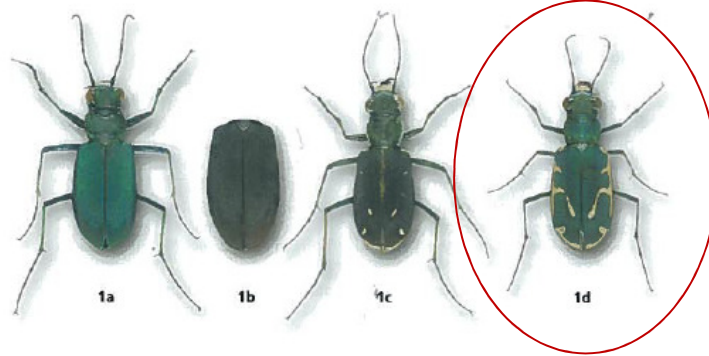


Cicindela formosa gibsoni
Gibson's Big Sand
Tiger Beetle

Cicindela scutellaris yampae
Yampa Festive
Tiger Beetle

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

Cicindelidia obsoleta – Large Grassland Tiger Beetle

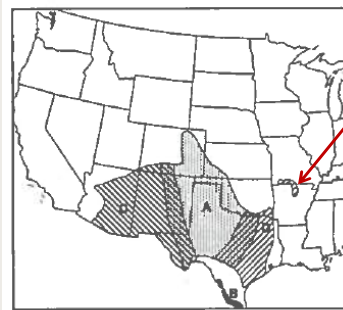


Cicindelidia obsoleta obsoleta
southwestern Great Plains

Cicindelidia obsoleta vulturina
southeastern Great Plains MO/AR disjunct

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

Cicindelidia obsoleta vulturina Prairie Tiger Beetle (MO/AR disjunct)



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

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



White River near Calico Rock, Arkansas



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



Cicindelidia obsoleta vulturina – Prairie Tiger Beetle



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



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.



Beetle's-eye view of sandstone glade habitat.



Cicindela scutellaris yampae
Yampa Festive Tiger Beetle

Map 43 Festive Tiger Beetle, *Cicindela* (*Cicindela*) *scutellaris*; A, *C. s. scutellaris*; B, *C. s. flavoviridis*; C, *C. s. lecontei*; D, *C. s. rugata*; E, *C. s. rugifrons*; F, *C. s. unicolor*; G, *C. s. yampae*.

- Species occurs broadly east of the Rocky Mountains and exhibits the greatest amount of geographical variation of any tiger beetle species in North America
- Disjunct population in Yampa Valley, Colorado
- Dry, upland sand habitats, including dunes, blowouts, road cuts, and sparsely vegetated pine and pine-oak forests
- “Spring-fall” species
- Yampa ssp. distinguished by usually broad marginal band

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



Cicindela scutellaris yampae – Yampa Festive Tiger Beetle



The population exhibits a high degree of macular development
(and this female demonstrates her less white mandibles)

Cicindela formosa gibsoni
Gibson's Big Sand Tiger Beetle



Map 27 Big Sand Tiger Beetle, *Cicindela* (*Cicindela*) *formosa*; A, *C. f. formosa*; B, *C. f. generosa*; C, *C. f. gibsoni*; D, *C. f. pigmentosignata*; E, *C. f. rutilovirescens*.

- Species occurs broadly east of the Rocky Mountains in many of the same areas as the Festive Tiger Beetle (missing from the southeastern Coastal Plain)
- Disjunct population in Yampa Valley, Colorado
- Dry, upland sand habitats, including dunes, blowouts, and road cuts, declining as vegetation increases
- “Spring-fall” species
- Elytral maculations fused and nearly covering elytra
- Large tiger beetle, often preys upon smaller species

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



Cicindela formosa gibsoni – Gibson's Big Sand Tiger Beetle



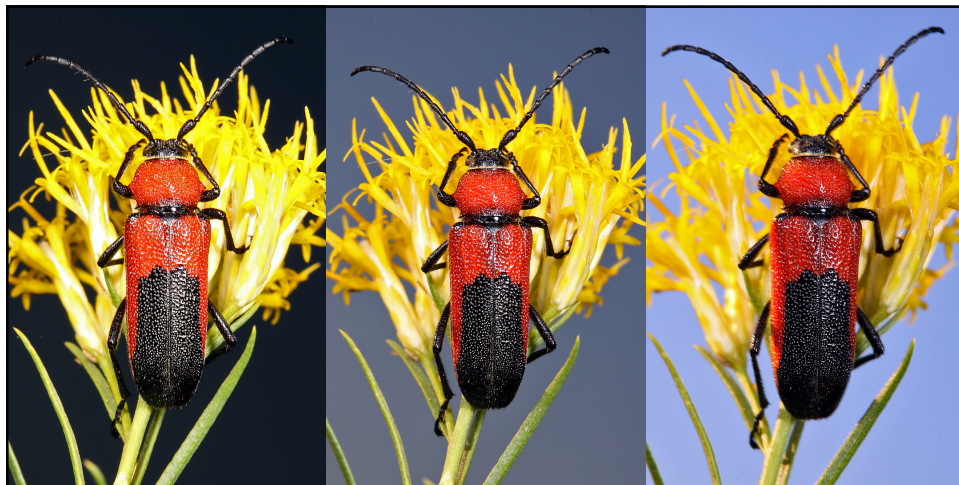
Adults from this population look nearly identical to a population in Saskatchewan – a possible example of convergent evolution.



Big Sand Tiger Beetles often occur in the same habitats as the Festive Tiger Beetle and, due to their larger size, sometimes prey upon them.



Crossidius coralinus fulgidus on flowers of *Ericameria nauseosa* (rabbitbrush) near Vernal, Utah



ISO 100, 1/200 sec


ISO 400, 1/200 sec

ISO 400, 1/60 sec

Increasing the ISO setting makes sensor more sensitive to light, allowing some light from sky to register on camera sensor. Decreasing the shutter speed allows more light to enter the camera, increasing the amount of light registered from the sky itself. The camera flash unit will give a short "pulse" to illuminate only the subject, which does not give off enough light to register on the camera sensor unless illuminated by flash.

Techniques for blue sky background in flash macrophotography

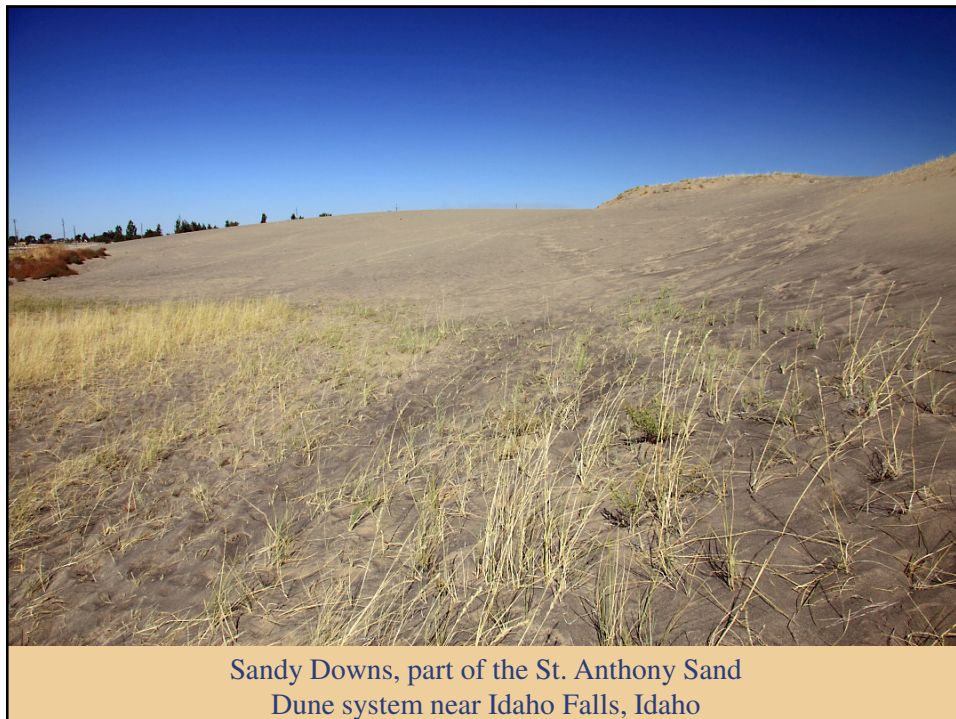
Cicindela arenicola
St. Anthony Dune Tiger Beetle



- Occurs only in the St. Anthony dune system in the Snake River Valley of eastern Idaho (although a small population was recently discovered in southwestern Montana)
- Active in sparsely vegetated swales between active sand dunes
- A population in Minidoka Co. shows characters intermediate with the Bruneau Dune Tiger Beetle

Map 24 A, St. Anthony Dune Tiger Beetle, *Cicindela* (*Cicindela*) *arenicola*; B, Bruneau Dune Tiger Beetle, *Cicindela* (*Cicindela*) *waynei*.

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





Numerous adult burrows were evident on the sandy slopes. Were these from tiger beetles or some other insect (sand bees and wasps)?



A closer look at the burrows shows the flattened opening and fine debris pile that are characteristic of adult tiger beetle burrows.



Cicindela arenicola – St. Anthony Sand Dune Tiger Beetle



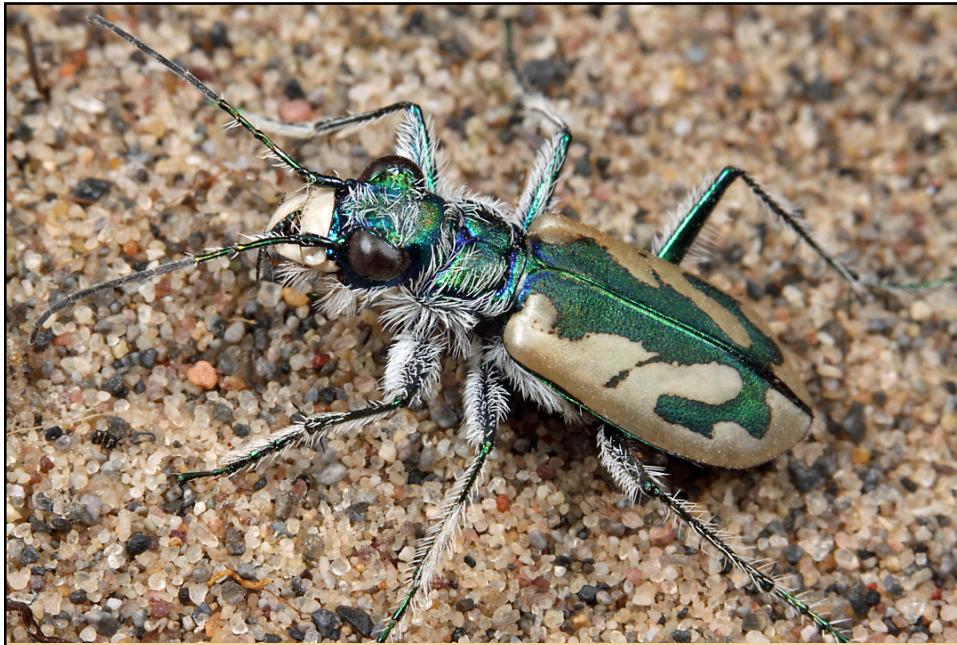
The dense covering of white “hairs” on the ventral and lateral surfaces is an adaptation exhibited by many dry sand inhabiting species.



Cicindela arenicola adult excavating burrow



Excavated adult at the bottom of its burrow (~8–10 inches)



Male with green elytra and expanded markings



Tiger beetle's-eye view of its preferred sand dune habitat



Lytta vulnerata cooperi (family Meloidae) on rabbitbrush flower

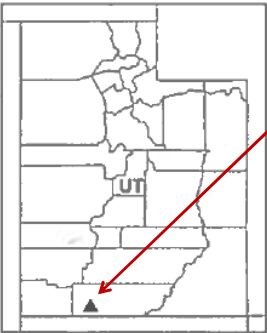
Cicindela waynei
Bruneau Dune Tiger Beetle

Map 24 A, St. Anthony Dune Tiger Beetle, *Cicindela* (*Cicindela*) *arenicola*; B, Bruneau Dune Tiger Beetle, *Cicindela* (*Cicindela*) *waynei*.

- Originally considered a variant of St. Anthony Dune Tiger Beetle
- Occurs on a single sand dune in southwestern Idaho (Bruneau Dune State Park)
- Recent molecular studies support specific distinction
- Adults mate and lay eggs on the leeward base of the dune
- The most critically endangered of the western sand dune endemics – has not been seen for the past two years

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

Cicindela albissima
Coral Pink Dune Tiger Beetle



- Known only from <400 hectare sand dune system in southwestern Utah (most restricted range of any North American tiger beetle)
- Considered a subspecies of a more widespread sand-inhabiting species until 2000, when DNA studies showed the two are not closely related (convergence due to similarity of habitat?)
- Entire range lies within Coral Pink Sand Dunes State Park
- Adults forage in sparsely vegetated areas of dune slopes, while larval burrows are in swales between active dunes
- Recent adult censuses estimate a total population size of 800–3,000 individuals

Map 22 Coral Pink Sand Dune Tiger Beetle, *Cicindela albissima*.

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





Colored pink by iron oxide minerals, the dunes are estimated at 10,000 to 15,000 years old.



Adult beetles were found on the northern edge of this dune. A majority were seen amongst sparse vegetation rather than barren areas.



Cicindela albissima – Coral Pink Sand Dune Tiger Beetle



Cicindela albissima – Coral Pink Sand Dune Tiger Beetle



Cicindela albissima – Coral Pink Sand Dune Tiger Beetle



Cicindela albissima – Coral Pink Sand Dune Tiger Beetle

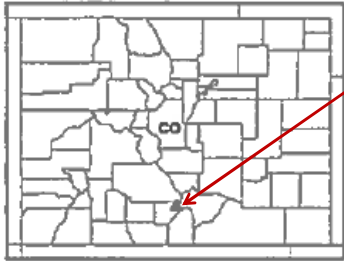


Cicindela albissima – Coral Pink Sand Dune Tiger Beetle



Off-road vehicle (ORV) tracks can be seen just outside the conservation area boundary.

Cicindela theatina
Colorado Great Sand Dunes Tiger Beetle



Map 23 Colorado Dune Tiger Beetle, *Cicindela* (*Cicindela*) *theatina*.

- Found only in Great Sand Dunes National Park and nearby areas in south-central Colorado
- Adults forage on smaller sand dunes and along the sparsely vegetated border at the base of larger sand dunes
- Another “spring-fall” species, although few adults are seen before June
- The entire range is protected by Great Sand Dunes National Park and Nature Conservancy’s adjacent Medano-Zapata Ranch

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



Great Sand Dunes National Park, Saguache/Alamosa Cos., Colorado
 (“Chinese Walls” visible ~12–14 miles distant)



Numerous small sand dunes lie west of GSDNP in the Nature Conservancy's Medano-Zapata Ranch.



Cicindela theatina – Colorado Great Sand Dune Tiger Beetle



Cicindela theatina – Colorado Great Sand Dune Tiger Beetle



Like most sand dune tiger beetles, adults are densely hairy on the lateral and ventral surfaces.



Adults "hug" the sand for warmth during the cooler morning hours.



Fabulous metallic red and green highlights on the head and pronotum contrast with the reddish brown elytra and their white lateral markings.

Acknowledgments

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