

The Aquatic and Semiaquatic Hemiptera of Oklahoma

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PART I, NEPIDAE

Oklahoma's shorelines are steadily increasing as numerous farm ponds and reservoirs are established in the state. This increase adds more and more habitats for aquatic insects. This paper is the first of a series which will provide easy means for the identification of the aquatic and semiaquatic Hemiptera found in Oklahoma as well as those species that are likely to occur in the state but are not yet recorded. Useful general information about aquatic and semiaquatic Hemiptera, as well as keys to the families, may be found in the following books: Blatchley (1926), Edmondson (1959), Pennak (1954) and Usinger (1956).

In addition to the above literature, Hungerford's (1922) revision of the family Nepidae applies to this part of the series. The Oklahoma fauna has two of the three nearctic genera of Nepidae and is represented by six species.

When pinning fresh material, one should wash debris from the head and move the forelegs away from the ventral side of the head to avoid obscuring the view of the antennae.

KEY TO THE SPECIES

1. Body flattened and elongate-oval *Nepa apiculata*
Body rounded, linear and narrow 2
2. Second antennal joint simple, without a branch *Ranatra kirkaldyi*
Second antennal joint branched (branch may be very short
and stubby) 3
3. Lateral branch of second joint not over one-half length of
third joint 4
Lateral branch over one-half length of third joint 5
4. Prosternum with single wide, deep longitudinal trough or groove.....
..... *Ranatra buenoi*
Prosternum without single trough but with two longitudinally im-
pressed lines *Ranatra nigra*
5. Fore femora without subapical tooth *Ranatra australis*
Fore femora with subapical tooth *Ranatra fusca*

Nepa apiculata Uhler

Characteristics: Length 18-20 mm; body elongate-oval, flattened; head inserted in median concavity of pronotum; fore femora swollen, grooved full length to receive curved tibiae and rigid one-jointed tarsi; hind femora with a groove.

Distribution: McCurtain County.

Ranatra australis Hungerford

Characteristics: Length of body 32-37 mm; fore femora and tibiae palely annulated with dark transverse bands; scutellum with two pits; respiratory tubes as long as abdomen.

Distribution: Cleveland, Love, Marshall, Murray and Payne counties.

Ranatra buenoi Hungerford

Characteristics: Length 32-38 mm; fore femora and tibiae concolorous, except in paler specimens palely annulated near apices of joints with dark transverse bands; scutellum with two pits.

Distribution: McCurtain, Payne and Pontotoc counties.

Ranatra fusca Palisot de Beauvois

Characteristics: Length of body 35-42 mm; fore femora and tibiae not or faintly annulated with dark transverse bands; scutellum with two very shallow pits, divided by a prominent medial carina; respiratory tube shorter than abdomen.

Distribution: Mayes County.

Ranatra kirkaldyi Torre-Bueno

Characteristics: Length 23-30 mm; fore femora and tibiae not or distinctly annulated in paler specimens, fore femora not narrowed beyond submedial spine; scutellum with two very shallow pits; respiratory tubes shorter than abdomen.

Distribution: Cleveland, McCurtain and Payne counties.

Ranatra nigra Herrich-Schaeffer

Characteristics: Length 30-32 mm; fore femora and tibiae not annulated, fore femora long and slender, about as broad as fore coxae, narrowed at submedial spine; scutellum with two pits, respiratory tubes shorter than abdomen.

Distribution: Cleveland, Comanche, LeFlore, Marshall, Mayes, McCurtain, Oklahoma and Payne counties.

PART II NOTONECTIDAE

This part contains keys and distribution data for the eight species of Notonectidae that one is likely to collect in Oklahoma.

The nearctic notonectids belong to two genera, *Notonecta* and *Buena*, which have been monographed by Hungerford (1933) and Truxal (1953) respectively. Both genera are present in Oklahoma.

KEY TO THE SPECIES

1. Hemelytral commissure without pit at anterior end2
Hemelytral commissure with hair-lined pit at anterior end, behind apex of scutellum6
2. Color largely dark, nearly black, hemelytra flecked with brown and blue-black*Notonecta irrorata*
Color largely pale, or reddish to orange; hemelytra may have transverse black band across corial-membrane union, not flecked as above3
3. Mesotrochantal margin plainly angulate4
Mesotrochantal margin evenly rounded5
4. Hemelytra reddish to orange with black transverse band
Hemelytra almost entirely pale*Notonecta whleri*
.....*Notonecta raleighi*
5. Anterior width of vertex (ca. 1 mm as seen from above) less than length of vertex (1.5 mm)*Notonecta indica*
Anterior width of vertex (ca. 1mm) generally subequal or somewhat greater than length of vertex*Notonecta undulata*

6. Scutellum narrow, not as long as pronotum *Buenoa confusa*
 Scutellum broad, as long as pronotum 7
7. Stridulatory area of male inner femora with long conspicuous cross
 ridges, 30 or more *Buenoa scimitra*
 Stridulatory area of male inner femora with small oval cross ridges,
 15 or less *Buenoa margaritacea*

Buenoa confusa Truxal

Characteristics: Length 4.16-7 mm, greatest body width 1.3-1.62 mm; color generally whitish to pale testaceous; head, pronotum, scutellum, most of thoracic venter, limbs whitish to testaceous; abdominal venter light brown to black except median keel and connexivum pale testaceous.

Distribution: Truxal (1953) gives as part of the species distribution Kansas and Texas.

Buenoa margaritacea Torre-Bueno

Characteristics: Length 6.01-8.25 mm; greatest body width 1.-2.4 mm; color similar to *B. scimitra*, separated by key characters.

Distribution: Beaver, Grant, Harper, LeFlore, Marshall, Tillman and Woods counties.

Buenoa scimitra Bare

Characteristics: Length 5.46-7.5 mm, greatest body width 1.52-2.15 mm; color generally whitish to fuscous; head, anterior portion of pronotum, most of thoracic venter, limbs white to testaceous; posterior portion of pronotum white to hyaline; scutellum orange to reddish yellow, often black margined, abdomen black except median keel and connexivum and dorsum testaceous. This species is very similar to *B. margaritacea*, separated only by key characters.

Distribution: Cherokee, Marshall, McCurtain, Payne, Pushmataha and Tulsa counties.

Notonecta indica Linnaeus

Characteristics: Length 10-11 mm, width of pronotum 3.36-3.75 mm; color variable, typical color as in *N. undulata*; transverse dark band across apex and broadly covering most of membrane; insect often nearly whitish, no concentrated dark areas; terminal abdominal sternite of female notched shallowly or not at all. This species can be confused easily with *N. undulata* on color and structure.

Distribution: Cleveland, Latimer, Marshall, Mayes and Payne counties.

Notonecta irrorata Uhler

Characteristics: Length 12.9-15.5 mm; width of pronotum 4.5-5 mm; vertex of head with anterior width equal to its length; interocular width one-third anterior width of vertex, one-third width of an eye; pronotum more than twice length of head; mesotrochanters nearly right angulate.

Distribution: LeFlore, McCurtain and Pushmataha counties.

Notonecta raleighi Torre-Bueno

Characteristics: Length 8-8.9 mm, pronotal width 2.5-2.9 mm; vertex of head slightly longer than its anterior width; interocular width one-fifth anterior width of vertex; pronotum two- to four-tenths longer than head.

Distribution: McCurtain County.

Notonecta uhleri Kirkaldy

Characteristics: Length 10-12 mm, width of pronotum 3.3-4 mm; vertex of head with anterior width less than length; interocular width one-sixth or one-eighth anterior width of vertex; pronotum longer than scutellum.

Distribution: McCurtain County.

Notonecta undulata Say

Characteristics: Length 10.5-12.6 mm, pronotal width 3.6-4 mm; color variable, typical color—posterior portion of pronotum and scutellum black, hemelytra white with undulate narrow transverse black band across apex of corium and base of membrane, most of membrane whitish; often body nearly all whitish, no concentrated dark areas; terminal abdominal sternite of female notched at top, notch deeper than wide. This species can be confused easily with *N. indica* on color and structure.

Distribution: Alfalfa, Beaver, Beckham, Canadian, Cimarron, Cleveland, Custer, Garfield, Garvin, Harper, Kay, Latimer, Marshall, Noble, Osage, Ottawa, Pawnee, Payne, Pontotoc, Woods and Woodward counties.

PART III, GERRIDAE and VELLIDAE

This part deals with the family of small water striders, Vellidae, and the water striders, Gerridae.

As the common names of the two families indicate, they are closely related and resemble each other. The two families may be separated by the following couplet:

Hind femora very long, greatly exceeding apex of abdomen; adults with a median metasternal scent gland openingGerridae

Hind femora scarcely surpassing tip of abdomen; adults with lateral metasternal scent gland openings Vellidae

The family Gerridae, cosmopolitan in distribution, is represented in Oklahoma by three subfamilies: Gerrinae, two genera; Halobatinae, two genera; and Rhagadotarsinae, one genus.

Characteristics: Body form narrow elongate, widest behind pronotum; covered ventrally with short, dense hydrofuge hairs; head shorter than united pro- and mesonota; hind margin of eyes touching pronotum; ocelli present, very small and obscure; legs long and slender; anterior pair of legs shorter, raptorially adapted; tarsi two-jointed; hemelytra often absent, apterous, when present may be macropterous or brachypterous.

KEY TO THE SPECIES OF GERRIDAE

1. Eyes with inner margins sinuate or concave behind middle; length 4.5 mm or greater 2
 Eyes with inner margins convexly rounded; length usually less than 4 mm 3
2. Pronotum dull, tarsal segments of foreleg subequal in length 5
 Pronotum glabrous, shiny; first tarsal segment of foreleg much shorter than second *Limogonus hesione*

3.	First antennal segment subequal to remaining three together.....	
 <i>Metrobates hesperius depilatus</i>	
	First antennal segment much shorter than remaining three together	4
4.	Third antennal segment with several stiff bristles	16
	Third antennal segment with fine pubescence only	18
5.	Males	6
	Females	11
6.	Venter singly emarginate at apex; connexival spines very long, reaching to or slightly beyond middle of last genital segment	7
	Venter doubly emarginate at apex, second emargination forming a more or less distinct notch at middle; connexival spines shorter or absent	8
7.	Length 14-16 mm	<i>Gerris nebularis</i>
	Length 8-11 mm	<i>Gerris canaliculatus</i>
8.	Large robust species (11 mm or more); connexival spines rather long and conical; first genital segment with very prominent, strongly elevated keel	9
	Smaller species (less than 11 mm); connexival spines shorter, angular, first genital segment with keel only moderately prominent or absent	10
9.	Color brownish	<i>Gerris remigis</i>
	Color deep black	<i>Gerris nyctalis</i>
10.	First genital segment beneath with conspicuous long, silvery hairs on each side	<i>Gerris comatus</i>
	First genital segment without long hairs	<i>Gerris marginatus</i>
11.	Large species, length 11 mm or more	12
	Smaller species, length 10.8 mm or less	14
12.	Connexival spines long, slender, curved in and upward, as long as both genital segments	<i>Gerris nebularis</i>
	Connexival spines shorter, long as first genital segment	13
13.	Color brownish	<i>Gerris remigis</i>
	Color black	<i>Gerris nyctalis</i>
14.	Connexival spines extending to apices of first genital segment	15
	Connexival spines longer than both genital segments	<i>Gerris canaliculatus</i>
15.	Connexival spines straight	<i>Gerris marginatus</i>
	Connexival spines incurved	<i>Gerris comatus</i>
16.	Metafemora of male without fine hairs, may have spine-like hair cluster at apices	17
	Metafemora of male with long hairs along inner margins	<i>Rheumatobates rileyi palosi</i>
17.	Mesofemora posteriorly with a row of long straight hairs.....	<i>Rheumatobates hungerfordi</i>
	Mesofemora posteriorly hairless except for a few apically	<i>Rheumatobates trulliger</i>
18.	Males	19
	Females	22

19. Femora and basal portion of tibiae of middle legs clothed with a fringe of hairs whose length is subequal to diameter of leg at point of origin 20
 Femora and basal portion of tibiae of middle legs clothed with a fringe of hairs whose length is shorter, $\frac{1}{2}$ diameter of the leg at point of origin *Trepobates pictus*
20. Third antennal segment with long hairs on basal, inner side 21
 Third antennal segment without long hairs on basal, inner side *Trepobates subnitidus*
21. First genital segment below with long, conspicuous brownish hairs *Trepobates knighti*
 First genital segment below with short, sparse inner hairs *Trepobates inermis*
22. Connexivum produced outward and upward at apex into long curved spines *Trepobates knighti*
 Connexivum not as above 23
23. Mesonotum in apterous form produced backward into a hornlike process *Trepobates pictus*
 Mesonotum in apterous form not produced, truncate 24
24. Antennal segment 2 subequal to 3 *Trepobates subnitidus*
 Antennal segment 2 distinctly shorter than 3 *Trepobates inermis*

Gerris canaliculatus Say

Characteristics: Length 8.15-10.84 mm, width 1-1.25 mm; color dark brown to black, sometimes reddish, ventrally yellowish brown; pronotum longitudinally carinate medially in macropterous and apterous forms; first antennal segment shorter than second and third together.

Distribution: Bryan, Cleveland, LeFlore, Marshall, McCurtain and Pushmataha counties.

Gerris comatus Drake and Hottes

Characteristics: Length 7.35-9.2 mm, width 2.3-2.8 mm; similar to *G. marginatus*; separated by key characters.

Distribution: Cimarron and Texas counties.

Gerris marginatus Say

Characteristics: Length 8.21-10.35 mm, width 2.32-2.55 mm; venter of male, notch at apex of sixth abdominal venter deep, broadly rounded.

Distribution: Beaver, Beckham, Bryan, Carter, Cleveland, Comanche, Craig, Custer, Delaware, Greer, Harper, Jefferson, Johnston, Latimer, Lincoln, Love, Marshall, Payne and Pontotoc counties.

Gerris nebularis Drake and Hottes

Characteristics: Length 14-16 mm, width 2.35 mm; color dark brown to black, ventrally grayish; pronotum longitudinally carinate medially; first antennal segment subequal to or longer than second and third together.

Distribution: Alfalfa, Jefferson, Okmulgee, Pawnee and Payne counties.

Gerris nyctalis Drake and Hottes

Characteristics: Length 11-13 mm, width 2.3-3.5 mm; color blackish;

silvery patches on connexivals much smaller than but otherwise similar to those of *G. remigis*.

Distribution: Comanche County.

Gerris remigis Say

Characteristics: Length 11.5-16 mm, width 3-4 mm; color variable, usually brownish-black, sometimes reddish-brown, ventrally grayish; first antennal segment subequal in length to second and third together; connexiva with prominent silvery or golden spots at junctions of the segments; anterior lobe of pronotum with a broad medial yellowish to red line.

Distribution: Adair, Alfalfa, Caddo, Cherokee, Cleveland, Comanche, Craig, Custer, Johnston, Kay, Le Flore, Major, Mayes, Murray, Noble, Ottawa, Pawnee, Payne, Pontotoc, Pushmataha, Texas and Woodward counties.

Limnogonus hesione (Kirkaldy)

Characteristics: Length 4.5-7.9 mm, width 1.4-1.8 mm; color black, transverse pale spot at base of head; length of first antennal segment subequal to width of head through eyes; apex of abdomen not surpassing basal one-fifth of hind femora.

Distribution: Carter, Cleveland, Johnston and LeFlore counties.

Metrobates hesperius depilatus Hussey and Herring

Characteristics: Length 3-5 mm, greatest width 2-2.5 mm; color velvety black, clothed with a grayish bloom, with a rusty red spot on vertex and a narrow medial strip down the meso- and metanotum; pronotum with a medial yellow spot; mesofemora about 4 mm long.

Distribution: Adair, Cherokee, Johnston, Le Flore, Marshall, McCurtain and Pushmataha counties.

Rheumatobates hungerfordi Wiley

Characteristics: Color velvety black, covered with a bluish-white bloom; head black, sometimes with a yellow band at base of vertex; pronotum with a yellow spot occupying entire length, in some specimens quadrate, others twice as wide as long with rounded sides, or disc entirely yellow; mesonotum with a large medial yellow spot of variable shape; in winged forms only pronotal spot is visible; hemelytral base whitish, veins brown, distal half smoky; thoracic venter yellow, with brown band behind each front coxa, often mesosternum dark, abdominal venter brown.

Distribution: Cleveland, Craig, Love and Pontotoc counties.

Rheumatobates rileyi palosi Blatchley

Characteristics: Color velvety black; pronotal, mesonotal yellow spots of variable size or absent; ventrally pale.

Distribution: Jefferson, LeFlore, Love, Marshall, McCurtain and Payne counties.

Rheumatobates trulliger Bergroth

Characteristics: Color velvety black; vertex with yellow line at its base; pale spot on pronotum, may be narrow or broad covering most of disc, in apterous forms the pale spot variable to absent; thoracic venter pale with brown band behind each anterior coxa; abdominal venter smoky in females, brown to black in males.

Distribution: Adair, Delaware, Le Flore, McCurtain and Ottawa counties.

Trepobates pictus (Herrich-Schaeffer)

Characteristics: Color and pattern variable, yellow markings usually predominant.

Trepobates inermis Esaki

Characteristics: Second antennal segment distinctly shorter than third, third and fourth subequal; third antennal segment of male with long appressed hair on basal, ventral portion, connexiva in female not produced behind.

Distribution: McCurtain County.

Trepobates knighti Drake and Harris

Characteristics: Third antennal segment of male with long hair on basal inner side; connexivum of female produced outward and upward at apex into long curved spines.

Distribution: Bryan, Delaware, Johnston, Le Flore, Marshall, McCurtain, Muskogee, Pawnee, Payne, Pontotoc and Pushmataha counties.

Trepobates subnitidus Esaki

Characteristics: Second antennal segment subequal to third and to fourth, third segment of male antennae without extremely long hairs, middle femora and tibiae of male with long hairs on underside.

Distribution: Carter, Cleveland, Jefferson, Johnston, Marshall and McCurtain counties.

The veliids may be characterized as follows: beak four-jointed, surpassing the front coxae, third segment longer than others united; ocelli absent; antennae four-segmented; hemelytra usually wanting; hind femora not or but slightly surpassing the abdomen.

KEY TO THE SPECIES OF VELIIDAE

1. Tarsal apex of middle leg deeply cleft, plumose hairs arising from base of cleft 3
Tarsal apex of middle leg not cleft 2
2. Tarsal formula, three on middle and hind legs 5
Tarsal formula apparently one, two, two 6
3. Male: trochanter of foreleg with distinct spine; female: without transverse constriction at middle of mesofemora, but latter may appear dorsoventrally flattened 4
Male: trochanter of foreleg without spine, if a small agglutinated group of hairs look like a spine as in above then abdominal dorsum hairy; female with transverse constriction at middle of mesofemora *Rhagovelia choreutes*
4. Male: trochanter of hind leg with spines; female: mesonotum enlarged, larger than metanotum *Rhagovelia rivale*
Male: trochanter of hind leg with few small dark spines; female: mesonotum smaller than metanotum *Rhagovelia knighti*
5. Tarsi of middle leg with second joint longer than third
Tarsi of middle leg with second and third joints subequal *Velia brachialis*
Tarsi of middle leg with second and third joints subequal *Velia watsoni*

6. Antennae longer than head and thorax combined
 *Microvelia americana*
 Antennae shorter than head and thorax combined7
7. Tibiae of hind leg of male curved *Microvelia pulchella*
 Tibiae of hind leg of male straight *Microvelia hinet*

Microvelia americana (Uhler)

Characteristics: Length 2.1-2.4 mm; antennae longer than head and thorax combined, first segment subequal to or longer than third; apterous forms with dorsal pubescence, abdominal dorsum with conspicuous patches of silvery-gray pubescence; mesonotum visible in apterous forms.

Distribution: Adair, Beaver, Bryan, Carter, Delaware, Harper, Johnston, Latimer, LeFlore, Love, Marshall, Mayes, Muskogee, Pawnee, Payne and Pontotoc counties.

Microvelia pulchella Westwood

Characteristics: Length 1.6-2.5 mm; antennae shorter than head and thorax combined; hind tibiae of male curved, female tibiae straight; mesonotum visible in apterous forms; patches of grayish abdominal pubescence.

Distribution: Choctaw, Comanche, Johnston, Marshall and McCurtain counties.

Microvelia hinet Drake

Characteristics: Length 1.3-1.6 mm; antennae shorter than head and thorax combined, hind tibiae of male and female straight; mesonotum visible in apterous forms; abdominal patches of bluish-gray pubescence.

Distribution: Bryan, Choctaw, Marshall and McCurtain counties.

Rhagovelia choreutes Hussey

Characteristics: Length apterous male 3.7 mm, winged male 4.22, apterous female 4 mm, winged female 4.5; middle femora of female transversely constricted at middle; trochanter of fore legs of male usually unarmed; dorsum of abdomen hairy.

Distribution: Johnston, Marshall, McCurtain, Murray and Pontotoc counties.

Rhagovelia knighti Drake and Harris

Characteristics: Length apterous male 3.6 mm, apterous female 3.7 mm, winged forms unknown according to Bacon (1956); middle femora of female without transverse constriction at middle; trochanters of male fore and hind leg armed with a spine; dorsum of male abdomen with median areas of each segment shining.

Distribution: Cherokee, Delaware, LeFlore, Muskogee and Ottawa counties.

Rhagovelia rivale Torre-Bueno

Characteristics: Length apterous male 3.5 mm, winged male 3.8 mm, apterous female 4.3 mm, winged female 4.6; middle femora of female without transverse constriction at middle; trochanters of male fore legs armed, hind legs unarmed; dorsum of male abdomen with only a few basal segments shining.

Distribution: Atoka and Ottawa counties.

Vella brachialis Stål

Characteristics: Length 5-5.5 mm; compound eyes imbedded in thorax; humeral angles of pronotum prominently rounded; hemelytra of corium of winged form differing from membrane by lack of pile; brachypterous form, hemelytra appear as short, narrow triangular white pads.

Distribution: Johnston, Marshall and Payne counties.

Vella watsoni Drake

Characteristics: Length 4-5 mm; compound eyes smaller, not appearing as if imbedded in thorax tubercles on sides of pronotum, very distinct; hind margin of pronotum with fringe of long hairs.

Distribution: Marshall and McCurtain counties.

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