

## REVIEW OF THE GENUS *THORACOPHORUS* (COLEOPTERA: STAPHYLINIDAE: OSORIINAE) IN NORTH AMERICA NORTH OF MEXICO, WITH A KEY TO SPECIES

MICHAEL L. FERRO

Louisiana State Arthropod Museum, Department of Entomology  
Louisiana State University, 404 Life Sciences Building  
Baton Rouge, LA 70803, U.S.A.  
spongymesophyll@gmail.com

### ABSTRACT

Three species of *Thoracophorus* Motschulsky (Staphylinidae: Osoriinae) are reported from North America north of Mexico: *T. brevicristatus* (Horn), *T. costalis* (Erichson), and *T. guadalupensis* Cameron. A survey of nearly 5,000 specimens from 38 institutions showed that *T. costalis* was the most common and widespread of the three species, representing 99% of all specimens and ranging throughout eastern North America west to central Texas and north to Edmonton, Alberta, Canada. *Thoracophorus brevicristatus* is found across the extreme southern USA from Arizona to Florida. *Thoracophorus guadalupensis* is found only in Florida. A key to species and range maps are provided.

Key Words: unmarginated rove beetles, faunistics, taxonomy, furrowed rove beetle

*Thoracophorus* Motschulsky (Staphylinidae: Osoriinae) contains 54 described species found in the Neotropical, Nearctic, Palearctic, Ethiopian, Madagascan, Oriental, Australian, and Oceanic regions (Herman 2001). The center of diversity is in the Neotropics with 36 species (Irmeler 2010). Irmeler (1985) provided a key to and illustrations of 22 Neotropical species. He later described 11 new species from the region (Irmeler 2001 (7 species), 2005 (2 species), 2010 (2 species)). Four species north of Mexico have been reported (Herman 2001), but Ferro and Gimmel (2011) synonymized two names, *T. longicollis* Motschulsky and *T. fletcheri* Wendeler, leaving only *T. costalis* (Erichson) and *T. brevicristatus* (Horn) as valid species in the region. The presence of a third species informally reported from the United States, *T. guadalupensis* Cameron (Navarrete-Heredia *et al.* 2002; Margaret Thayer, personal communication), prompted the current study to determine the number and range of species of *Thoracophorus* in North America north of Mexico.

### MATERIAL AND METHODS

Adult specimens of *Thoracophorus* collected within the United States and Canada were examined from the following institutions. Collections and their acronyms are from Evenhuis (2014). Collection managers and curators are indicated.

**BYUC** Monte L. Bean Life Science Museum, Brigham Young University (Provo, UT, USA; Shawn Clark).  
**CAS** California Academy of Sciences (San Francisco, CA, USA; Norman Penny).

**CNC** Canadian National Collection of Insects (Ottawa, ON, Canada; Patrice Bouchard).  
**CSCA** California State Collection of Arthropods (Sacramento, CA, USA; Jacqueline Kishmirian-Airos).  
**CSUC** Colorado State University (Fort Collins, CO, USA; Boris Kondratieff).  
**CUAC** Clemson University (Clemson, SC, USA; Michael Caterino).  
**CUIC** Cornell University (Ithaca, NY, USA; Jason Dombroskie).  
**EMEC** Essig Museum of Entomology, University of California (Berkeley, CA, USA; Cheryl Barr and Pete Oboyski).  
**FMNH** Field Museum of Natural History (Chicago, IL, USA; James Boone).  
**FSCA** Florida State Collection of Arthropods, Division of Plant Industry (Gainesville, FL, USA; Paul Skelley).  
**ICUI** The University of Iowa Museum of Natural History (Iowa City, IA, USA; Elizabeth Fouts, Cindy Opitz).  
**INHS** Illinois Natural History Survey (Champaign, IL, USA; Jamie Zahniser).  
**KSPC** Kyle Schnepf personal collection (Gainesville, FL, USA; Kyle Schnepf).  
**LSAM** Louisiana State Arthropod Museum, Louisiana State University (Baton Rouge, LA, USA; Victoria Bayless).  
**MCZ** Museum of Comparative Zoology, Harvard University (Cambridge, MA, USA; Rachel Hawkins).  
**MEM** Mississippi State University (Starkville, MS, USA; Terence Schiefer).  
**MSUC** Michigan State University (East Lansing, MI, USA; Anthony Cognato, Gary Parsons).

<b>MTEC</b>	Montana State University (Bozeman, MT, USA; Michael Ivie).
<b>NCSU</b>	North Carolina State University Insect Collection (Raleigh, NC, USA; Bob Blinn).
<b>OMNH</b>	Oklahoma Museum of Natural History, University of Oklahoma (Norman, OK, USA; Katrina Menard).
<b>OSUC</b>	C. A. Triplehorn Insect Collection, Ohio State University (Columbus, OH, USA; Luciana Musetti).
<b>PMNH</b>	Peabody Museum of Natural History, Yale University (New Haven, CT, USA; Lawrence F. Gall).
<b>SEMC</b>	Snow Entomological Museum, University of Kansas (Lawrence, KS, USA; Zachary Falin).
<b>TAMU</b>	Texas A & M University (College Station, TX, USA; Ed Riley).
<b>UAAM</b>	The Arthropod Museum, Department of Entomology, University of Arkansas (Fayetteville, AR, USA; Jeffrey K. Barnes).
<b>UASM</b>	E. H. Strickland Entomological Museum, University of Alberta (Edmonton, AB, Canada; Danny Shepley).
<b>UCDC</b>	R. M. Bohart Museum of Entomology, University of California (Davis, CA, USA; Lynn Kimsey).
<b>UCFC</b>	University of Central Florida (Orlando, FL, USA; Sandor Kelly).
<b>UCMS</b>	University of Connecticut (Storrs, CT, USA; Jane O'Donnell).
<b>UCRC</b>	Entomology Research Museum, Department of Entomology, University of California (Riverside, CA, USA; Doug Yanega).
<b>UGCA</b>	University of Georgia (Athens, GA, USA; E. Richard Hoebeke).
<b>UMRM</b>	W. R. Enns Entomology Museum, University of Missouri (Columbia, MO, USA; Kristin Simpson).
<b>UMSP</b>	University of Minnesota (St. Paul, MN, USA; Robin Thomson).
<b>UNHC</b>	University of New Hampshire (Durham, NH, USA; Donald Chandler).
<b>VMNH</b>	Virginia Museum of Natural History (Martinsville, VA, USA; Nancy Moncrief).
<b>WFBM</b>	W. F. Barr Entomological Collection, University of Idaho (Moscow, ID, USA; Frank Merickel).
<b>WIRC</b>	University of Wisconsin Insect Research Center, Department of Entomology, University of Wisconsin (Madison, WI, USA; Steven Krauth).
<b>WSU</b>	Maurice T. James Entomological Collection, Washington State University (Pullman, WA, USA; Richard Zack).

Verbatim label information is reported for specimens of *T. costalis* collected at the extreme northwestern border of that species' known range and for all specimens of *T. brevicristatus* and *T. guadalupensis* (Appendix 1). Specimens are separated by an asterisk ("\*"), label breaks indicated by a slash ("/"), and the lending institution and number of specimens are indicated. Specimens were photographed using a Leica Application Suite Ver. 4.1.0, Leica Microscopy system, and images were edited using Adobe Photoshop®. Maps were created using the mapping utility at GPS Visualizer ([www.gpsvisualizer.com](http://www.gpsvisualizer.com)).

## RESULTS AND DISCUSSION

In total, 4,982 specimens of *Thoracophorus* spp. were examined from 38 lending institutions. Only *T. brevicristatus*, *T. costalis*, and *T. guadalupensis* were represented in the material. Specimens of *T. costalis* were by far the most common, representing 99% of all material examined, and were found throughout eastern North America, from Maine west to Edmonton, Alberta, south to Montana, central Colorado, central Texas, and east to southern Florida (Fig. 1). *Thoracophorus brevicristatus* was recorded along a narrow strip along the southern portion of the United States from central Arizona to southern Florida (Fig. 2); eastern specimens were never collected north of 31° latitude. Specimens of *T. guadalupensis* were only collected in Florida (Fig. 3). The ranges of all three species overlap in Florida, with the possible exception that *T. guadalupensis* may not occur in the panhandle region. The ranges of *T. brevicristatus* and *T. costalis* overlap in the southern USA from central Texas east to Florida. With the exception of the population of *T. brevicristatus* in Arizona, all specimens above 31° latitude were *T. costalis*.

The ecology of *Thoracophorus* species is poorly known. All species appear to be fungivores that feed on "higher fungi" (Newton 1984), and most have been collected in leaf litter or under bark of dead trees (Irmeler 2010; Newton 1984). Burakowski and Newton (1992) provided a description of the immature and of the life history of the myrmecophilous European species *Thoracophorus corticinus* Motschulsky. Irmeler (2010) reviewed the ecology of Neotropical species but found that little information was available beyond collection data.

Information specific to the species reviewed is found in the Species Accounts section below.

## DIAGNOSIS OF *THORACOPHORUS*

Throughout North America north of Mexico, *Thoracophorus* can be distinguished from other Staphylinidae by the following combination of

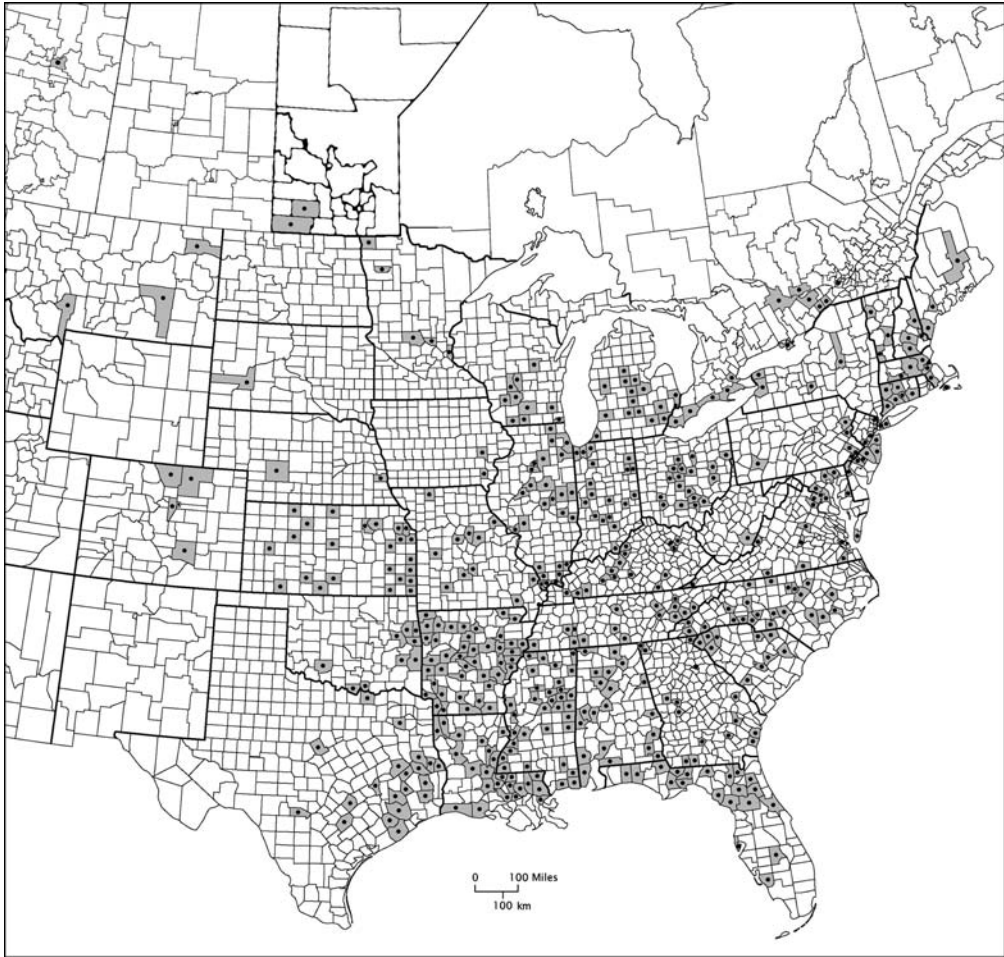


Fig. 1. Distribution of *Thoracophorus costalis* in the United States and Canada by county (or equivalent).

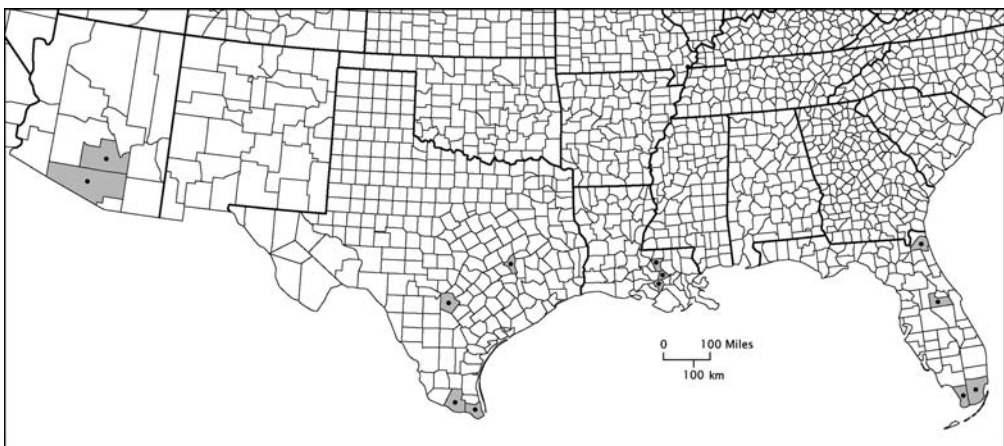


Fig. 2. Distribution of *Thoracophorus brevicristatus* in the United States by county.

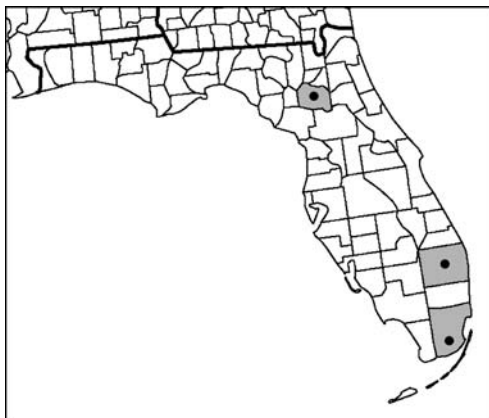


Fig. 3. Distribution of *Thoracophorus guadalupensis* in Florida by county.

characters: abdominal tergum and sternum of each of segments III–VII fused into complete ring; protibia with inner edge straight, without ctenidium; procoxae contiguous; procoxal fissure closed; trochantin concealed; elytra costate; abdominal sternum VIII extended dorsally in front of tergum VIII (Newton *et al.* 2001).

#### KEY TO THE SPECIES OF *THORACOPHORUS* IN NORTH AMERICA NORTH OF MEXICO

1. Eyes visible from above; combined length of pronotum and elytra <0.7 mm; pronotal disc with 2 sublateral ridges (Fig. 7); Florida .....  
.....*T. guadalupensis* Cameron
- 1'. Eyes not visible from above; combined length of pronotum and elytra >0.8 mm; pronotal disc with 2 apically bifurcated, sublateral ridges (Fig. 6), or pronotal disc with 4 ridges (Figs. 4–5); widespread including Florida ..... 2
2. Pronotal disc with 2 apically bifurcated, longitudinal ridges (Fig. 6); vertex of head with 2 irregular carinae; extreme southern USA: Arizona east to Florida .....  
.....*T. brevicristatus* (Horn)
- 2'. Pronotal disc with 4 longitudinal ridges (Figs. 4–5); vertex of head with 4 complete carinae; widespread: Maine to central Alberta south to Montana and central Texas, east to southern Florida .....*T. costalis* (Erichson)

#### SPECIES ACCOUNTS

##### *Thoracophorus brevicristatus* (Horn, 1871) (Figs. 2, 6)

**Range.** UNITED STATES: Arizona, Florida, Louisiana, Texas. MEXICO. WEST INDIES.

**COSTA RICA. MASCARENE ISLANDS. PHILIPPINES** (Herman 2001; Navarrete-Heredia *et al.* 2002). Blackwelder (1943) had “grave doubts” that *T. brevicristatus* var. *deletus* Fauvel (1902) from the Mascarene Islands and Philippines was truly a variety of *T. brevicristatus*. In that case, those ranges are in error. *Thoracophorus brevicristatus* is probably also present in southern Alabama, Georgia, and Mississippi, based on extrapolation from documented occurrences.

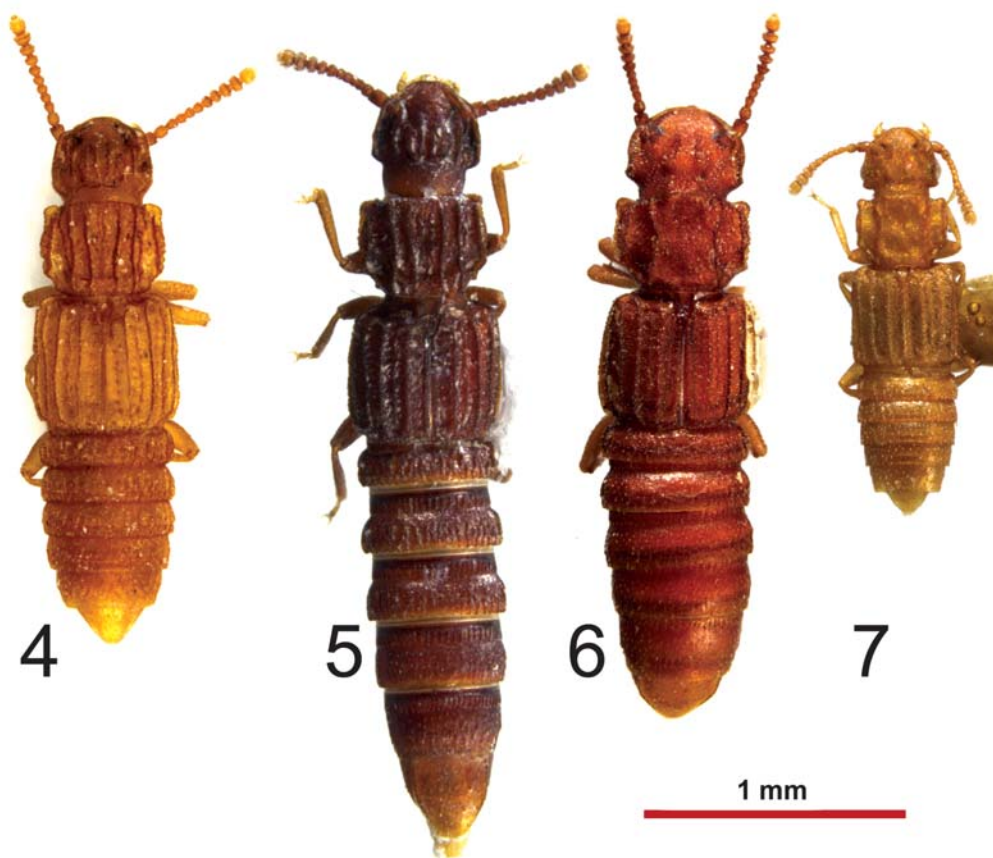
**Collection Methods.** Hand collection, Berlese funnel, floating pitfall trap, elevated flight intercept trap, Lindgren funnel trap.

**Habitat.** Floating aquatic vegetation, forest litter, cottonwood duff, rotten log, dense costal brush, under bark of dead cottonwood, under bark of dead sugarberry, *Celtis laevigata* Willd. (Cannabaceae), dead sotol, *Neotoma* Say and Ord [packrat] nest, *Trametes corrugata* (Pers.) Bres. [polypore fungus], cedar-elm forest.

**Comments.** In total, 38 specimens of *T. brevicristatus* were examined from 13 counties (or equivalents) within four states in the United States. Specimens were collected during March through December, and adults are probably available year-round throughout their range. Based on this study, no clear distinction between preferred habitat of *T. brevicristatus* and *T. costalis* can be identified, and why *T. brevicristatus* is so rarely collected is unclear. Irmiler (2010) reported that *T. brevicristatus* is an inquiline of *Neoterмес* Holmgren termites (Isoptera: Kalotermitidae) based on observations by Boháč (1978). While Boháč (1978) observed adults and immatures living in a termite colony, he provided little evidence that *T. brevicristatus* were more than tolerated by their hosts. Information from specimens collected in the United States indicate that *T. brevicristatus* may be found in a wide variety of situations and its association with termites, at least in the United States, is unclear.

Collection localities of *T. brevicristatus* in Arizona may represent a narrow northern population extension from Mexico (Fig. 8). The next nearest locality in the USA is 1,300 km east. In eastern Arizona, the synoptic insect collection at the Southwestern Research Station in the Chiricahua Mountains (Fig. 8, #6) does not possess specimens of *T. brevicristatus*. No specimens have been collected in or around that area by Louisiana State Arthropod Museum members despite extensive collecting (30,000+ specimens) during the past five years. The northern limit of the species may be south of extreme eastern Arizona, New Mexico, and western Texas.

**References.** Horn 1871 (as *Glyptoma brevicristatus*, figures and key separating *T. costalis* from *T. brevicristatus*); Blackwelder 1943 (key separating



Figs. 4–7. *Thoracophorus* species, habitus. 4) *T. costalis*, teneral, contracted specimen; 5) *T. costalis*, mature, extended specimen; 6) *T. brevicristatus*; 7) *T. guadalupensis*.

*T. brevicristatus* from *T. guadalupensis*); Newton 1984 (fungivory); Irmeler 1985 (key to species, illustrations of head, pronotum, and aedeagus, in German), 2010 (general ecology of the genus); Burakowski and Newton 1992; Herman 2001; Navarrete-Heredia *et al.* 2002.

***Thoracophorus costalis* (Erichson, 1840)**

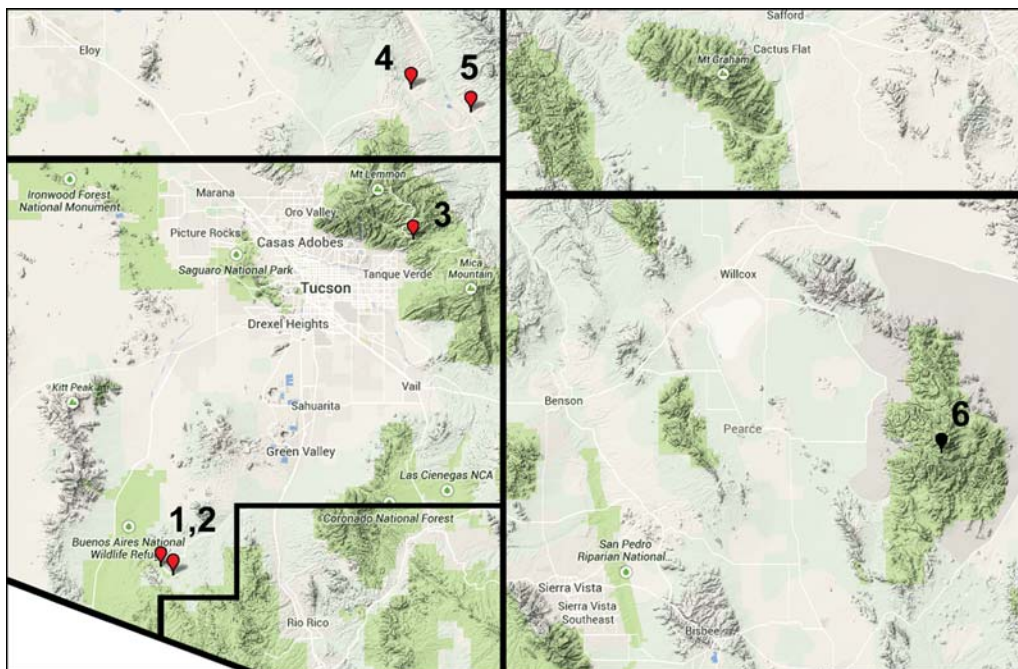
furrowed rove beetle  
(Figs. 1, 4–5)

**Range.** **CANADA:** Alberta, Manitoba, Ontario, Québec. **UNITED STATES:** Alabama, Arkansas, Colorado, Connecticut, District of Columbia, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West

Virginia, Wisconsin. **MEXICO** (Irmeler 1985; Herman 2001; Navarrete-Heredia *et al.* 2002).

**Collection Methods.** Hand collection, pitfall trap, emergence chamber, Berlese funnel, fogging, UV light, flight intercept trap, Malaise trap, canopy trap, x-vane trap, ethanol-baited Lindgren funnel, cantharidin-baited Lindgren, alpha pinene-baited Lindgren funnel.

**Habitat.** Top soil in deep woods, forest litter, leaf litter, leaf mould, ground cover, ground cover edge of woods, litter under shrubs in draw, litter at base of rock bluff, litter under *Populus* stand, magnolia leaf litter, sawdust, slab pile, base of fungusy tree bole, rotten stump, standing barkless *Ulmus* sp. bole in woods, maple stump, oak stump litter and passalid beetle frass, debris under rotten *Populus* stump, old maple log, fungus-covered logs, slime mold covered log, rotten *Quercus* log, sifted hollow log, fogging fungusy cut logs, under rotten log, dead tulip tree, under bark, under bark dead *Pinus taeda*, under deciduous



**Fig. 8.** Map of the southeastern corner of Arizona, with collection localities of *Thoracophorus brevicristatus*. 1–4: approximate collection locations of specimens examined in this research; 5: approximate type locality; 6: Chiricahua Mountains and surrounding areas where no specimens of *T. brevicristatus* have been obtained despite intense collecting.

bark, ex. hackberry bark, under pine bark, bark of dead pine, bark of bleeding *Ostrya*, tree hole, *Populus* tree hole debris, reared from elm, ex. Myxomycetes, misc. mushrooms, gilled mushroom, ex. *Polyporus* sp., white crustose polypore, mouse nest in stump, *Neotoma* nest, nest of *Lasius niger americanus* - under bark encircling old stump, roof and floor of beaver lodge.

**Comments.** In total, 4,926 specimens of *T. costalis* were examined from 464 counties (or equivalents) within 41 states (or equivalents) in the United States and Canada (Fig. 1). Specimens were collected during each month, and adults are probably available year-round throughout their range. Based on the known range and the wide variety of collection habitats, *T. costalis* is probably present in every US county and county equivalent along the southern border of Canada located east of 95° longitude. The few county records from Iowa, Maine, Minnesota, New York, Pennsylvania, and West Virginia are probably due to poor collecting rather than true gaps in distribution. No specimens were seen from Rhode Island, but *T. costalis* has been reported from that state (Sikes 2004).

The western records of the species were unexpected, especially records from Montana and Edmonton, Alberta, Canada. Additional collecting in the extreme western range is needed to resolve

if the species is truly rare, restricted to a narrower “habitat”, or just overlooked by collectors. *Thoracophorus costalis* is probably also present in North Dakota, Wyoming, and Saskatchewan. Fauvel (1878) reported *T. costalis* from California, however, no specimens from California could be found, so this may be an error.

On a wider scale, *T. costalis* may not be restricted to North America north of Mexico. Imler (1985) reported *T. costalis* from Mexico, but Navarrete-Heredia *et al.* (2002) were unable to confirm the record. However, a specimen of *T. costalis* (identification determined by U. Imler and checked by myself) is in the MCZ collection with the label reading in full: “Mex.” More specimens are needed before the southern extent of the species’ range can be confirmed. Additionally, *T. costalis* has been collected from southern Florida and may extend into the northern Caribbean Basin.

Despite being widespread and well-represented in collections, little is known about *T. costalis* beyond collection data. Graves (1960) sampled organisms inhabiting a wide variety of woody shelf fungi and collected many *T. costalis* from *Ganoderma applanatum* (Pers.) Pat. (as *Fomes applanatus?*). He reported that *T. costalis* would burrow through the conk and directly eat the fungi. In some instances, adults could be found

in large numbers, and immatures and copulation were also observed within the conk. Ferro *et al.* (2012b) found that *T. costalis* had significantly higher abundance in later decay stages of coarse woody debris than earlier stages. *Thoracophorus costalis* also had significantly higher abundance in decay class V coarse woody debris than leaf litter (Ferro *et al.* 2012a).

**References.** Horn 1871 (as *Glyptoma costale* Erichson, figures and key separating *T. costalis* from *T. brevicristatus*); Blatchley 1910 (as *G. costale*); Notman 1920; Newton 1984 (fungivory), 1990 (generic key of immature Staphylinidae); Irmeler 1985 (key to species, illustrations of head, pronotum, and aedeagus, in German), 2010 (ecology); Burakowski and Newton 1992; Downie and Arnett 1996 (figure is not *T. costalis*); Peck and Thomas 1998; Herman 2001; Navarrete-Heredia *et al.* 2002; Ferro and Gimmel 2011.

***Thoracophorus guadalupensis* Cameron, 1913**  
(Figs. 3, 7)

**Range.** UNITED STATES: Florida. MEXICO. WEST INDIES. BELIZE. COSTA RICA. PANAMA. PERU. BRAZIL. (Herman 2001; Navarrete-Heredia *et al.* 2002).

**Collection Methods.** Berlese funnel. "Flying at dusk, under bark of rotting logs, under chips on stumps of the breadfruit tree" (Blackwelder 1943).

**Habitat.** Mixed forest litter, litter in gumbo limbo buttress, dry litter and log, litter at log w/ants, litter between logs w/mouse nest.

**Comments.** In total, 18 specimens of *T. guadalupensis* were examined from three counties within Florida (Fig. 3). Specimens collected in northern Florida, Alachua Co., suggest that the species may occur in southern Georgia. Specimens were collected during January, March, and May, but adults may be available year-round. Discovery of this species in Florida is not surprising because it is known from Cuba and other West Indian islands. Other species of *Thoracophorus* may be native to southern Florida or as transients after extreme weather events such as hurricanes. Human-assisted dispersal may also occur.

**References.** Blackwelder 1943 (key separating *T. brevicristatus* from *T. guadalupensis*); Irmeler 1985 (key to species, illustrations of head, pronotum, and aedeagus, in German), 2010 (ecology); Herman 2001; Navarrete-Heredia *et al.* 2002.

**ACKNOWLEDGMENTS**

I thank the curators, collection managers, and others that assisted in the loan of specimens. I thank Rachel Hawkins and Phil Perkins for help with "rediscovery" of the "lost" Mexican specimen

of *T. costalis*. I thank Christopher Carlton and Brittany Owens for reviewing this manuscript. This publication was approved by the Director, Louisiana Agricultural Experiment Station as manuscript number 2014-234-17782.

**REFERENCES CITED**

- Blackwelder, R. E. 1943.** Monograph of the West Indian beetles of the family Staphylinidae. United States National Museum Bulletin 182: 1–658.
- Blatchley, W. S. 1910.** Coleoptera or Beetles Known to Occur in Indiana. The Nature Publishing Company, Indianapolis, IN.
- Boháč, J. 1978.** Description of the larva and pupa of *Thoracophorus brevicristatus* (Coleoptera, Staphylinidae). Acta Entomologica Bohemoslovakia 75: 394–399.
- Burakowski, B., and A. F. Newton, Jr. 1992.** The immature stages and bionomics of the myrmecophile *Thoracophorus corticinus* Motschulsky, and placement of the genus. Annali del Museo Civico di Storia Naturale di Genova 89: 17–42.
- Downie, N. M., and R. H. Arnett, Jr. 1996.** The Beetles of Northeastern North America, 2 vols. The Sandhill Crane Press, Gainesville, FL.
- Evenhuis, N. L. 2014.** Abbreviations for insect and spider collections of the world. Available from: [hbs.bishopmuseum.org/codens/codens-inst.html](http://hbs.bishopmuseum.org/codens/codens-inst.html) (Accessed 30 September 2014).
- Fauvel, A. 1878.** Les Staphylinides de l'Amérique du nord. Bulletin de la Société Linnéenne de Normandie 3(2): 167–269.
- Fauvel, A. 1902.** Staphylinides exotiques nouveaux. Revue d'Entomologie 21: 8–37.
- Ferro, M. L., and M. L. Gimmel. 2011.** New synonymies and range extension for North American *Thoracophorus* Motschulsky (Coleoptera: Staphylinidae: Osoriinae). The Coleopterists Bulletin 65: 403–404.
- Ferro, M. L., M. L. Gimmel, K. E. Harms, and C. E. Carlton. 2012a.** Comparison of the Coleoptera communities in leaf litter and rotten wood in Great Smoky Mountains National Park, USA. Insecta Mundi 0259: 1–58.
- Ferro, M. L., M. L. Gimmel, K. E. Harms, and C. E. Carlton. 2012b.** Comparison of Coleoptera emergent from various decay classes of downed coarse woody debris in Great Smoky Mountains National Park, USA. Insecta Mundi 0260: 1–80.
- Graves, R. C. 1960.** Ecological observations on the insects and other inhabitants of woody shelf fungi (Basidiomycetes: Polyporaceae) in the Chicago area. Annals of the Entomological Society of America 53: 61–78.
- Herman, L. H. 2001.** Catalog of the Staphylinidae (Insecta: Coleoptera). 1758 to the end of the second millennium. III. Oxytelinae group. Bulletin of the American Museum of Natural History 265: 1067–1806.
- Horn, G. H. 1871.** Descriptions of new Coleoptera of the United States, with notes on known species. Transactions of the American Entomological Society 3: 325–344.

- Irmeler, U. 1985.** Neue Arten der Gattungen *Aneucamptus* und *Thoracophorus* (Col., Staphylinidae) aus der Neotropis. *Entomologische Blätter für Biologie und Systematik der Käfer* 81: 41–58.
- Irmeler, U. 2001.** New Neotropical species of the genera *Clavilispinus*, *Aneucamptus*, *Thoracophorus*, and *Holotrochus* (Coleoptera: Staphylinidae, Osoriinae). *Amazoniana* 16: 349–361.
- Irmeler, U. 2005.** New *Thoracophorus* species from the Neotropical region (Coleoptera: Saphylinidae, Osoriinae). *Studies on Neotropical Fauna and Environment* 40(2): 123–127.
- Irmeler, U. 2010.** Two new species of the genus *Thoracophorus* Motschulsky, 1837 (Coleoptera: Staphylinidae, Osoriinae) with remarks on ecology of the genus in the Neotropical region. *Psyche* Article ID 138518: 1–6. doi:10.1155/2010/138518
- Navarrete-Heredia, J. L., A. F. Newton, M. K. Thayer, J. S. Ashe, and D. S. Chandler. 2002.** Guía Ilustrada para los Géneros de Staphylinidae (Coleoptera) de México [Illustrated Guide to the Genera of Staphylinidae (Coleoptera) of Mexico]. Universidad de Guadalajara y CONABIO, Mexico.
- Newton, A. E., Jr. 1984.** Mycophagy in Staphylinoida (Coleoptera) [pp. 302–353]. *In: Fungus-Insect Relationships: Perspectives in Ecology and Evolution* (Q. Wheeler and M. Blackwell, editors). Columbia University Press, New York, NY.
- Newton, A. E., Jr. 1990.** Insecta: Coleoptera: Staphylinidae adults and larvae [pp. 1137–1174]. *In: Soil Biology Guide* (D. E. Dindal, editor). John Wiley and Sons, New York, NY.
- Newton, A. E., Jr., M. K. Thayer, J. S. Ashe, and D. S. Chandler. 2001.** 22. Staphylinidae Latreille, 1802 [pp. 272–418]. *In: American Beetles, Volume 1* (R. H. Arnett, Jr. and M. C. Thomas, editors). CRC Press, Boca Raton, FL.
- Notman, H. 1920.** Staphylinidae from Florida in the collection of the American Museum of Natural History, with descriptions of new genera and species. *Bulletin of the American Museum of Natural History* 42: 693–732.
- Peck, S. B., and M. C. Thomas. 1998.** A distributional checklist of the beetles (Coleoptera) of Florida. *Arthropods of Florida and Neighboring Land Areas* 16: viii + 180.
- Sikes, D. S. 2004.** The Beetle Fauna of Rhode Island: and Annotated Checklist. Rhode Island Natural History Survey, Volume 3. Kingston, RI.

(Received 22 October 2014; accepted 19 January 2015.  
Publication date 18 March 2015.)



## APPENDIX 1

Verbatim label information for specimens of *T. costalis* collected at the extreme northwestern border of that species' known range and for all specimens of *T. brevicristatus* and *T. guadalupensis*.

*Thoracophorus brevicristatus*

**UNITED STATES: ARIZONA: Pima Co.:** \*ARIZONA, Pima Co. Arivaca Nov. 30 1969 K. Stephan leg. / Field Mus. Nat. Hist. Karl H. Stephen [sic] Collection, 1977 Acc. No. Z-15, 639 (FMNH, 2 specimens). \*ARIZONA, St. Catalina Mts. Molino Basin March 14 1970 / dead sotol K. Stephan leg. / Field Mus. Nat. Hist. Karl H. Stephen [sic] Collection, 1977 Acc. No. Z-15, 639 (FMNH, 4 specimens). \*2 mi NW Arivaca Pima Co., Ariz. XI-13-1971 DSChandler colr / Berlese Cottonwood duff (UCDC, 1 specimen). **Pinal Co.:** \*10 mi SE Mammoth San Pedro R., Ariz. Pima Co., XI-10-1971 DSChandler colr / under bark of dead Cottonwood (UCDC, 1 specimen) [Pima Co. is ~20 miles south of Mammoth by road]. **FLORIDA: Miami-Dade Co.:** \*USA: Fla. Dade Co. Coral Gables 27-vii-1949 H.S.Dybas (FMNH, 2 specimens). **Duval Co.:** \*Jacksonville 12-17-III-37 Fla. U.S.A. / Field Mus. Nat. Hist. 1966 A. Bierig Collin. Acc. Z-13812 / *T. sahlbergi* Irmeler det. Irmeler [label folded] / *Thoracophorus brevicristatus* det. Newton 1991 (FMNH). \*Jacksonville III-37 Fla. U.S.A. / Field Mus. Nat. Hist. 1966 A. Bierig Collin. Acc. Z-13812 (FMNH, 2 specimens). **Monroe Co.:** \*Lignum Vitae Key Monroe Co., FLA. V-28-68 / J. F. Lawrence Lot. 2574 / *Trametes corrugata* [shelf fungus] / A. Newton Collection / *Thoracophorus brevicristatus* det. Newton 1991 (FMNH). \*Lignum Vitae Key Monroe Co., FLA. V-28-68 / J. F. Lawrence Lot. 2574 / *Trametes corrugata* (MCZ, 2 specimens). \*FLA. Monroe Co. [?] Islamorada, Lignum Vitae Key, 13.VII.1981 ,S.Peck Neotoma nest ber. / *Thoracophorus brevicristatus* det. U. Irmeler (CNC). \*Florida: Monroe Co. Upper Key Largo June 9 – 14, 2014 Lindgren funnel trap Kyle E. Schnepf (KSPC). **Orange Co.:** \*Fla. Orlando 16 III 72 J. Cornell / Univ. Calif. Riverside Ent. Res. Museum UCRC ENT 429841 (UCRC). \*Fla. Orlando 16 III 72 J. Cornell / J.F. Cornell Collection N.C. State Univ. Raleigh (NCSU, 2 specimens). **LOUISIANA: Ascension Par.:** \*USA: LA: Ascension Parish Gramercy, N. of 61 and I-10 N 30°09.804' W 90°48.643' 16–30 June 2009 B1 KA Parys – Floating Pitfall / KP-GPF / LSAM 0244116. **Assumption Par.:** \*USA: LA: Assumption Parish, Pierre Part, n. Lake Verret, 30 Dec 1992, D. R. Ganaway / coll. in rotten log (LSAM). **East Baton Rouge Par.:** \*USA: LA: East Baton Rouge Parish, Baton Rouge, 12 Dec 1990, M. Sean Strother / under

bark of dead sugarberry *Celtis laevigata* Willd (LSAM). \*LA: E. Baton Rouge Par. Baton Rouge, Place DuPlantier Apts. XII-30-1993, E. Riley Berlese forest litter (TAMU). **TEXAS: Bexar Co.:** \*San Antonio Bexar Co. Tex. IX-9-58 / J. F. Lawrence Collector / J. F. Lawrence Collection (MCZ, 2 specimens). \*same data: 1 specimen (TAMU). \*San Antonio Bexar Co. Tex. XI-9-58 / J. F. Lawrence Collector / Thoracophorus Det. J.M.Campbell 19 / UC Berkley EMEC 1068805 [QR code] (EMEC). **Brazos Co.:** \*TEXAS: Brazos Co. College Station April 25, 1974 W. E. Clark (TAMU). **Cameron Co.:** \*USA: TEXAS: Cameron Co. Laguna Atascosa NWR (site 1) 26.22375°N, 97.35454°W IX-3-17-2008, FIT-elevated J. King & E. Riley-29 dense coastal brush / TAMU - ENTO X0832224 [barcode] (TAMU). **Hidalgo Co.:** \*USA: TEXAS: Hidalgo Co. Bentsen R.G.V.S.P. (site 1) 26.17830°N, 98.38577°W IV-7-IX-12-2009, cedar elm for., Lindgren FT, Riley-1267 / TAMU - ENTO X0591684 [barcode] (TAMU). \*same data TAMU - ENTO X0840624 [barcode] (TAMU). \*same data TAMU - ENTO X0840847 [barcode] (TAMU). \*same data TAMU - ENTO X0842817 [barcode] (TAMU). \*USA: TEXAS: Hidalgo Co. LRGVNRW, La Coma (site 1) 26.05302°N, 98.04665°W IX-4-19-2008, Lindgren FT J. King & E. Riley-47 re-vegetation site / TAMU - ENTO X0602609 (TAMU). \*same data: TAMU - ENTO X0950444 (TAMU). \*USA: TEXAS: Hidalgo Co. LRGVNRW, La Coma (site 2) 26.05611°N, 98.03635°W IX-6-20-2009, Lindgren FT J. King & E. Riley-1136 re-vegetated site / TAMU - ENTO X0955193 (TAMU). \*USA: TEXAS: Hidalgo Co. LRGVNRW, McManus Unit 26.05380°N, 98.04987°W IX-6-20-2009, Lindgren FT ebony-guayacan association / TAMU - ENTO X0848093 (TAMU). \*USA: TEXAS: Hidalgo Co. Santa Ana NWR (site 3), Wildlife Drive, Lindgren FT 26.07526°N, 98.13880°W IV-24-VII-26-2009 D.Heffern & E.G. Riley-1061 / TAMU - ENTO X0612253 (TAMU).

*Thoracophorus costalis*

**CANADA: ALBERTA:** \*Edmonton. Alta. 27 IV, 1918 F. S. Carr / Glyptoma (UASM, 1 specimen). **MANITOBA:** \*Aweme, Man. 17. v. 27 R. M. White (CNC, 4 specimens on two pins). \*Aweme, Man. 17. v. 27 R. M. White / *Thoracophorus costalis* 3315 Et. Det. J.B.W. 6.iii.48 (CNC 2 specimens on one pin with queen ant). \*Tp. 2 Rge. 27 W. 1 Mer. Man. 10.VI.1992 Lot 5 BR&JL Carr / J. & B. Carr Coll. Bequest to CNC August, 2000 / CNC COLEO DNA Barcode voucher 00250748 / Barcode of Life DNA voucher specimen SmpID CNC COLEO 00250748 BOLD Proc. ID: CNCCJ2037-14 (CNC). \*Treesbank, Man. 25.VI.28 R M White (CNC).

**UNITED STATES: MONTANA: Gallatin Co.:** \*MONT: Gallatin Co. E. Gallatin R. 4650' 5 APR 1987 D.L. Gustafson col. [N 45.720677°, W 111.055787°, 4650'] (MTEC, 7 specimens). \*MONT: Gallatin Co. E. Gallatin R. 4700' 13 June 1987 D.L. Gustafson col. [N 45.713134°, W 111.042186°, 4700'] (MTEC). \*MONT: Gallatin Co. E. Gallatin R. 4700' 10 November 1987 D.L. Gustafson col. [N 45.713134°, W 111.042186°, 4700'] (MTEC, 2 specimens). **Rosebud Co.:** \*MONT: Rosebud Co. Rosebud at Far West Access 31 AUG 1989 D.L. Gustafson col. [N 46.278293°, W 106.480527°, 754 m] (MTEC, 3 specimens). \*MONT: Rosebud Co. Rosebud- Far West 13 July 1991 D.L. Gustafson col. (MTEC). \*[Same data, 19 July 1990, 4 specimens] [Rosebud-Far West is at 46.278293N, 106.480527W, 754m. Collecting was centered around the campground, on the Yellowstone River. Dan Gustafson personal communication]. \*MONT: Rosebud Co. Tongue R.- Ashland 06 June 1991 D.L. Gustafson col. (MTEC, 2 specimens) [Tongue River at Ashland is at 45.598572N, 106.276683W, 887m. Dan Gustafson personal communication]. **Roosevelt Co.:** \*MONT: Roosevelt Co HWY16, mi 86 48.1922°N, 104.4984°W 16JUNE-28JULY2011, 2281ft Hart&Staven; BaitLinFn129 (MTEC). **SOUTH DAKOTA:** \*Mt.Rushmore, VIII.30.51.S.D Bryant Lot.38. /

*Thoracophorus costalis* Er. Det. M.W.Sanderson 52 (CAS).

*Thoracophorus guadalupensis*

**UNITED STATES: FLORIDA: Alachua Co.:** \*USA: Florida: Alachua Co. N 29.6333°, W 82.3680° UF Nat. Area Teaching Lab 8 May 2014 mixed forest Sift/Berlese M. Ferro (LSAM, 2 specimens). **Miami-Dade Co.:** \*USA: Fla. Dade Co. Everglades Nat. Pk. PalmaVista Hammock 5-i-75 / FM(HD) #74-98 litter in gumbo limbo buttress (FMNH, 4 specimens) [A single specimen from FMNH was labeled: "USA: Ohio, Hocking Co. Enterprise 29-vii-1979 ex rotten wood & litter around stump LE Watrous." The point, glue, and specimen preparation are indistinguishable from the previous specimens and the locality label is almost certainly in error. (FMNH)]. \*USA: Fla. Dade Co. Everglades Nat. Pk. PalmaVista Hammk. / 16-i-75 W. Suter FM(HD) #75-31 ex dry litter and log (FMNH). **Palm Beach Co.:** \*USA: Fl., Palm Beach Co., W of Loxahatchee, 24-III-1982 FMHD #82-153, litter at log w/ants. W. Suter. (FMNH, 7 specimens). \*USA: Fl., Palm Beach Co., W of Loxahatchee, 24-III-1982 FMHD #82-154, litter between logs w/mouse nest. W. Suter. (FMNH, 3 specimens).

## **Review of the Genus *Thoracophorus* (Coleoptera: Staphylinidae: Osoriinae) in North America North of Mexico, with a Key to Species**

Author(s): Michael L. Ferro

Source: The Coleopterists Bulletin, 69(1):1-10.

Published By: The Coleopterists Society

DOI: <http://dx.doi.org/10.1649/0010-065X-69.1.1>

URL: <http://www.bioone.org/doi/full/10.1649/0010-065X-69.1.1>

---

BioOne ([www.bioone.org](http://www.bioone.org)) is a nonprofit, online aggregation of core research in the biological, ecological, and environmental sciences. BioOne provides a sustainable online platform for over 170 journals and books published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Web site, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at [www.bioone.org/page/terms\\_of\\_use](http://www.bioone.org/page/terms_of_use).

Usage of BioOne content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.