



# Mosquitoes of the U.S. Virgin Islands: Surveys reveal new records and species

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Figure 1: United States Virgin Islands



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More than 120 larval collection sites (above: open yellow circles) were productively sampled on the three main islands during 2019. The number of unique collections (habitats) per site ranged from 1-11. A spatially explicit ESRI Story Map, with collection records, is accessible using the provided QR code.

Figure 2. A New Species of Genus *Wyeomyia*



This is a first report of the genus *Wyeomyia* in the USVI. The collections (STJ) represent a previously undescribed and new species of genus *Wyeomyia*. Larvae were collected from multiple bromeliads during December 2019.

**Selected References:** 1) Beatty, H.A. 1944. The insects of St. Croix, Virgin Islands. *The Journal of Agriculture of the University of Puerto Rico*. 28:4 114-172. 2) Belkin, J.N. and Heinemann, S. J. 1975. Collection records of the project "Mosquitoes of Middle America" 2. Puerto Rico (PR, PRA, PRX) and Virgin Island (VI, VIA). *Mosquito Systematics*. 7:3 269-296. 3) Porter, J.E. 1967. A check list of the mosquitoes of the Greater Antilles and the Bahama and Virgin Islands. *Mosquito News*. 27:1 35-41. 4) Flemings, M.B. and Wash, R.D. 1966. Mosquitoes of the America Virgin Islands. *Mosquito News*. 26:3 424-426. 5) Miskimen G.W. and Bond, R.M. 1970. Scientific Survey of Porto Rico and the Virgin Islands. New York Academy of Sciences. 6) Seger, K.R. et al. 2019. First record of *Mansonia dyari* from Saint Croix, United States Virgin Islands. *Journal of the American Mosquito Control Association*. 35:3 214-216.

## ABSTRACT

**Background:** The paucity of recent studies documenting the Culicidae fauna in the United States Virgin Islands (USVI) limits the ability of public health officials to prepare for and address emerging mosquito-borne diseases. Natural disasters (e.g., Hurricane Irma and Maria) and outbreaks of dengue, chikungunya, and Zika viruses within the USVI clearly underscore the need for robust integrated mosquito surveillance and management efforts. **Objectives:** Conduct island-wide larval surveys (Figure 1), determine the validity of historical records, and determine if new, or previously unrecognized species, are present in the USVI. **Materials and Methods:** Historical collection records in the published literature were reviewed (Table 1). Standard collection methods (e.g., dippers, pipettes, trays) were used to collect larvae from diverse habitats on the islands during 2019; samples were identified morphologically using taxonomic literature and/or through molecular barcoding. **Results:** Our results include 1) reconciling published historical mosquito records (Table 1), 2) discovery of a new *Wyeomyia* species on the island of St. John (Figure 2), and 3) reporting the first records of *Mansonia dyari* on St. Croix (Figure 3) and *Culex janitor* on St. John and St. Thomas. **Conclusions:** Periodic surveys are important to assess changes in mosquito fauna. Our 2019 efforts yielded updated records and the detection of 3 new mosquito species for the USVI, including a species previously unknown to science. Survey efforts with external partners can be an effective method to build local capacity as USVI staff training occurred simultaneously while surveying various larval habitats (Figure 4) across all three islands.

Figure 3. *Mansonia dyari*



The first records of *Mansonia dyari* in the USVI are reported (Seger et al. 2019). Adult females were collected by BG-Sentinel traps and larvae were obtained from a freshwater pond (St. Croix) by rinsing *Pistia* sp. roots. The QR code is linked to the published report.



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Table 1. Mosquito Inventories on the U.S. Virgin Islands (1944-Present)

No.	Species	Historical Records (1944-1975) <sup>1</sup>	VIDOH & WCU (2019)			
			USVI (any island)	St. Croix	St. John	St. Thomas
1	<i>Aedes aegypti</i>	Y	Y	Y	Y	Y
2	<i>Aedes mediovittatus</i>	Y	Y	Y <sup>2</sup>	Y	Y
3	<i>Aedes scapularis</i>	Y	-	-	-	-
4	<i>Aedes sollicitans</i>	Y	-	-	-	-
5	<i>Aedes taeniorhynchus</i>	Y	Y	Y	-	-
6	<i>Aedes tortilis</i>	Y	-	-	-	-
7	<i>Anopheles albimanus</i>	Y	Y	Y	-	-
8	<i>Anopheles grabhamii</i>	Y	Y	Y	Y	Y
9	<i>Culex antillummagnorum</i>	Y	Y	Y	Y	Y
10	<i>Culex atratus</i>	Y	-	-	-	-
11	<i>Culex bahamensis</i>	Y	Y	Y	Y	-
12	<i>Culex erraticus</i>	Y	Y	Y	Y <sup>3</sup>	Y
13	<i>Culex duplicator</i>	Y	-	-	-	-
14	<i>Culex habilitator</i>	Y	-	-	-	-
15	<i>Culex infictus</i>	Y	-	-	-	-
16	<i>Culex janitor</i>	-	Y	-	Y	Y
17	<i>Culex nigripalpus</i>	Y	Y	Y	Y	Y
18	<i>Culex quinquefasciatus</i>	Y	Y	Y	Y	Y
19	<i>Deinocerites cancer</i>	Y	? <sup>4</sup>	Y <sup>4</sup>	Y <sup>4</sup>	Y <sup>4</sup>
20	<i>Deinocerites magnus</i>	Y	Y <sup>4</sup>	Y <sup>4</sup>	Y <sup>4</sup>	Y <sup>4</sup>
21	<i>Mansonia dyari</i>	-	Y	Y	-	-
22	<i>Mansonia flaveola</i>	Y	-	-	-	-
23	<i>Orthopodomyia signifera</i>	Y	-	-	-	-
24	<i>Psorophora insularius</i>	Y	-	-	-	-
25	<i>Psorophora jamaicensis</i>	Y	-	-	-	-
26	<i>Psorophora johnstonii</i>	Y	Y <sup>2</sup>	Y <sup>2</sup>	-	Y <sup>2</sup>
27	<i>Psorophora confinnis</i>	Y	-	-	-	-
28	<i>Psorophora pygmaea</i>	Y	Y	Y	-	-
29	<i>Toxorhynchites portoricensis</i>	Y	Y	-	Y	Y
30	<i>Uranotaenia cooki</i>	Y	-	-	-	-
31	<i>Uranotaenia lowii</i>	Y	Y	Y	-	Y
32	<i>Uranotaenia sapphirina</i>	Y	-	-	-	-
33	<i>Uranotaenia socialis</i>	Y	-	-	-	-
34	<i>Wyeomyia</i> sp. nov.	-	Y	-	Y	-
<b>Total Valid Species:</b>		<b>31</b>	<b>18</b>	<b>15</b>	<b>12</b>	<b>12</b>

<sup>1</sup>Specific record references are listed in the references section. Many (~46%) of Miskimen & Bond (1970) records are not based on their own collections but are reports of previous records by Beatty (1944). <sup>2</sup>Adult collections only from adult *Aedes aegypti* surveillance activities (BG-Sentinel collections) and survey activities. <sup>3</sup>Pending molecular confirmation (early instars). <sup>4</sup>We identified *De. cancer* on STX based on morphology, however molecular evidence compared to the Barcode of Life Database and multi-locus analysis (NCSU) conclusively identified the sample as *De. magnus*. Further studies are necessary to determine the identities and distribution of crab hole mosquitoes in the USVI. **Questionable Records:** Above table includes valid species based on Harbach, 2019 (mosquito taxonomy inventory). Records not included in the table but reported in Beatty 1944 include: 1) *Culex americanus* (not a valid species), 2) *Psorophora coffinis* (synonymized with *Ps. johnstonii*), and 3) *Cx. chrysonotum* (synonymized with *Cx. theobaldi*).

Figure 4. Representative Larval Habitats



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