THE AQUATIC AND SEMIAQUATIC HEMIPTERA OF NORTHERN FLORIDA. PART 1: GERRIDAE.

Jon L. Herring
Department of Biology, University of Florida

The aquatic and semiaquatic Hemiptera like so many other groups of insects have been neglected in Florida. Because of this my interest was stimulated and I began an investigation of the group which has extended over the period of 1946 through 1949. During the course of the study much information on taxonomy, distribution, and life histories has been collected. It is my intent to publish this information from time to time in the series "The Aquatic and Semiaquatic Hemiptera of Northern Florida." The earlier papers will include annotated lists of the various families; the last will present a classification of habitats in northern Florida as well as a key to species.

Figure 1. Map of Florida showing the area where collections were made.

The area where collections were made is bounded roughly by the Suwannee River and St. Mary's River to the north, the Weekiwachee and Ocklawaha rivers to the south, and the St.
Johns and Suwannee rivers on the east and west respectively (Figure 1). Some of the localities were visited many times, owing to their proximity to Gainesville, and others, more difficult of access, were visited only a few times. In addition to the material collected by me, certain specimens collected by others have been included in the study.

FAMILY GERRIDAE

Genus GERRIS Fabricius

Gerris canaliculatus Say

Almost every conceivable aquatic habitat teems with specimens of canaliculatus. It occurs in the dark, still waters of cypress swamps, the cool, clear, calcareous streams and in the swiftly flowing, sand-bottomed creeks. It seems to reach its peak of abundance in the latter habitat as do most of the other members of the genus Gerris. Hardly any type of habitat is without this species. It may be seen on the thick algal mats common in Nymphaea marshes, the roadside ditches which are densely overgrown with vegetation, and on the still waters of the sand-bottomed and hammock-region lakes. Bueno (1923) says that this form is rather rare in the northern states, where it frequents secluded little coves and bays in ponds. Only the nymphs in Florida appear to prefer the more secluded margins and coves of ponds and streams.

On April 30, 1948, I collected approximately one dozen males and females of this species from San Fclasco Hammock Pond and placed them in a twenty-gallon aquarium. They appeared to be a little disturbed by the trip and spent several minutes brushing their legs together in order to remove the excess water that had splashed over them in transit. In the late afternoon, one pair was observed in copulation. The male encircled the thorax of the female with his anterior legs and extended his middle legs at right angles to his body, with his entire weight borne by the female. She seemed hardly aware of this and skated blithely about feeding on coccinellid beetle larvae which were thrown into the water. At times she would brush violently at the forelegs of the male in an attempt to free herself. Copulation lasted for approximately twenty minutes, with the female finally freeing herself by raising almost vertically on her posterior legs and brushing the male loose with her front legs. He jumped several inches into the air and bounded
away to the corner of the aquarium. The female rested for several minutes on a leaf of frogbit (*Limnobium spongia*). Another pair of *Gerris canaliculatus* was observed later in the evening in copulation which lasted for thirty minutes.

Coccinellid beetle larvae were the chief foods offered to the gerrids during the period that they were under observation. Rafts of mosquito eggs were placed in the aquarium and panes of window glass were used to prevent the emerging mosquitoes from escaping. The gerrids, however, cared very little for mosquitoes and were never observed attacking the larvae or pupae as they came to the surface for air. Adult mosquitoes were taken as food only when no beetles (adults, pupae or larvae) were offered for long periods of time. Most of the coccinellid larvae were nearly as large as the gerrids, but this was no obstacle for the water striders. One would skate up to a struggling larva, stab it with its beak, skate away and return from the other side to attack again until the larva’s struggle had almost ceased. Then it would gorge itself on the body fluid until it was almost cylindrical. On several occasions, adults were observed attacking small snails that were creeping along under the surface film. At every stab, the snail would withdraw its foot. Finally, the gerrid gave up and skated away. Many times beetle pupae were picked up by the front legs of the strider and carried about until their body juices had been completed exhausted. Once, a gerrid captured a mosquito that was just beginning to emerge from its pupal skin.

The first eggs were discovered on May 5. Since mating had occurred repeatedly since April 30, it was not possible to determine how long after copulation the eggs were laid. The eggs were discovered on the underside of a frogbit leaf that floated on the surface of the water. They were arranged in long rows along the periphery of the leaf blade. Some were mottled with brown spots; others were chalky white. In many of the mottled eggs, the red eyespots of the developing nymph were already visible. All of the eyespots in these and the dozen of other eggs discovered, were at the end of the egg next to the periphery of the leaf. The eggs varied in length from 1.13 to 1.19 millimeters, and varied in width at the widest point from .298 to .375 millimeters.

After the eggs were laid, they remained milky white for at least fifteen hours. They then began to mottle with brown and were very speckled twenty-four hours later. In another thirteen
hours the brilliant red eyespots were visible and shortly prior to hatching, an egg-burster could be seen through the shell.

The eggs hatched in a little less than six days after they were laid. The egg suddenly split longitudinally for half of its length. The nymph probably aided the process by using the small triangular egg-burster, although no movement of the nymph inside was observed until the egg split open. Following this, the nymph slid half of the body into view still enclosed in the embryonic membrane, which bore the egg-burster on its anterior end. This membrane split before the nymph was completely out and the struggling nymph emerged from the shell and the membrane at the same time. After the nymph had freed itself, it struggled violently to reach the surface film. In most cases, this initial struggle was futile and the young gerrid fell to the bottom, remaining there for five or ten minutes before making another attempt to reach the surface. Some nymphs were rescued from the bottom of the aquarium; they were still alive after they had remained there for forty-five minutes.

Fatality rate was very high among the newly hatched young. They refused almost all food that was given to them, but feasted upon their dead companions. Out of approximately sixty that hatched, only one was raised to maturity. This single male passed through five instars, each of about three days duration, and reached maturity on June 4. The total time from egg to adult was thirty days.

Hibernation does not occur in Florida due to the relatively mild winters. Adults have been collected in every month of the year and nymphs have been taken in January, February, April, May, September and December. It appears that breeding occurs throughout most of the year.

Specimens Examined: Alachua Co.: Santa Fe River, 200 yards east of Poe Springs, May 8, 1947,1 3, 5 nymphs; Poe Springs, May 14, 1934, R. Rubin 1 3; Lake Santa Fe, December 2, 1947, 7 3, 3 9, 6n; December 4, 1947, 2 3, 1 9, 4n; Blues Creek, 6 miles northwest of Gainesville, September 21, 1947, 6 3, 2 9, 5n; February 3, 1948, 9 3, 4 9, 1n; Twin Oaks Pond, November 23, 1947, 5 3, 4 9; May 14, 1948, 2 9, 1n; Biven's Arm of Payne's Prairie, March 30, 1946 W. Beck 2 9; April 13, 1946, W. Beck 1 9; October 12, 1946 W. Beck 1 9; October 22, 1946 W. Beck 1 9; November 5, 1946 W. Beck 1 9; Hailes Siding Pond on Payne's Prairie, November 23, 1947, 2 3, 3 9; west branch of Hogtown Creek, February 3, 1948, 4 3, 2 9; Hogtown Creek at the sink, March 14, 1933 collector unknown 1 9; April 24, 1937 F. N. Young 1 3, 1 9; March 13, 1947, 10 3, 12 9; May 1, 1947, 7 3, 2 9, 2n; San Felasco Hammock Pond, October 28, 1947, 1 9; Big Hatchet Creek,
February 27, 1947 I. J. Cantrall et al 1♂, 1♀; Green Sink, Campus of University of Florida, December 30, 1947, 7♂♂, 1♀; River Styx, 6 miles southeast of Gainesville, January 31, 1948, 1♂, 2♀; Big Orange Creek, January 18, 1948, 4♂♂, 9♀, 8♀; roadside canal, R.20E., T.7S., S.17, February 7, 1948, 1♂, 1♀; cypress-gum swamp, 5 miles southeast of Gainesville, January 31, 1948, 2♂♂, 3♀; Pond “A”, Sugarfoot Hammock, 4 miles west of Gainesville, August 17, 1946, 1♂, 3♀; Pond “C”, 3 miles southwest of Gainesville, May 18, 1933 J. Kilby 1♀; April 4, 1933 J. S. Rogers 1♂, 2♀; Devil’s Millhopper, 5 miles northwest of Gainesville, September 16, 1947, 1♂, 1♀; Rocky Creek, 8 miles north of Gainesville. February 7, 1948, 3♀; Scott Prairie, R.19E., T.7S., S.35, 2♂, 2♀. Dixie Co.: Little Fannin Springs, May 28, 1947, 3♂♀, 2♀, 2♀. Hernando Co.: Salt Creek, 2 miles east of Bayport, January 29, 1948, 1♀; Mark 20, 1948, 1♂; May 22, 1948, 3♂♂, 4♀; June 20, 1948, 1♀. Levy Co.: Otter Creek, May 22, 1948, 1♂; hammock stream, 3 miles east of Cedar Key. December 31, 1947, 1♂, 1♀, 6♀. Marion Co.: Sweetwater Springs, 1 mile southwest of Juniper Creek bridge, July 3, 1948 G. K. Reid, Jr. 8♀, 1♀; Temporary pool near Eureka, February 12, 1938 Collector Unknown 2♂♂, 1♀, 2♀. Putnam Co.: Little Orange Creek, January 18, 1948, 11♂♂, 1♀; 4♀; gum swamp on St. Johns River, 8 miles north of Palatka, August 12, 1948, 1♂; roadside ditch in flatwoods, 8 miles north of Palatka, August 12, 1948, 1♀.

Gerris nebularis Drake and Hotte

G. nebularis, the largest of the Florida gerrids, prefers the swift flowing, sand-bottomed creeks. It has been taken occasionally in the calcareous streams and rarely in sinkholes and fluctuating hammock ponds. It may be seen coursing the more shaded areas of the sand-bottomed creeks. It usually may be found most readily underneath bridges. In these situations, it is wary, keeping just out of reach of a dip-net and taking wildly to the open when suddenly alarmed.

The life history of Gerris nebularis, described in 1925 from material collected at Hoptown Creek, is unknown. Since that time, there have been no published life history observations on this species. Because of size and food requirements, it does not take well to laboratory rearing. In general, the larger gerrids require a longer period of time for incubation and maturity. As in the case of canaliculatus, the time required is more than likely several days to a week shorter than the time required in the cooler climate of the North. There are five instars in the other members of the genus; it should not vary in this form.

I have collected adults throughout most of the year. Nymphs have been taken along the more secluded areas of streams in February, April and May.
Food consists largely of winged insects that alight upon or fall into the water. At Little Orange Creek, I fed individuals of *nubularis* by killing deer-flies and throwing them upon the surface of the water. The adults skated close to me to retrieve the flies and then glided away, carrying the prey on their beaks.

**Specimens Examined:** Alachua Co.: Hogtown Creek, 200 yards south of Michigan Avenue, April 24, 1937 F. N. Young 1♂, 1♀; Hogtown Creek at Michigan Avenue, October 5, 1932 collector unknown 1♂; Santa Fe River near Poo Springs, May 8, 1947, 1♂, 1♀, 4♀; Santa Fe River at Worthington Springs, February 6, 1949, 1♂; Rocky Creek, 8 miles north of Gainesville, February 7, 1948, 4♂♂, 1♀; Pond “C”, 3 miles southwest of Gainesville, March 9, 1933 collector unknown 3♂♂, 6♀♀; Santa Fe Sink, April 8, 1947 G. K. Reid, Jr. and H. G. Dowling 2♂♂. Bradford Co.: Sampson River, February 6, 1949, 5♂♂, 9♀♀. Dixie Co.: Little Fannin Springs, May 23, 1947, 10♂♂, 8♀♀, 5♀. Levy Co.: Otter Creek, May 22, 1948, 3♂♂, 3♀♀. Marion Co.: temporary pool near Eureka, February 12, 1938 collector unknown 1♂. Putnam Co.: Little Orange Creek, May 22, 1947, 3♂♂, 1♀, 1♀.

**Genus LIMNOGONUS** Stal

**Limnogonus hesione** (Kirkaldy)

This little water strider prefers the quieter lakes and ponds of the area. It has been taken in great numbers from Nymphaeaceae marshes, sinkholes and vegetation-filled, roadside ditches. *Limnogonus hesione* is not abundant in the larger or swifter streams but frequents, most commonly, the smaller ditches and fluctuating ponds. On several occasions, it has been taken from calcareous streams and sand-bottomed creeks. It is quite frequently macropterous and probably flies to more permanent bodies of water when the roadside ditches or other temporary habitats disappear. Drake (1915) states that the long-winged form is rare in the North.

Drake described the life history of this species. The eggs are laid just below the surface of the water on the underside of sticks and leaves. Many individuals remain *in coitu* for several days. One pair which I brought into the laboratory was observed to be in almost continuous copulation for an entire day. The female of this pair had one posterior leg missing except for a small part of the femur. The lack of this leg caused the female considerable difficulty in supporting the male during coitus.

The eggs are somewhat enlarged at one end and about three times as long as wide. They vary in length from 1.00 to 1.33 millimeters, and are a dirty greenish yellow which becomes dark-
er with age. As the nymph emerges, the membrane (termed chorion, by Drake) is split longitudinally over one-half of its length. The nymph passes through the usual five instars. In Ohio, the adult stage was reached fifty days after hatching.

I have taken adults in April, May, July, August, September, October, November and December. Nymphs were taken in April, September, October and November.

The food of *L. hesione* consists of small insects that fall into the water. Drake (1915) says that if there are no living victims, then they do not disdain dead and decaying material.

**Specimens Examined:** *Alachua Co.*: Biven’s Arm of Payne’s Prairie, April 2, 1946 W. Beck 2n; April 23, 1946 W. Beck 1n; October 22, 1946 1♀; August 12, 1947, 1♀; sinkhole, 3 miles southeast of Gainesville on Pearl Street Road, October 17, 1934 H. T. Townsend 1♂, 1♀, 1n; November 27, 1934 H. T. Townsend 2♂ 1♀; December 18, 1934 H. T. Townsend 1♂, 2♀ 1♀; September 27, 1937 S. H. Spurr 1♂, 2♀ 2♀, 2♀; Santa Fe River near Poe Springs, May 14, 1934 H. T. Townsend 2♀ 1♀; May 8, 1947, 6♀ 1♂ 6♀; Freezer's Pond, 2 miles northwest of University of Florida, May 7, 1938, collector unknown 1♂; August 1, 1946, 1♂; Pond “B” in Sugarfoot Hammock, October 21, 1947, 3♂ 2♀; Lake Wauberg, April 30, 1938 collector unknown 2♀ 2♀; Lake Alice, May 24, 1938 S. H. Spurr 1♀; Hogtown Creek at Hogtown “Sink, May 16, 1947, 3♂ 2♀. *Citrus Co.*: drainage ditch, 8 miles north of Homosassa Springs, November 2, 1947, 2♂ 2♀, 2♀ 1♀, 1♀. *Dixie Co.*: Little Fannin Springs, May 23, 1947, 1♂, 5♀ 1♀. *Hernando Co.*: Salt Creek, 2 miles east of Bayport, April 25, 1948, 1♂.

**Genus METROBATES** Uhler

**Metrobates hesperius depilatus** Hussey and Herring

Calcareaous streams are the only habitats from which *M. k. depilatus* has been taken. Here, they form compact schools of thousands of individuals. The water is literally covered with adults and nymphs. They are swift runners on the surface film and tend to congregate over the deeper pools where it is difficult to collect them unless one has a boat. Wielding tea strainers from a motor boat, Dr. John Kilby and I collected well over one-thousand specimens in a few minutes on the Weekiwachee River on July 18, 1948. At Salt Creek, I collected many specimens by using a D-net and wading into the deeper pools where the striders were congregated.

Very little is known about the life history of *depilatus* or the other forms of *Metrobates*. I have collected adults in January, March, April, May, June, July and November. The adults were accompanied by nymphs in March, June and July.
Drake and Harris (1932:84) state, “For food, they [the members of the genus, as a whole] prey largely upon insects, which chance to fall into the water. Very little is known regarding the breeding and hibernating habits and life-cycle of the members of the genus.”

All of the specimens of *depilatus* are apterous. Alate individuals of *hesperius* are found occasionally. In the genus *Metrobates*, as well as in a number of genera of Gerridae, the wings are frequently mutilated, being broken off near their bases by the insects themselves.

**Specimens Examined:** *Hernando Co.*: Salt Creek, 2 miles east of Bayport, January 29, 1948, 4 ♀ ♀, 3 ♂ ♀; March 20, 1948, 5 ♂ ♀, 9 ♀ ♀, 15n; April 25, 1948, 48 ♂ ♀, 49 ♀ ♀; May 22, 1948, 3 ♂ ♀, 2 ♀ ♀; June 20, 1948, 4 ♂ ♀, 9 ♀ ♀, 11n; WeekiWachee River at the springs, July 18, 1948, 198 ♂ ♀, 198 ♀ ♀, 691n; November 1, 1947, 1 ♂.

**Metrobates hesperius ocalensis** Hussey and Herring

This form is known only from the type material collected at Rainbow River in Marion County. In a recent paper (1949), Hussey and Herring erroneously placed this river in the Ocala National Forest. It is located in the southwest corner of the county, approximately one mile from Dunnellon. It is also worth noting that in the key to the males in this paper, couplet 3 leading to *M. hesperius depilatus* which reads, “legs as in the subspecies immediately preceding”, should be corrected to read, “legs as in *M. hesperius ocalensis.*”

**Metrobates anomalus comatipes** Hussey and Herring

This subspecies is known from only two counties in Florida. I took *comatipes* in Little Orange Creek, a sand-bottomed stream in Putnam County; the other locality is a calcareous stream located in Marion County. Nymphs were taken in May and July.

**Specimens Examined:** *Marion Co.*: Sweetwater Springs, 1 mile southwest of Juniper Creek bridge, July 3, 1948, G. K. Reid, Jr. 19 ♂ ♀, 17 ♀ ♀, 23n. *Putnam Co.*: Little Orange Creek, May 22, 1947, 6 ♂ ♀, 1 ♀, 2n.

Genus **TREPOBATES** Uhler

**Trepobates pictus** (Herrich-Schaeffer)

*T. pictus* appears to be one of the rarest of the north Florida water striders. I have collected it only at Rainbow River, a calcareous stream in Marion County. Two males and one nymph were taken in company with several *Rheumatobates tenuipes* and numerous individuals of *Metrobates hesperius ocalensis.*
The only Florida record in the literature is that of Uhler (1884), "Massachusetts to Florida."

Hungerford (1919) has worked out the life history of this form in Kansas. He found that the egg masses are laid in a gelatinous material on the underside of leaves and sticks in the water. Three to ten eggs are laid in each mass. They are white at first but become beautifully mottled with small dots before hatching. Nymphs hatched five days after the eggs were laid.

Like the other gerrids, the members of this genus are all predaceous, feeding upon small insects.

Specimens Examined: Marion Co.: Rainbow River, August 4, 1946, 2♀♂, 1♀.

Genus Rheumatobates Bergroth

Rheumatobates rileyi Bergroth

R. rileyi lives on the slower-moving stretches of the sand-bottomed and calcareous streams where it usually forms compact little schools over the deeper portions.

On May 17, 1948, I collected about fifty specimens from Hogtown Creek, near Gainesville, and brought them into the laboratory. When they were brought in, several of them were dead and the surviving individuals immediately feasted upon the dead bodies. During their brief laboratory life of two weeks, they devoured small moths, psychodid flies and ants. They refused to touch a dead roach that was placed on the surface of the water. Silvey (1931) states that they catch small ostracods through the surface film and run about continually with the small crustaceans on the end of their upturned beak until all of the usable material is removed from the body of the ostracod.

The amount of time required to pass from egg to adult is unknown. Silvey (1931) has published an interesting study of the life history of this form but he does not mention any time relationships.


Rheumatobates tenuipes Meinert

Like rileyi, tenuipes lives on the surface of the swift-flowing streams. It has been taken from the deeper pools of the calcareous and sand-bottomed creeks. The following is from my field notes: "On the 16th and 17th of May, 1948, both species of Rheuma-
tobates were collected at Hogtown Creek, approximately $\frac{1}{2}$ mile cast of Hogtown Sink. They were observed in large groups in the center of the stream where the current was sluggish and the creek was deeper, as well as wider, than at any other point in the vicinity. This deep pool was separated from the remainder of the creek by a barrier of water hyacinths (Piaropus crassipes) on the west and another barrier formed on the east by the creek suddenly becoming narrow and very swift. Further collecting failed to reveal these species at any other spot along the creek.” At Little Fannin Springs, numerous individuals were collected at the mouth of the springs under conditions similar to those described above. On one occasion, specimens were collected in a quiet cypress swamp.

The life history is probably quite similar to that of rileyi. The eggs are inserted in the stems and leaves of aquatic plants.

SPECIMENS EXAMINED: Alachua Co.: Hogtown Creek near the sink, May 16, 1947, 2 $\delta$, 1 $\varphi$; May 17, 1947, 1 $\delta$, 4 $\varphi$, 2. Dixie Co.: Little Fannin Springs, May 23, 1947, 15 $\delta$, 65 $\varphi$, 24n. Hernando Co.: Salt Creek, 2 miles east of Bayport, November 1, 1947, 1 $\delta$, 1 $\varphi$, 2n; January 29, 1948, 16 $\delta$, 27 $\varphi$, 25n; March 20, 1948, 5 $\delta$, 26 $\varphi$, 5n; May 22, 1948, 3 $\delta$, 7 $\varphi$, 1n; Weeki Wachee River near the springs, July 18, 1948, 53 $\delta$, 58 $\varphi$, 8n. Marion Co.: Rainbow River, August 4, 1946, 1 $\delta$, 1n. Putnam Co.: gum swamp on St. Johns River, 8 miles north of Palatka, June 6, 1947, 10n.

LITERATURE CITED


