



A new species and a new form of leafhopper from the Great Smoky Mountains National Park (Hemiptera: Cicadellidae: Typhlocybae)

DMITRY A. DMITRIEV¹ & JAMES N. ZAHNISER²

¹Illinois Natural History Survey, 1816 S. Oak St., Champaign, IL 61820, USA. E-mail: arboridia@gmail.com

²E-mail: zahniser@illinois.edu

Abstract

A new species *Erasmoneura tricuspidata* sp.n. and a new morphological variant of *Erythridula stolata* McAtee are described from the Great Smoky Mountains National Park.

Key words: Homoptera, Auchenorrhyncha, Erythroneurini

Introduction

The tribe Erythroneurini was recently revised comprehensively in the New World (Dmitriev & Dietrich, 2003 onward, 2007, 2009, 2010; Dmitriev, 2008; Dietrich & Dmitriev, 2006, 2007, 2008). These revisions resulted in the restructuring of generic concepts and circumscriptions of New World erythroneurine genera and provided descriptions, illustrations, biological and distributional information, and identification keys for all species, which for the first time allowed species to be easily identified with an updated and comprehensive suite of resources. Faunistic surveys of this hyperdiverse group of insects which were previously impractical due to the scattered nature of the historical literature and unclear or unwarranted species concepts are now feasible.

The Great Smoky Mountains National Park (GSMNP) harbors an extremely rich diversity of hardwood trees which are hosts for many Erythroneurini, and some erythroneurine leafhopper species are known only from the Park. The great diversity of potential hosts and the ecological integrity of the area suggest that the diversity of Erythroneurini and other Typhlocybae is likely to be very high. In association with the All Taxon Biodiversity Survey (ATBI) of GSMNP, a recent preliminary survey of the Typhlocybae of the park was conducted. This study complements previous studies on the Auchenorrhyncha of GSMNP which excluded Typhlocybae due to their (previous) cumbersome taxonomic state. While documenting the Typhlocybae of the park, this study revealed a new species of *Erasmoneura* and a new morphological variant of *Erythridula stolata* McAtee, and these are described here.

Materials and methods

In the ATBI “structured sampling” protocol, samples were collected once every two weeks at semi-permanent study sites where a series of passive and active sampling techniques were used, and detailed physical and vegetative data were collected (Parker & Bernard, 2006; Jenkins, 2007). Thousands of typhlocybine leafhopper specimens were collected with these methods, and due to time and resource constraints, only a fraction of them were processed for identification. Specimens were stored in 70% ethanol, approximately 500 specimens were later point-mounted and pinned, and abdomens for representatives of morphospecies were cleared in 10% KOH, rinsed in water, and suspended in glycerin. An additional ~100 entire male specimens were placed directly into 10% KOH, thus completely clearing the entire leafhopper. This method allows for more rapid identification, avoids the

need to dry and pin the specimens which sometimes results in damaging or shrinking these fragile leafhoppers, and provides a higher level of confidence in the identification, because rather than assuming the identity of a specimen based on external similarity to one identified by examining genitalia, the genitalia were examined for all specimens.

The specimens from this study were collected from the ATBI Twin Creeks site, classified as a low to mid-elevation (594 m) secondary forest with some disturbance (a settlement) and dominated by tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), sweet birch (*Betula lenta*), and sycamore (*Platanus occidentalis*) (Jenkins, 2007).

The distribution map was produced using the SimpleMappr online tool (Shorthouse, 2010).

Terminology follows Dmitriev & Dietrich (2007).

The holotype of the new species is deposited to the collection of the Great Smoky Mountains National Park, Cat. # GRSM 107962, Acc. # GRSM-02205. It is on long-term loan to the Insect Collection of the Illinois Natural History Survey.

Results

Family Cicadellidae

Subfamily Typhlocybinae

Tribe Erythroneurini

Erasmoneura tricuspidata sp.n.

Description: Body length 2.8 mm. Forewing outer apical cell about 2X as long as wide; second apical cell basally truncate (ir crossvein present). 2S abdominal apodemes large, broad, reaching 3S posterior margin. Pygofer not extended to apex of subgenital plate; pygofer lobe rounded; dorsal emargination extended to base of segment. Pygofer basolateral setae in distinct group, small; distal setae undifferentiated. Pygofer dorsal appendage with distinct basal suture, but not movably articulated, simple, extended beyond pygofer apex, straight in dorsal view, curved upward in lateral view; ventral appendage absent. Style apex with 3 points; second point very short, toothlike; third point elongate, about as long as half distance between other two points; angle between basal and third points about 90°. Dorsal apodeme of aedeagus broadly expanded in lateral view, with distinct V-shaped ligaments, connected to anal tube and pygofer appendages; preatrium longer than shaft; shaft symmetrical, straight and broad in lateral view, round in crosssection, smooth, with tip depressed and abruptly curved dorsad; aedeagus with unpaired ventral process placed basally, shorter than shaft; distal processes long, apical, slender.

Coloration: Dorsum yellowish with reddish and brownish color pattern; vertex mostly dark; anteclypeus pale, concolorous with rest of face; pronotum almost entirely dark; mesonotum entirely dark; thoracic venter with dark mesosternum, remainder pale. Forewings with oblique vittae forming continuous zigzag pattern, without crossbands, without numerous irregular red dots. Clavus largely or entirely bright red or brown. Forewings mainly dark with pale lateral specks and two big diamond or pentagonal spots at middle; dark spot on costal margin; apical cell II with distal spot; inner apical cell without brown spot.

Type locality: Holotype ♂, USA, Tennessee, Sevier Co., Twin Creeks, Malaise trap, 35°41'6" N 83°29'56" W, 5 XI–5 XII 2001, col. IC Stocks, (Great Smoky Mountains National Park).

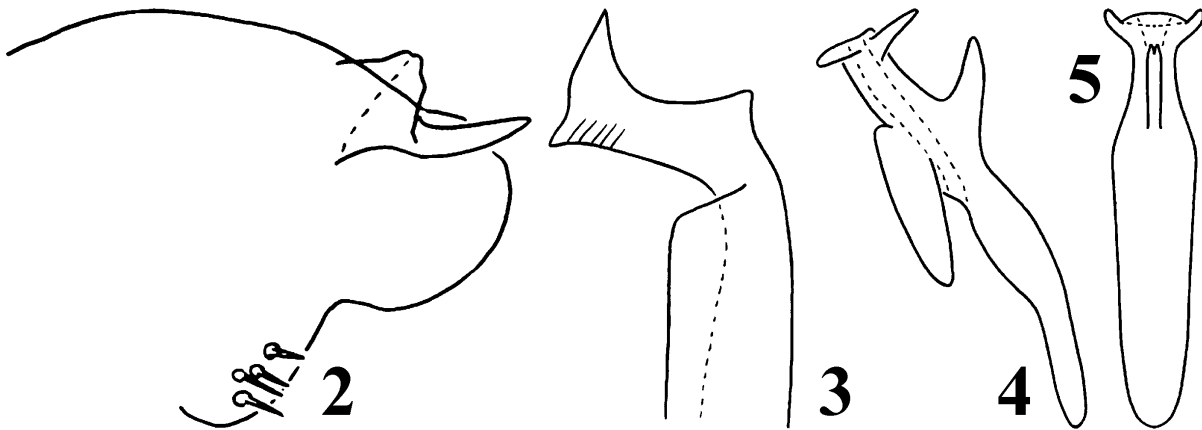
Distribution: The species is known only from the type locality.

Host plant: Unknown.

Notes: The new species is similar to *E. bipentagona* Beamer in habitus and color pattern. The main difference is the shape of the aedeagus, which has an unpaired basal process (paired in *E. bipentagona*) and long distal processes (very short in *E. bipentagona*). The species name refers to the shape of the aedeagal shaft having 3 processes. The holotype specimen (whole body) was cleared with KOH before it was recognized as a new species. Because this is the only known specimen of the new species, it is not possible to provide a photograph showing the natural coloration and the body measurement and description of the color pattern may not be directly comparable to such information in the previous literature provided for other described species of the genus.



FIGURE 1. *Erasmoneura tricuspidata* sp.n. Distribution map.



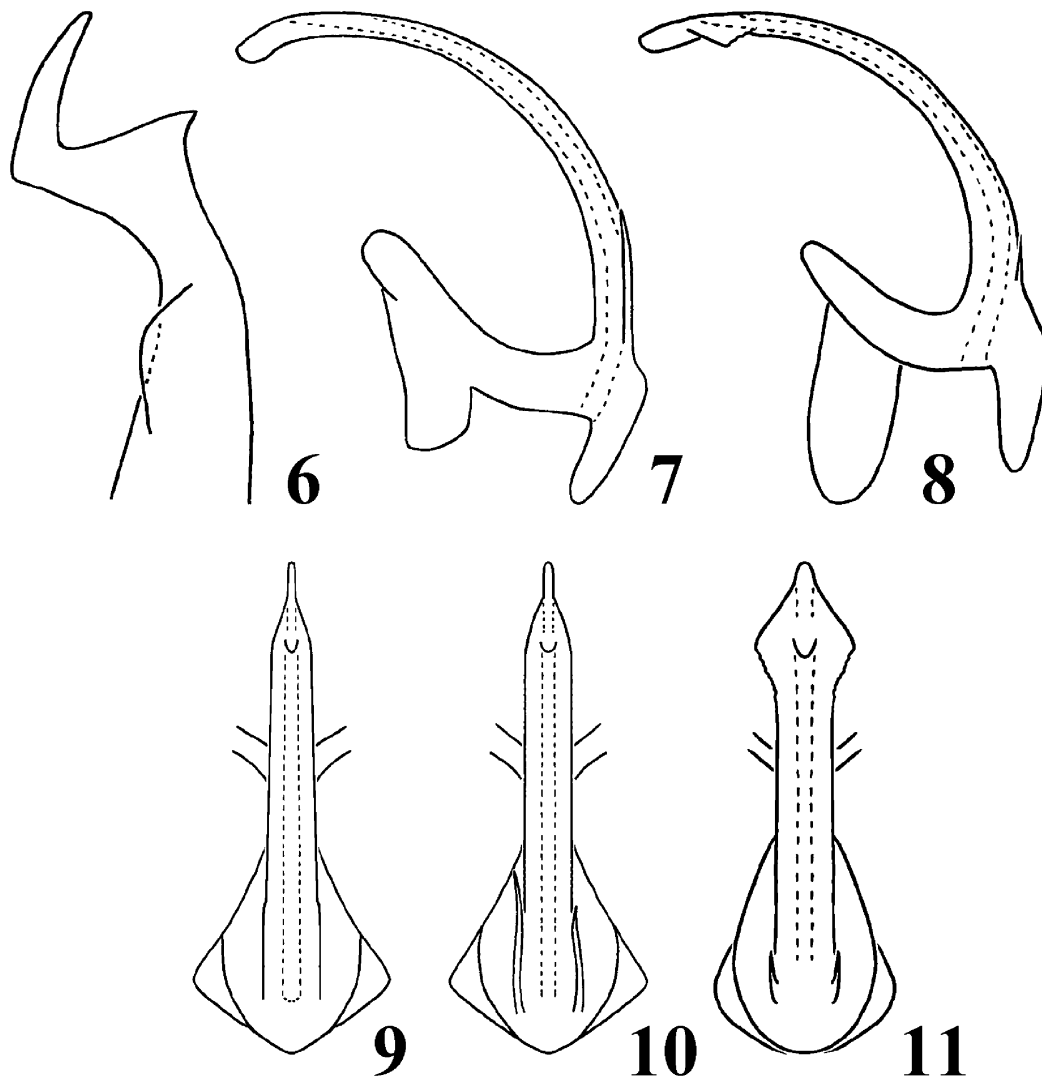
FIGURES 2–5. *Erasmoneura tricuspidata* sp.n. 2, pygofer lobe, lateral view; 3, style apex; 4, aedeagus, lateral view; 5, aedeagus, ventral view.

***Erythridula stolata* McAtee**

Studied material: 9 ♂, 2 ♀, USA, Tennessee, Sevier Co., Great Smoky Mountain National Park, Twin Creeks, Malaise trap, 35°41'6" N 83°29'56" W, 5 XI–5 XII 2001, col. IC Stocks, (INHS).

Notes: Specimens we identified as *E. stolata* collected in GSMNP exhibit some differences from previously studied specimens of this species. Although the habitus and color pattern are typical, the shape of the aedeagus is slightly different. The basal processes of the aedeagus were very short or absent, and a pair of flat triangular distal

processes was well developed. Based on comparison with specimens we interpret this newly observed variation as intraspecific but additional study, ideally including analysis of molecular data, is warranted.



FIGURES 6–11. *Erythridula stolata* McAtee. 6, style apex, 7–8, aedeagus, lateral view, variation; 9–11, aedeagus, ventral view; 8 and 11, specimens from the Great Smoky Mountains National Park.

Acknowledgements

We thank Discover Life in America for providing funding for this study, the ATBI and GSMNP staff for providing resources and assistance in obtaining permits and facilitating collections and data reporting, and Charles Bartlett (University of Delaware) for assistance with the study. We also thank Christopher Dietrich for reviewing this manuscript. The work was supported by NSF-REVSYS grants DEB0315373, DEB050529679, DEB0715499, DBI1458285, and DEB1639601 grants.

References

- Dietrich, C.H. & Dmitriev, D.A. (2006) Review of the New World genera of the leafhopper tribe Erythroneurini (Hemiptera: Cicadellidae: Typhlocybinae). *Bulletin of the Illinois Natural History Survey*, 37 (5), 1–IV, 119–190.
- Dietrich, C.H. & Dmitriev, D.A. (2007) Revision of the New World leafhopper genus *Neozygina* Dietrich & Dmitriev (Hemiptera: Cicadellidae: Typhlocybinae: Erythroneurini). *Zootaxa*, 1475, 27–42.

- Dietrich, C.H. & Dmitriev, D.A. (2008) Review of the species of New World Erythroneurini (Hemiptera: Cicadellidae: Typhlocybinae). II. Genus *Zyginama*. *Bulletin of the Illinois Natural History Survey*, 38 (3), I–IV, 129–176.
- Dmitriev, D.A. (2008) New and little known species of *Erasmoneura* Young (Hemiptera: Cicadellidae: Typhlocybinae). *Zootaxa*, 1851, 65–68.
- Dmitriev, D.A. & Dietrich, C.H. (2003) Erythroneurini database. Available from: <http://dmitriev.speciesfile.org/> (accessed 30 June 2017)
- Dmitriev, D.A. & Dietrich, C.H. (2007) Review of the New World Erythroneurini (Hemiptera: Cicadellidae: Typhlocybinae). I. Genera *Erythroneura*, *Erasmoneura*, *Rossmoneura*, and *Hymetta*. *Bulletin of the Illinois Natural History Survey*, 38 (2), I–V, 59–128.
- Dmitriev, D.A. & Dietrich, C.H. (2009) Review of the New World Erythroneurini (Hemiptera: Cicadellidae: Typhlocybinae). III. Genus *Erythridula*. *Bulletin of the Illinois Natural History Survey*, 38 (6), I–IV, 215–334.
- Dmitriev, D.A. & Dietrich, C.H. (2010) Review of the New World Erythroneurini (Hemiptera: Cicadellidae: Typhlocybinae). IV. Genus *Eratoneura*. *Bulletin of the Illinois Natural History Survey*, 39 (3), I–VIII, 79–258.
- Jenkins, M.A. (2007) Vegetation Communities of Great Smoky Mountains National Park. *Southeastern Naturalist*, Special Issue, 6, 35–56.
[https://doi.org/10.1656/1528-7092\(2007\)6\[35:VCOGSM\]2.0.CO;2](https://doi.org/10.1656/1528-7092(2007)6[35:VCOGSM]2.0.CO;2)
- Parker, C. & Bernard, E. (2006) The Science Approach to the Smokies ATBI. *The George Wright Forum*, 23 (3), 26–36.
- Shorthouse, D.P. (2010) SimpleMappr, an online tool to produce publication-quality point maps. Available from: <http://www.simplemappr.net> (accessed 30 June 2017)