TEXAS BLACKFLY RECORDS (DIPTERA: SIMULIIDAE)

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A review of the literature reveals published records of nine species of blackflies from Texas localities. Eight are species of Simulium Latreille and the ninth referable to the genus Cnephia Enderlein. With one exception none of the published Texas records are of recent date and each was reported from only one or two localities. Our collecting efforts demonstrated an additional species. In a personal communication Dr. Alan Stone of the U.S. National Museum provided us with unpublished records of four additional species of Simulium together with many additional locality records for most of the previously reported species of Texas blackflies. We wish to express our sincere thanks to Dr. Stone for identifying blackfly material that we have collected, for graciously permitting us to include unpublished data supplied by him, and for suggestions incident to the preparation of this manuscript.

In the course of our continuing statewide vector surveillance program it has been possible for us to search for blackfly breeding in streams over a rather extensive area of Texas. Our collecting efforts, coupled with information furnished by Dr. Stone, indicate that blackflies are widespread and relatively abundant in Texas and, at least in the central and southern areas of the state, that breeding continues throughout the year. In recent years residents of Austin, Texas, have complained of being bitten by gnats while out of doors during the summer months. Investigation showed these bites to be caused by S. mediovittatum Knab. Here this species swarms about human beings, especially at their ankles, but is usually hesitant about attacking. Once they have begun to feed they are not easily alarmed and engorge rapidly. The bites are almost immediately painful and the sites swell into pronounced welts in a short time. This is usually accompanied by an intense irritation which persists for a day or longer. Several instances of systemic disturbance, possibly allergic in nature, have been called to our attention following S. mediovittatum bites. An extensive search was made in the Austin area and but a single breeding site for this species discovered—in the Colorado River adjacent to the City Power Plant. Here water cascades over a streamside, man-made chain of rocks and large fragments of concrete, erected to impound water for municipal uses. Human annoyances by S. mediovittatum occurred up to eight miles distant from this breeding area.

It is quite possible that similar situations occur in other Texas cities but reports of such occurrences have not come to our attention. We have received no complaints of annoyance by biting gnats from hunters and fishermen.

Utilizing large, home aquaria, well aerated with a device attached to a compressed air supply, we have had no difficulty rearing adult blackflies from larvae or pupae in our insectary. We observed many pupal cases to contain one to several water mites (Hydracellidae). Very frequently we found one or more of these mites attached to emerged adult blackflies and we regard this phenomenon as an example of phoresy.

There is a general tendency amongst entomologists to consider the Simulidae of the United States to be represented by five genera, viz., Prosimulium Roubaud 1906, Parasilvum Malloch 1914, Eusimulium Roubaud 1906, Simulium Latreille 1802, and Cnephia Enderlein 1921.

In the following tabulation of blackfly records, those marked with an asterisk (*) represent data furnished by Dr. Stone and all collections dated April 1941 were made by him. The stage or stages reported are indicated in the following manner: A—adult; P—pupa; L—larva.

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Simulium argus Williston 1893

Not previously reported from Texas. This species, considered identical with vittatum by Malloch (1914), is regarded as a valid species by Dr. Stone. Texas records are as follows:

Medina County
*Hondo River, Oct. 16, 1957, P
*Hondo Creek, Apr. 20, 1941, P

Burnet County
Unnamed stream, Feb. 2, 1958, L

Uvalde County
*Sabinal, Mar. 22, 1911, A
*Sabinal River, Apr. 20, 1941, P
*Uvalde, Dec. 28, 1923, P

Travis County
*Small stream south of Austin, Apr. 19, 1941, P
*Slaughter Creek, Apr. 19, 1941, P

Menard County
*Los Morros Creek, Apr. 23, 1941, P
*San Saba River, Apr. 23, 1941, P

Kerr County
*Kerrville, Mar. 1955, L, P

Val Verde County
*Devil’s River, June 13, 1953, L, P

Simulium bivittatum Malloch 1914

Not previously recorded from Texas. Texas records are as follows:

Menard County
*Los Morros Creek, May 22, 1939, A

Collin County
*McKinney, Mar. 28, 1913, A

Simulium jenningsi Malloch 1914

Not previously recorded from Texas. Texas records are as follows:

Kerr County
*Kerrville, June 1, 1953, A

Cherokee County
*Unnamed stream west of Jacksonville, Apr. 17, 1941, P

Simulium mediouittatum Knab 1915

Type locality Arlington, Tarrant County, Texas, Oct. 28, 1914. Dyar and Shannon (1927) list this species from Bay City, Matagorda County, Texas, Jan. 26, 1911. Additional Texas records are as follows:

Travis County
*Austin, July 8, 1955, A
*Sandy Creek, July 5, 1957, P
*Barton Creek, July 29, 1957, L, P
*Onion Creek, July 13, 1957, L, P
*Colorado River, Aug. 18, 1957, L, P
*Colorado River, Jan. 22, 1958, L, P
*Austin, Aug. 26, 1955, A

Medina County
*Hondo River, Oct. 16, 1957, L, P

Kinney County
*Pinto Creek, Oct. 15, 1957, L, P

Hamilton County
*Partridge Creek, Nov. 13, 1957, L, P
*Cowhouse Creek, Nov. 13, 1957, L

Lampasas County
*Lampasas River, Nov. 13, 1957, L

Burnet County
*Lampasas River, Nov. 13, 1957, L

Nueces County
*Nueces County, Dec. 10, 1958, L, P

Zavala County
*Crystal City, June 21, 1935, A

Uvalde County
*Leona River, Apr. 21, 1941, P

Menard County
*San Saba River, Apr. 23, 1941, P
*Los Morros Creek, Oct. 1, 2, 9, 1942, A, P
*Los Morros Creek, July 3, 1940, A
*Los Morros Creek, May 22, 1939, A

Dimmit County
*Winter Haven, June 21, 1935, A

Simulium meridionale Riley 1886

Recorded, as S. occidentale Townsend 1891., by Dyar and Shannon (1927) from Liberty, Liberty County, Texas, Mar. 19, 1908, and Dallas, Tarrant County, Texas, June 2, 1922. Additional Texas records are as follows:

Cameron County
*Brownsville, June 2, 1904, A

Tom Green County
*Christoval, Sept. 5, 1941, L, P

Brazos County
*College Station, 1945, A
Nueces County
*Corpus Christi State Park, Oct. 6, 1951, A

Simulium notatum Adams 1904
Recorded by Dyar and Shannon (1927) from Devil's River, Texas, May 6, 1907. In a personal communication Dr. Stone states that he believes Dyar and Shannon misidentified this species and that it does not occur in Texas.

Simulium slossonae Dyar and Shannon 1927
Not previously reported from Texas. Texas records are as follows:
Leon County
*Buffalo Creek, Apr. 18, 1941, L, P

Simulium solarii Stone 1948
Type locality San Saba River, Menard County, Texas, Apr. 23, 1941. In his description of this species Stone (1948) designated as paratypes specimens collected in Menard, Travis, Uvalde, Val Verde, Kerr, and Burnet counties. Additional Texas records are as follows:
Travis County
Barton Creek, July 29, 1957, L
Onion Creek, July 13, 1957, L, P
Hays County
Hamilton County, July 13, 1957, L, P
Kerr County
Guadalupe River, Sept. 21, 1957, L, P
Guadalupe River, Sept. 21, 1957, L, P
Burnet County
Unnamed stream, Feb. 2, 1958, L, P

Simulium trivittatum Malloch 1914
Recorded by Malloch (1914) as S. distinctum new species from Devil's River, Texas, no date, and by Dyar and Shannon (1927) from Devil's River, Texas, May 5, 1907, and from Victoria, Victoria County, Texas, Dec. 13, year not given. Additional Texas records are as follows:
Val Verde County
Creek in Del Rio, Texas, Oct. 18, 1957, L, P

Lampasas County
Lampasas River, Nov. 13, 1957, P
Burnet County
Lampasas River, Nov. 13, 1957, P
Unnamed stream, Jan. 22, 1958, P
Unnamed stream, Jan. 22, 1958, P
Unnamed stream, Jan. 22, 1958, P
Unnamed stream, Jan. 22, 1958, L, P
Travis County
Bull Creek, Dec. 15, 1957, P
Bull Creek, Dec. 15, 1957, L
Unnamed stream, Dec. 15, 1957, L
Williamson County
S. San Gabriel River, Dec. 16, 1957, L, P
S. San Gabriel River, May 20, 1958, P
*Large stream southwest of Hutto, Apr. 18, 1941, P
Tom Green County
Concho River at Christoval, Apr. 20, 1959, L, P
Uvalde County
*Sabinal River, Apr. 20, 1941, P
*Leona River, Apr. 21, 1941, P
*Concho River, Apr. 21, 1941, P
*Nueces River, Sept. 7, 1941, P
Edwards County
*Pulliam Creek, Apr. 22, 1941, P
Kimble County
*S. Llano River, Apr. 22, 1941, P
Menard County
*Los Morros Creek, Apr. 23, 1941, P
*San Saba River, Apr. 23, 1941, P
*Clear Creek, Apr. 23, 1941, P

Simulium venustum Say 1829
Recorded by Dyar and Shannon (1927) from Texas. An additional Texas record is as follows:
Cherokee County
*Two streams near Jacksonville, Apr. 17, 1941, P

Simulium tuberosum (Lundstroem) 1911
Not previously reported from Texas.

Simulium virginatum Coqillet 1993
Recorded by Dyar and Shannon (1927) from Devil's River, Texas, May 5, 1907,
and by Stains and Knowlton (1936) from Texas. Additional Texas records are as follows:

Hays County
Bear Creek, July 8, 1957, A, L, P

Travis County
Bull Creek, Dec. 15, 1957, L
Bull Creek, Dec. 15, 1957, P
Unnamed stream, Dec. 15, 1957, L
*Small stream south of Austin, June 19, 1941, L, P

Nueces County
Nueces River, Dec. 10, 1957, L

Barnet County
Unnamed stream, Feb. 2, 1958, P
Unnamed stream, Feb. 2, 1958, P

Bexar County
Helotes Creek, Apr. 5, 1958, L, P

Bell County
San Gabriel River, May 20, 1958, L

Williamson County
San Gabriel River, May 20, 1958, P
*Large stream southwest of Hutto, Apr. 18, 1941, P

Menard County
*Los Morros Creek, May 22, 1939, A
Los Morros Creek, Apr. 12, 1943, A
*San Saba River, Apr. 23, 1941, P

Edwards County
*Spring near Llano River, Apr. 22, 1941, P

Medina County
*Hondo Creek, Apr. 20, 1941, P

Uvalde County
*Sabinal River, Apr. 20, 1941, P
*Frio River, Apr. 21, 1941, P

Zavala County
*Nueces River, Apr. 20, 1941, P

Simulium vittatum Zetterstedt 1835

Recorded by Dyar and Shannon (1927) from Sabinal, Uvalde County, Texas, Mar. 22, 1911, and by Vargas (1945) from Los Morros Creek, Menard, Menard County, Texas, July 3, 1940. Additional Texas records are as follows:

Tom Green County
Concho River at Christoval, Apr. 20, 1959, L, P

Concho River at San Angelo, Apr. 21, 1959, L, P

McCulloch County
San Saba River southeast of Brady, Apr. 22, 1959, L, P, A

Travis County
Colorado River at Austin, 1959, L, P

Rusk County
*Outflow from Henderson water supply, Apr. 17, 1941, L, P

Cherokee County
*Sampson Creek, Apr. 17, 1941, P
*Stream east of Jacksonville, Apr. 17, 1941, L, P
*Stream west of Jacksonville, Apr. 17, 1941, L, P
*Spillway from culvert east of Nueces River, Apr. 17, 1941, P

Anderson County
*Stream north of Palestine, Apr. 18, 1941, L, P

Lecn County
*Buffalo Creek, Apr. 18, 1941, L, P

Roberts County
*Stream west of Ridge, Apr. 18, 1941, L, P

Medina County
*Hondo Creek, Apr. 20, 1941, P

Uvalde County
*Leona River, Apr. 21, 1941, P
*Nueces River, Apr. 21, 1941, P

Menard County
*Los Morros Creek, Apr. 23, 1941, P
*San Saba River, Apr. 23, 1941, P
*Clear Creek, Apr. 23, 1941, P

Taylor County
*Small stream north of Abilene, Apr. 24, 1941, L, P

LaSalle County
*Nueces River at Cotulla, Apr. 4, 1941, A

Cnephia pecuaria (Riley) 1886

Previously recorded, as Eusimulium pecuaria (Riley) by Dyar and Shannon (1927) from College Station, Brazos County, Texas, no date, and by Stains and Knowlton (1943) from Lufkin, Angelina County, Texas, Jan. 17, 1941. Additional Texas records are as follows:

Burnet County
Unnamed stream, Feb. 2, 1958, P
Grimes County
*Navasota, Mar. 11, 1946, A
Jasper County
*Kirbyville, Mar. 25, 1908, A

Summary

Nine species of blackflies have been previously reported from Texas, the identity of one of which (S. notatum) is questionable. In this paper, additional locality records are given for seven of these species. Texas locality records for five previously unrecorded species of *Simulium* are included bringing the total number of species definitely known to occur in the state to thirteen.

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**MOSQUITO DENSITIES IN ORANGE COUNTY, TEXAS**

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The flat coastal plains of Texas, with annual rainfall in excess of 50 inches and a moderate climate, are well-known to offer optimum conditions for the production of large mosquito populations. Orange County has a full complement of all of the drainage problems which are typical of the area. The county is shaped somewhat like a broad horseshoe with the higher land in the center and along the top or open end of the shoe. The still higher land areas of Newton and Jasper Counties adjoin Orange County on the north, and the uncontrolled surface water runoff from 104,000 acres of these higher lands is discharged into Cow Bayou, Adams Bayou and other Orange County streams.

The county boundaries to the east, the south and the west are two major rivers, the Sabine and the Neches. Both become tidal estuaries a few miles below the north boundary of the county, and the tidal marshes along the lower reaches of these rivers, particularly on the Neches, attain maximum widths of up to 4 miles between the river channel and the 5-foot contour. These rivers join at Lake Sabine, a salt water arm of the Gulf of Mexico which covers nearly 100 square miles. A 15-square-mile wedge of the lake is included in Orange County.

The area of Orange County is usually listed at 356 square miles or 227,840 acres. Recent computations by one of the authors (JGF) indicate a total area of 367 square miles to be included between the western bank of the Sabine River, the eastern bank of the Neches River and the Newton-Jasper County line. Approximately 84 square miles, or 53,760 acres, are either submerged or in tidal and river marshes, below the 5-foot contour, and cannot be drained by gravity. The land area above the 5-foot contour is approximately 283 square miles, or 181,120 acres. There are in Orange County some 32,250 acres of marshland below 3 feet in elevation; of this

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