

1980

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Recommended Citation

Kittle, Paul D. (1980) "Water Striders (Hemiptera: Gerridae) of Arkansas," *Journal of the Arkansas Academy of Science*: Vol. 34 , Article 21.

Available at: <https://scholarworks.uark.edu/jaas/vol34/iss1/21>

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THE WATER STRIDERS (HEMIPTERA: GERRIDAE) OF ARKANSAS

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ABSTRACT

The taxonomy, distribution, and ecology of the water striders of Arkansas are discussed based on personal collections, museum specimens, and literature records. A total of 15 species representing six genera is presently known from the state. One additional species is included as probably occurring in Arkansas.

INTRODUCTION

Most studies on the Gerridae of Arkansas have been limited to scattered locality records which are cited under the appropriate species. Kittle (1974, 1977a) reported on the biology of those species occurring in Washington County, and Kittle (1977b) included numerous records of *Trepobates* spp. from Arkansas. The purpose of the present paper is to contribute additional knowledge of the taxonomy, ecology, and distribution of this neglected family of insects in Arkansas.

METHODS AND MATERIALS

Information on the Gerridae of Arkansas was gathered primarily through personal collections, especially in northwest Arkansas, and also from museum specimens and the literature. Approximately 5800 specimens were collected from 1972 through 1977, and 720 specimens were examined from the following institutions and individuals: Arkansas State University, Arkansas Tech University, Harold C. Chapman, Iowa State University, John T. Polhemus, Memphis State University, Purdue University, United States National Museum, University of Arkansas at Fayetteville, University of Kansas, and University of Southwestern Louisiana. Records were gathered for 58 of the 75 counties in Arkansas.

RESULTS AND DISCUSSION

Key to the Genera of Gerridae of Arkansas

1. Inner margins of eyes sinuate or concave behind the middle; body comparatively long and narrow 2
Inner margins of eyes convexly rounded; body comparatively short and broad 4
- 2(1). Basal segment of fore tarsus about half as long as second; dorsal surface of head and pronotum glabrous, shiny *Neogerris*
Basal segment of fore tarsus subequal in length to second; dorsal surface of head and pronotum sericeous, dull 3
- 3(2). Antennal segment 1 shorter than segments 2 and 3 together *Limnoporus*
Antennal segment 1 equal to or longer than segments 2 and 3 together *Gerris*
- 4(1). Antennal segment 1 long, longer than (male) or subequal to (female) 2, 3, and 4 united *Metrobates*
Antennal segment 1 much shorter than 2, 3, and 4 united 5
- 5(4). Middle femur distinctly longer than hind femur; antennal segment 2 very short, its length less than three times its diameter *Rheumatobates*

Middle femur distinctly shorter than hind femur; antennal segment 2 long, its length at least five times its diameter *Trepobates*

Gerris Fabricius

Four species of this genus are known to occur in Arkansas. *Gerris insperatus* is included in the following key as a species which will probably be found in Arkansas in the future.

Key to the Species of *Gerris* in Arkansas

1. First genital segment not divided ventrally (males) 2
First genital segment divided into two halves which meet along ventral midline (females) 6
- 2(1). Sixth abdominal ventrite singly emarginate at apex and with a broad median furrow *G. nebularis*
Sixth abdominal ventrite doubly emarginate at apex and without a broad median furrow 3
- 3(2). Length 12 mm or more; first genital segment with a strong keel ventrally *G. remigis*
Length 11 mm or less; first genital segment with keel moderately or weakly produced 4
- 4(3). Anterior lateral margin of pronotum with a pale stripe immediately posterior to eye *G. argenticollis*
Anterior lateral margin of pronotum without a pale stripe immediately posterior to eye 5
- 5(4). Venter of first genital segment strongly impressed on each side of median ridge, a distinct keel present *G. marginatus*
Venter of first genital segment not strongly impressed on each side of median ridge, a distinct keel absent *G. insperatus*
- 6(1). Length 14 mm or more 7
Length 12 mm or less 8
- 7(6). Connexival spines long, reaching to or slightly beyond apex of abdomen *G. nebularis*
Connexival spines short, reaching only to apex of first genital segment ventrally *G. remigis*
- 8(6). Anterior lateral margin of pronotum with a pale stripe immediately posterior to eye *G. argenticollis*
Anterior lateral margin of pronotum without a pale stripe immediately posterior to eye; females so similar they cannot be reliably separated with a key *G. insperatus* and *G. marginatus*

Gerris argenticollis Parshley

This species was collected from a variety of habitats including ponds, small lakes, borrow pits, and quiet pools of streams, but was most abundant on woodland pools. Collection dates ranged from 12 March to 12 June. *G. argenticollis* often was associated with *G.*

marginatus and *Limnopus canaliculatus*. All specimens were macropterous. The species was first recorded from the state by Kittle (1977a), but is apparently widespread. Records exist for these counties: Arkansas, Ashley, Calhoun, Cleveland, Columbia, Crawford, Dallas, Franklin, Lonoke, Montgomery, Newton, Polk, Searcy, Stone, Union, and Washington. *G. argenticollis* may be locally common but is a rare species in general. Eighty-five specimens were examined.

Gerris insperatus Drake and Hottes

This gerrid has not been recorded from Arkansas but is included here because of the probability that it eventually will be collected in the state. I have specimens in my collection from Cass Co., Texas, approximately 34 km west of the Arkansas state line. The species should be looked for in spring or early summer.

Gerris marginatus Say

This water strider was euryecious and was collected from the following habitats: ponds, lakes, woodland pools, streams, springs, temporary pools, roadside ditches, and borrow pits. It occurred on almost every body of water visited during the spring. Most habitats from which specimens were taken were permanent, but many were ephemeral. One specimen was collected at a blacklight in Union Co. *G. marginatus* was collected from 17 February to 29 October, but the majority of records were from April, May, and June. Habitats which supported large populations of this species in the spring were often uninhabited in late summer and autumn. The species was observed in association with *G. argenticollis*, *G. remigis*, *Limnopus canaliculatus*, and *Trepobates subnitidus* but was often found alone. Of the 817 adults examined, 802 (98%) were macropterous and 15 (2%) were brachypterous.

Kuitert (1942) recorded *G. marginatus* from Arkansas, and McGary and Harp (1972) and Harp and Hubbard (1972) reported this species from Cleburne Co. and Saline Co., respectively. It is abundant in spring and early summer, is widespread in the state, and has been recorded from the following counties: Arkansas, Ashley, Baxter, Benton, Clark, Cleburne, Craighead, Crawford, Crittenden, Cross, Dallas, Desha, Drew, Faulkner, Fulton, Greene, Hempstead, Hot Spring, Jackson, Johnson, Lawrence, Madison, Marion, Mississippi, Montgomery, Newton, Pike, Polk, Pope, Randolph, Saline, Scott, Searcy, Sharp, Stone, Union, Washington, and Woodruff.

Gerris nebularis Drake and Hottes

This species mainly inhabited large, quiet pools of medium and large streams but sometimes was found on small streams. It was restricted to lotic habitats. Collection dates ranged from 1 April to 15 October. *G. nebularis* often was associated with *G. remigis*. Of the 150 specimens examined, 141 (94%) were brachypterous and nine (6%) were macropterous. This water strider was reported from Arkansas by Drake and Harris (1934). *G. nebularis* is undoubtedly more widespread in Arkansas than is indicated by the following county records: Baxter, Benton, Carroll, Clark, Columbia, Fulton, Hempstead, Lonoke, Pike, Randolph, Sharp, and Washington. The species may be locally common but is more difficult to collect than most gerrids because of its wariness and microhabitat (middles of pools of larger streams).

Gerris remigis Say

This gerrid usually was recorded from small permanent streams but was common on medium and large streams. It rarely was observed on ponds, roadside ditches, or woodland pools. *G. remigis* was collected from a stream in the twilight zone of Logan Springs Cave, Benton Co., and McDaniel and Smith (1976) reported the species from the twilight zone of Needles Cave, Izard Co. It was recorded for each month of the year, but the majority of collections

were made from April through October. *G. remigis* sometimes was observed in association with *G. marginatus* and *G. nebularis*, but often occurred alone. Of the 751 adults examined, 676 (90%) were apterous and 75 (10%) were macropterous.

The species is abundant and widespread in the Interior Highlands but is apparently rare or absent from most of the Gulf Coastal Plain. The disjunct Arkansas Co. record may in fact be in error. It is based on a specimen in the University of Arkansas at Fayetteville collection which bears a label "black light trap", but the specimen is apterous. *G. remigis* was recorded from these counties: Arkansas, Baxter, Benton, Conway, Crawford, Franklin, Fulton, Greene, Independence, Izard, Johnson, Lawrence, Logan, Madison, Marion, Montgomery, Newton, Polk, Pope, Randolph, Scott, Searcy, Stone, and Washington.

Limnopus Stal

Limnopus canaliculatus (Say)

This species was formerly placed in the genus *Gerris*, subgenus *Limnopus*, but Andersen (1975) elevated the subgenus *Limnopus* to generic status. Cather and Harp (1975) reported *L. dissortis* (as *Gerris*) from northeast Arkansas, but this record probably applies to *L. canaliculatus*. *L. canaliculatus* was euryecious and was collected from the following habitats: lakes, ponds, woodland pools, borrow pits, temporary pools, and pools of small, medium, and large streams. Seventeen specimens were collected at a blacklight in Miller Co. The species was collected from 15 January to 25 November and was often associated with *G. marginatus* and *G. argenticollis*. One hundred seventy-two (79%) of the 217 specimens examined were macropterous and 45 (21%) were apterous.

L. canaliculatus was recorded from Little Rock by Drake and Harris (1928), from Arkansas by Kuitert (1942), and from Cleburne Co. by McGary and Harp (1972). This water strider is widespread in Arkansas and was recorded from the following counties: Arkansas, Ashley, Benton, Clark, Cleburne, Craighead, Crawford, Crittenden, Dallas, Desha, Drew, Faulkner, Greene, Hempstead, Jackson, Madison, Miller, Mississippi, Montgomery, Nevada, Newton, Pope, Pulaski, Randolph, Scott, Sevier, Union, Washington, and Woodruff. It was locally common, especially on lentic habitats.

Metrobates Uhler

Key to the Species of *Metrobates* in Arkansas

1. First genital segment not divided ventrally (males) 2
- First genital segment divided into two halves which meet along ventral midline (females) 3
- 2(1). With a single spur on the midline of the mesosternum *M. alacris*
- Without a mesosternal spur *M. hesperius*
- 3(1). Light pronotal marking a broad stripe *M. alacris*
- Light pronotal marking more or less oval or circular *M. hesperius*

Metrobates alacris Drake

M. alacris was collected only from streams in July and September. Kittle (1977c) first recorded this species from Arkansas. Although it is known only from two localities in Greene and Hempstead counties, *M. alacris* is probably locally common on many of the streams of the Gulf Coastal Plain. Twenty-one apterous specimens were examined.

Metrobates hesperius Uhler

This water strider was collected only from larger streams and usually was found either immediately above or below riffle areas.

Collection dates ranged from 25 June to 21 October. This species was gregarious but was not closely associated with any other gerrid. All specimens were apterous. *M. hesperius* was reported from Arkansas by Anderson (1932). It was found to be widely distributed in the Interior Highlands and was recorded from the following counties: Baxter, Benton, Carroll, Fulton, Independence, Lawrence, Madison, Marion, Montgomery, Newton, Pike, Polk, Randolph, Saline, Scott, Stone, and Washington. *M. hesperius* was locally common, and 409 specimens were examined.

Neogerris Matsumura

Neogerris hesione (Kirkaldy)

This species was formerly placed in the genus *Limnogonus*, but belongs in *Neogerris* according to the treatment of Andersen (1975). *N. hesione* usually was collected from permanent ponds and lakes, but macropterous specimens were occasionally taken from pools of streams. Adults were collected from 22 May to 3 November. *N. hesione* was highly gregarious and was often associated with *Trepobates subnitidus*. Of the 182 adults examined, 163 (90%) were apterous and 19 (10%) were macropterous. This gerrid was recorded from Arkansas by Drake and Harris (1934). It was locally common at localities scattered throughout the state and was recorded from the following counties: Craighead, Crawford, Faulkner, Fulton, Greene, Mississippi, Montgomery, Randolph, Scott, Sharp, Union, and Washington.

Rheumatobates Bergroth

Key to the Species of *Rheumatobates* in Arkansas

- 1. Antennae geniculate, with spines (males) 2
 Antennae not geniculate, without spines, cannot be adequately keyed at present females
- 2(1). Hind femur straight *R. tenuipes*
 Hind femur curved, often thickened 3
- 3(2). Hind femur with long hairs on the basal third of the inner margin *R. palosi*
 Hind femur without long hairs on the basal third of the inner margin 4
- 4(3). Middle femur with a row of long straight hairs on inner margin *R. hungerfordi*
 Middle femur hairless on inner margin except for a few hairs near apex *R. trulliger*

Rheumatobates hungerfordi Wiley

This water strider was collected only from streams on 11 and 29 July. It was associated with *R. palosi*, *R. tenuipes*, and *Trepobates subnitidus*. *R. hungerfordi* was recorded from Polk Co. based on two female specimens (Hungerford, 1954). I collected the species from two localities in Hempstead and Sebastian counties. All 13 specimens examined were apterous.

Rheumatobates palosi Blatchley

Blatchley (1926) described this water strider as a variety of *R. rileyi*; however, Bobb (1974) elevated it to specific rank, and the latter classification is followed here. The species was collected from a variety of habitats including pools of large and small streams, lakes, ponds, and borrow pits. Collection dates extended from 20 May to 15 October. *R. palosi* was associated with several species of *Rheumatobates* and *Trepobates*. Of the 513 specimens examined, 502 (98%) were apterous and 11 (2%) were macropterous. *R. palosi* was reported from Carroll and Polk counties by Hungerford (1954) and from Arkansas by Schroeder (1931). It is the most widespread and abundant *Rheumatobates* in Arkansas and was recorded from the following counties: Ashley, Calhoun, Carroll, Clay, Cleveland, Columbia, Craighead, Crawford, Fulton, Hempstead, Johnson, Lawrence,

Logan, Montgomery, Newton, Pike, Polk, Pope, Randolph, Saline, Scott, Sevier, Union, and Washington.

Rheumatobates tenuipes Meinert

This water strider usually was collected from pools of large streams, but one record was from a pond and one from a borrow pit. Collection dates ranged from 20 May to 15 October. *R. tenuipes* was associated with several species of *Rheumatobates* and *Trepobates*. Of the 223 specimens examined, only two (1%) were macropterous, and 221 (99%) were apterous. This gerrid was first recorded from Arkansas by Kittle (1977a). It is widely distributed and is occasionally locally common. Records were gathered for the following counties: Crawford, Fulton, Greene, Hempstead, Lawrence, Poinsett, Randolph, Sebastian, Union, and Washington.

Rheumatobates trulliger Bergroth

This species was collected only from pools of streams from 21 August to 23 September. It was associated with several species of *Rheumatobates* and *Trepobates*. Of the 24 specimens examined, 23 were apterous and one was macropterous. Literature records for *R. trulliger* in Arkansas include Arkansas (Schroeder, 1931), Polk Co. (Hungerford, 1954), and Craighead Co. (Cather and Harp, 1975). The species is known only from four localities in Craighead, Montgomery, Polk, and Washington counties and is apparently a rare species in Arkansas.

Trepobates Uhler

Key to the Species of *Trepobates* in Arkansas

- 1. First genital segment not divided ventrally (males) 2
 First genital segment divided into two halves which meet along ventral midline (females) 4
- 2(1). Antennal segment 3 with a basal row of long hairs, these hairs often appressed to segment *T. knighti*
 Antennal segment 3 without long hairs 3
- 3(2). Usually with a light yellow mesopleural stripe posterior to black postocular stripe of pronotum which is continuous between anterior and posterior margins *T. pictus*
 Without a mesopleural stripe as described above *T. subnitidus*
- 4(2). Mesonotum prolonged posteriorly into a median, horn-like projection *T. pictus*
 Mesonotum not prolonged posteriorly 5
- 5(4). With a light mesopleural spot posterior to black postocular stripe of pronotum; antennal segment 2 distinctly shorter than 3 *T. knighti*
 Without a light mesopleural spot as described above; antennal segment 2 only slightly shorter than or subequal to 3 *T. subnitidus*

Trepobates knighti Drake and Harris

This gerrid inhabited pools of large, medium, and small streams and is apparently restricted to lotic habitats. One specimen was collected at a blacklight in Montgomery Co. Adult collection records in Arkansas ranged from 16 June to 25 October. *T. knighti* was commonly collected in close association with *T. subnitidus*, *Rheumatobates palosi*, and *R. tenuipes*. Of the 1257 specimens examined, 1243 (99%) were apterous and only 14 (1%) were macropterous.

T. knighti was recorded from Arkansas by Drake and Harris (1932), Drake and Hottes (1952), and Drake and Chapman (1953). This gerrid is common on most streams in the Interior Highlands, and almost all collections were from this area. Specimens were examined from the following counties: Baxter, Boone, Carroll, Cleburne, Crawford, Fulton, Hot Spring, Independence, Johnson, Lawrence,

Logan, Madison, Marion, Montgomery, Newton, Pike, Polk, Randolph, Saline, Scott, Sharp, Stone, Van Buren, and Washington.

Trepobates pictus (Herrich-Schaeffer)

This species was collected from pools of small, spring-fed streams in Stone and Washington counties and from an unknown habitat in Cross Co. from 1 July to 12 September. *T. pictus* was associated with *T. knighti* and *Rheumatobates palosi* at the Washington Co. site. All 43 specimens examined were apterous. This Gerrid was common at the single locality in Washington Co., but its abundance at the other two sites could not be determined.

Trepobates subnitidus Esaki

Females of this species may have the connexiva produced into short or long connexival spines or not produced into spines. In general, spineless females predominate in Gulf Coastal Plain populations and long-spined females predominate in Interior Highlands populations, with intermediate and mixed populations occurring in transitional areas. The long-spined populations were referred to as *T. sp.* by Kittle (1974, 1977a) because of their uncertain taxonomic status, but it was subsequently demonstrated (Kittle, 1977b) that long-spined populations were a morphological variant of *T. subnitidus*.

T. subnitidus was collected from lakes, ponds, borrow pits, and pools of large, medium, and small streams and was much more common on lentic than lotic habitats. Collection dates ranged from 20 May to 1 November. The species was commonly collected in association with *T. knighti*, *Gerris marginatus*, *Neogerris hesione*, and several species of *Rheumatobates*. Of the 1634 adults examined, 1502 (92%) were apterous and 132 (8%) were macropterous.

The record of *T. inermis* from Saline Co. (Harp and Hubbard, 1972) applies to *T. subnitidus*. *T. subnitidus* is widespread in Arkansas and is locally abundant. Records were gathered for these counties: Ashley, Benton, Boone, Calhoun, Clay, Cleburne, Cleveland, Craighead, Crawford, Desha, Faulkner, Fulton, Greene, Hempstead, Jackson, Johnson, Lawrence, Little River, Logan, Madison, Marion, Mississippi, Montgomery, Pike, Polk, Pope, Randolph, Saline, Scott, Sebastian, Sevier, Sharp, Union, and Washington.

ACKNOWLEDGEMENTS

I thank the following individuals and institutions for providing specimens: Harley P. Brown, Harold C. Chapman, Rob Chenowith, Raymond D. Couser, George L. Harp, Iowa State University, Memphis State University, John T. Polhemus, Purdue University, E. Phil Rouse, United States National Museum, University of Kansas, and University of Southwestern Louisiana.

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