

## MOSQUITOES OF WEST VIRGINIA: AN UPDATE

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**ABSTRACT.** Nineteen species of larval mosquitoes were collected from 209 sites in 47 of West Virginia's 55 counties over a 7-month period (April–October) in 1992. *Aedes abserratus* is recorded from the state for the first time.

Little attention has been given to the mosquitoes of West Virginia even though many species are potential vectors of arboviruses and the ubiquitous dog heartworm, *Dirofilaria immitis*. Fletcher (1957),<sup>1</sup> who identified 9 mosquito species in his 19-county study, authored the initial mosquito survey for the state. Since then, 2 more comprehensive listings of mosquitoes from West Virginia have been published (Amrine and Butler 1978, Butler and Amrine 1980). The present study was prompted by the absence of published reports of mosquitoes from 7 of West Virginia's 55 counties, and because only one or 2 mosquito species were known from many other counties. Our primary objective was to look for mosquitoes in as many counties as travel and time limitations would allow over a single breeding season, paying particular attention to those 7 counties that lacked mosquito collection records. A secondary goal was to construct a data base that would facilitate retrieval of information on larval mosquitoes relative to species collected, county of record, specific location, and date of collection.

The state of West Virginia is divided into 8 Regional Educational Service Agencies (RESAs or RESA Regions) by the public school system (Fig. 1). The intent is to evenly balance (to the extent practical) the state's population for educational administration, planning, and reporting purposes. Thus RESAs reflect population density, with small RESAs encompassing larger population centers (i.e., cities and their environs), and large RESAs delineating the more sparsely populated rural areas. The West Virginia Department of Health and Human Resources has adopted the same RESA format for epidemiologic reporting because it eliminates any confusion that might arise by having the state partitioned differently by 2 different state governmental entities (L. Haddy, personal communication). So, for conformity, our mosquito data base is constructed in the RESA format.

Larval mosquitoes were collected from a variety of aquatic habitats in all 8 RESA Regions using a hand-held strainer having a mesh size of approximately 1.0 mm. Larvae trapped in the strainer were removed with forceps and transferred to appropriately labeled jars (date, county, specific county location) containing 70% ethanol for killing and fixing. Within 3 wk of capture, larvae were dehydrated in an ethanol series, cleared in methyl salicylate, and mounted on slides in Permount®. The key by Darsie and Ward (1981) was consulted for the identification of larvae. All pertinent data (i.e., RESA Region, county of record, specific location, date and species recovered) were entered on a 3.5-in. floppy disk in an MS DOS dBase III+ file format.

Nineteen species of mosquito larvae were collected from 209 different collection sites in 47 of the 55 counties (and all 8 RESA Regions) from April through October of 1992 (Fig. 1 and Table 1). *Culex restuans* Theobald, *Anopheles punctipennis* (Say), *Aedes triseriatus* (Say), and *Culex territans* Walker were the most frequently encountered species, being found in 41, 30, 28, and 27 of the 47 counties collected, respectively (Ta-

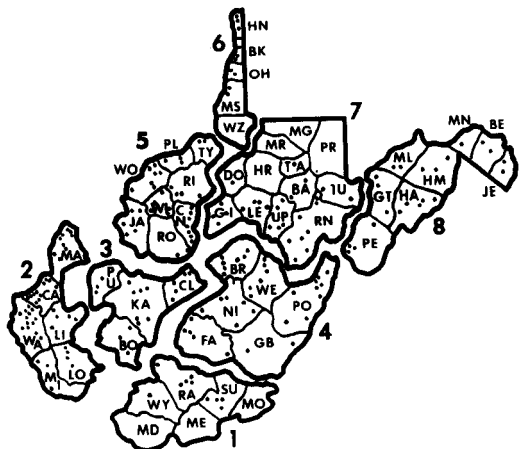


Fig. 1. State of West Virginia partitioned into 8 RESA Regions. Each county is identified by a 2-letter dBase designator (ref. CD column, Table 1). Closed circles indicate collection sites.

<sup>1</sup> Fletcher, L. W. 1957. The mosquitoes of West Virginia. M.S. thesis. West Virginia University, Morgantown, WV.

Table 1. Mosquito species of West Virginia listed by RESA Region and county. ▲ indicates species collected in the present study; ● indicates species collected in all previous studies. CD = county dBase III+ designator.

COUNTY	CD	SPECIES																									
		<i>Ae. abserratus</i> (Felt & Young)	<i>Ae. atropalpus</i> (Coquillett)	<i>Ae. canadensis</i> (Theobald)	<i>Ae. cinereus</i> Meigen	<i>Ae. hendersoni</i> Cockerell	<i>Ae. sollicitans</i> (Walker)	<i>Ae. sticticus</i> (Meigen)	<i>Ae. triseriatus</i> (Say)	<i>Ae. trivittatus</i> (Coquillett)	<i>Ae. vexans</i> (Meigen)	<i>An. barberi</i> Coquillett	<i>An. punctipennis</i> (Say)	<i>An. quadrimaculatus</i> Say	<i>Cq. perturbans</i> (Walker)	<i>Cx. erraticus</i> (Dyar & Knab)	<i>Cx. pipiens</i> Linnaeus	<i>Cx. restuans</i> Theobald	<i>Cx. salinarius</i> Coquillett	<i>Cx. territans</i> Walker	<i>Cs. inornata</i> (Williston)	<i>Or. signifera</i> (Coquillett)	<i>Ps. ciliata</i> (Fabricius)	<i>Ps. columbiae</i> (Dyar & Knab)	<i>Ps. ferox</i> (Humbolt)	<i>Tx. r. septentrionalis</i> (D & K)	<i>Ur. sapphirina</i> (Osten Sacken)
Region 1																											
McDowell	MD			●						●	●	●															●
Mercer	ME			●																							
Monroe	MO										●	●					●	●									
Raleigh	RA	▲						▲	●	●		▲	▲			▲	▲	▲	●	▲	●		●				
Summers	SU							▲	●	●		▲	▲	▲			▲	▲	▲	▲	●						
Wyoming	WY			●						●							▲	▲	▲	▲							
Region 2																											
Cabell	CA			●	▲			▲	▲	▲	▲	▲	●			▲	▲	▲	▲	▲							
Lincoln	LI			●	●			▲	▲	●	●	▲	▲			▲	▲	▲	▲	●							
Logan	LO	▲			●											▲	▲	▲	▲	▲	▲		▲				
Mason	MA							●	●	▲	▲	▲	▲	●		●	●	▲	▲	▲	▲		●	●	●		●
Mingo	MI			●						●		▲	▲			▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	●
Wayne	WA			▲				▲	▲	▲	▲	▲	▲			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Region 3																											
Boone	BO	▲	▲							▲		●	●			▲	▲	▲	▲	●							
Clay	CL											▲	▲			▲	▲	▲	▲	▲							
Kanawha	KA			▲					●	▲		▲	▲			▲	▲	▲	▲	▲			●	●		●	
Putnam	PU									▲		●	●			▲	▲	▲	▲	▲			▲				
Region 4																											
Braxton	BR									●		●	●			▲	▲	▲	▲	▲							
Fayette	FA		●					▲				▲	▲			▲	▲	▲	▲	▲	▲					▲	
Greenbrier	GB										●	●	●			●	●	●	●	●	▲						
Nicholas	NI		●					▲			●	●	●			▲	▲	▲	▲	▲	▲						
Pocahontas	PO	▲		●	●			▲	▲	▲	▲	▲	▲			▲	▲	▲	▲	▲	▲			●			
Webster	WE							▲				▲	▲			▲	▲	▲	▲	▲	▲						
Calhoun	CN							▲				▲	▲			▲	▲	▲	▲	▲	▲	▲				▲	
Jackson	JA		●					▲		●		▲	▲			▲	▲	▲	▲	▲	▲		●		●		
Region 5																											
Pleasants	PL	▲						▲				▲	▲			▲	▲	▲	▲	▲	▲						
Ritchie	RI							▲				▲	▲			▲	▲	▲	▲	▲	●						
Roane	RO									▲		▲	▲			▲	▲	▲	▲	▲							
Tyler	TY							▲				▲	▲			▲	▲	▲	▲	▲							
Wirt	WI							▲				▲	▲			▲	▲	▲	▲	▲	▲						
Wood	WO			●						▲	▲	▲	▲			▲	▲	▲	▲	▲	▲	▲		▲		▲	▲

Table 1. Continued.

	COUNTY	CD	SPECIES																									
			<i>Ae. abserratus</i>	<i>Ae. atropalpus</i>	<i>Ae. canadensis</i>	<i>Ae. cinereus</i>	<i>Ae. hendersoni</i>	<i>Ae. sollicitans</i>	<i>Ae. sticticus</i>	<i>Ae. triseriatus</i>	<i>Ae. trivittatus</i>	<i>Ae. vexans</i>	<i>An. barberi</i>	<i>An. punctipennis</i>	<i>An. quadrimaculatus</i>	<i>Cq. perturbans</i>	<i>Cx. erraticus</i>	<i>Cx. pipiens</i>	<i>Cx. restuans</i>	<i>Cx. salinarius</i>	<i>Cx. territans</i>	<i>Cs. inornata</i>	<i>Or. signifera</i>	<i>Ps. ciliata</i>	<i>Ps. columbiae</i>	<i>Ps. ferox</i>	<i>Tx. r. septentrionalis</i>	<i>Ur. sapphirina</i>
Region 6	Brooke	BK		▲						▲		▲						▲										
	Hancock	HN								▲		▲						▲		▲								
	Marshall	MS							▲		▲		▲				▲											
	Ohio	OH							▲				▲															
	Wetzel	WZ								●	●		●					●		●								
Region 7	Barbour	BA							▲	●								▲	●	▲								
	Doddridge	DO									●		▲					▲	●	▲								
	Gilmer	GI											▲	●				▲	●	▲								
	Harrison	HR											●	●					▲	●	▲							
	Lewis	LE	▲							▲		▲		▲				▲	●	▲								
	Marion	MR												●														
	Monongalia	MG		●	●				●	●	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●
	Preston	PR		●	●	●		●	●	●	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●
	Randolph	RN			●	●				▲		●		▲	●				▲	●	▲	●						
	Taylor	TA								▲																		
Region 8	Tucker	TU	●	●						●		●							▲	●	▲							
	Upshur	UP								▲		▲		▲	●				▲	▲	▲	●						
	Berkeley	BE								▲					●			▲	▲	▲	●							
	Grant	GT								▲	●		▲						▲	▲	▲	●				▲		
	Hampshire	HM								▲	●		▲	●					▲	▲	▲	●				▲		
	Hardy	HA		▲						▲	●		▲	●					▲	▲	▲	●				▲		
	Jefferson	JE	●															▲	▲	▲	●							
	Mineral	ML								▲		●	●						▲	▲	▲	●						
	Morgan	MN								●									▲	▲	▲	●						
	Pendleton	PE								▲				▲					▲	▲	▲	●						

ble 1). *Aedes vexans* and *Culex pipiens* Linnaeus were moderately common (16 and 13 counties, respectively), as well. Larval mosquitoes were collected in Brooke, Hancock, Marshall, Pleasants, Tyler, Webster, and Wirt counties; counties in which mosquitoes had not been previously reported (Table 1). We have established 122 new county records, and *Aedes abserratus* (Felt & Young) is reported for the first time from West Virginia (Logan County) (Table 1).

Our observation that *Cx. restuans*, *An. punctipennis*, and *Cx. territans* are common species in West Virginia corroborates the findings of pre-

vious investigators (Fletcher 1957,<sup>1</sup> Amrine and Butler 1978, Butler and Amrine 1980). Although *Ae. triseriatus* had been previously recorded from only 13 counties, this species was described by Amrine and Butler (1978) as, "... common in West Virginia...". Our collections of *Ae. triseriatus* from 28 counties indicate that this species is more widespread than formerly recorded.

We thank William E. Bickley, Associate Editor of the *Journal of the American Mosquito Control Association*, for his identification of *Ae. abserratus*, and for discussing with us the considerable variation that occurs in *Cx. territans* larvae. Lor-

etta Haddy, the state epidemiologist with the West Virginia Department of Health and Human Resources, Charleston, WV, discussed with us the rationale for dividing the state into 8 regions for the purpose of reporting diseases. James Amrine, West Virginia University, Morgantown, WV, also provided helpful suggestions in the preparation of this manuscript. Voucher specimens of *Ae. abserratus* and *Cx. territans* have been deposited in the National Museum of Natural History, Washington, DC, under accession number 404492; Dept. Entomology ENT-A-4161. Specimens of the remaining species collected during the course of this investigation presently reside in the medical entomology teaching collection at Marshall University. Specimens collected by Fletcher and Amrine and Butler are in the West

Virginia Insect Collection at Morgantown, WV. This work was supported by a Faculty Research Grant from the summer grant program of the Marshall University Foundation.

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