

species is resistant to DDT but susceptible to dieldrin and malathion in the province of Helmand.

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ANNOTATED LIST OF THE MOSQUITOES OF WEST VIRGINIA¹

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ABSTRACT. A list of mosquitoes collected or reported to be collected, in West Virginia is presented. Twenty-four species have been found to date, of which seven are reported in this paper as new state records: *Anopheles quad-*

rimaculatus, *Coquillettidia perturbans*, *Culex erraticus*, *Cx. salinarius*, *Culiseta inornata*, *Orthopodomyia signifera* and *Uranotaenia sapphirina*.

The first specific study of mosquitoes of West Virginia was provided by Lowell W. Fletcher (1957). Other records of mosquitoes from the state were provided by Dyar (1922, 1928), Carpenter (1950), and Zavortink (1972).

During the present study, mosquitoes were found in small to moderate numbers in isolated and scattered areas of the state.

The physiography of West Virginia provides few extensive breeding areas, and most reforested regions consist of relatively young trees with few tree holes. Marshes, bogs, lakes, and other permanent bodies of water are usually located distant to most of the populated areas. The more suitable mosquito habitats are found in the flood plains of the streams and rivers in the state.

For each species listed, information (if known) is provided for seasonal range, initial county record, date of collection, col-

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lector, stage, disposition of specimens, person making the determinations, published records for West Virginia and a discussion of pertinent data. The species are listed alphabetically without regard to subgeneric classification.

Aedes (Ochlerotatus) atropalpus (Coquillett, 1902).

31-VIII to 4-X. **MONONGALIA**, Cooper's Rock State Forest, 30-VIII-75, J.A., larvae, WVU, J.A. **PRESTON**, Rockville—Big Sandy Creek, 31-VII-75, D.B. and L.B., larvae, WVU, D.B. **TUCKER**, Blackwater Falls, 4-X-75, J.A., larvae, WVU, J.A. **JEFFERSON**, S.R., Shenandoah R.—WV Rt. 9, 7-IX-47, S.C. Carpenter (1950). Fletcher (1957). Found in pot holes in rocks near rivers and creeks; locally abundant.

Ae. (Och.) canadensis canadensis (Theobald, 1901). 28-III to 10-VIII. **MERCER**, L.F. **MONONGALIA**, S.R., Morgantown, 12-VIII-56, L.F. **PRESTON**, Bruceton Mills, 26-IV-57, L.F., adults. **RANDOLPH**, Laurel Fork Camp, 10-VIII-75, L.B., adult, WVU, L.B. **TUCKER**, Blackwater Falls, 30-IV-77, J.A., larvae, adults, WVU, J.A. **WOOD**, WVU, L.F. Fletcher (1957). Very common in a variety of habitats in early spring.

Ae. (Protomacleaya) hendersoni Cockerell, 1918. 1-5 IX. **MORGAN**, S.R., Rock Gap, Cacapon State Park, 1-5-IX-55, C. W. S., adults, USNM.

Ae. (Och.) sticticus (Meigen, 1838). 17-VII to 10-VIII. **MONONGALIA**, S.R., Morgantown, 17-VII-56, L.F., adults. Fletcher (1957). According to Fletcher, this species was found in a flood pool of the Monongahela River in 1956. No specimens have been found by the authors.

Ae. (Pro.) triseriatus (Say, 1823). 18-IV to 12-X. **MONONGALIA**, S.R., Morgantown, V-56, L.F., larvae. **POCAHONTAS**, Droop Mountain, L.F. **PRESTON**, 12-X-70, B.T., adult WVU, L.B. Fletcher (1957). Found in tree holes and in containers; common in West Virginia and is occasionally pestiferous.

Ae. (Och.) trivittatus (Coquillett, 1902). 31-VII to 1-IX. **MINERAL**, West of Keyser, Potomac River, 1-IX-77, J.A., adult, WVU, J.A. **MONONGALIA**, S.R., Morgantown, 2-VIII-56, L.F. Unknown Co., Dyar. Dyar (1928). Fletcher (1957). This species is infrequently found in West Virginia.

Ae. (Aedimorphus) vexans (Meigen, 1830). 27-III to 5-X. **GREENBRIER**, S.R., White Sulfur Springs, 1915, Dyar. **JACKSON**, Ripley Landing-Lick Run, 17-IX-77, J.A., adult, WVU, J.A. **MCDOWELL**, Panther State For-

est, 10-IX-77, L.B., adult, WVU, L.B. **MINERAL**, West of Keyser, Potomac River, 7-IX-77, J.A., adult, WVU, J.A. **MONONGALIA**, Morgantown, 27-III-56, L.F., larvae. **MONROE**, Pickaway, 25-IX-77, L.B., larvae, WVU, J.A. **WETZEL**, Lewis Wetzel Public Hunting Area, 14-IX-75, J.A., larvae, WVU, J.A. **WOOD**, Parkersburg, 6-IX-70, M.R., adult, WVU, L.B. Dyar (1922). Fletcher (1957). A common species in West Virginia. The larvae are found in numerous habitats and adults are occasionally pestiferous, especially in the fall.

Anopheles (Anopheles) barberi Coquillett, 1903. 17-VII to 10-IX. **HARRISON**, S.R., Bridgeport, 17-VII-57, L.F., adult. **MCDOWELL**, Panther State Forest, 10-IX-77, L.B., adult, WVU, J.A. **MONONGALIA**, Halleck, 7-X-77, J.A. & L.B., mature pupae and 1st instar larvae, WVU, J.A. Fletcher (1957). The Monongalia Co. specimens were found in a discarded, porcelain toilet. Rarely found. A more thorough study of tree holes and containers should produce more specimens.

An. (An.) punctipennis (Say, 1823). 27-IV to 18-X. **CABELL**, S.R., Huntington, 1902, A.D.H. **CLAY**, 1956-57, L.F. **GREENBRIER**, L.F. **HARRISON**, L.F. **JACKSON**, Lick Run at U.S. 33 & W.V. 2, 17-IX-77, J.A., larvae, WVU, J.A. **KANAWHA**, L.F. **MARION**, L.F. **MCDOWELL**, Panther State Forest, 10-IX-77, L.B., adult, WVU, L.B. **MERCER**, L.F. **MONONGALIA**, Morgantown, 1-V-57, L.F., adults, WVU. **MONROE**, L.F. **NICHOLAS**, L.F. **OHIO**, L.F. **PENDLETON**, North Fork Mountain, 6 mi. above Smokehole Rec. Area, 24-IX-77, L.B., larvae, WVU, J.A. **POCAHONTAS**, L.F. **PRESTON**, Pisgah, 27-IV-57, L.F. **PUTNAM**, L.F. **RANDOLPH**, L.F. **WETZEL**, L.F. Dyar (1922). Fletcher (1957). One of the most common species in West Virginia. The larvae are found in a variety of habitats; the adults are locally abundant and infrequently pestiferous, biting at night.

An. (An.) quadrimaculatus Say, 1824. 17-IX to 21-IX. **MASON**, S.R., Ashton, 17-IX-77, J.A., larvae, WVU, J.A. **MONONGALIA**, Morgantown, 21-IX-77, J.A., larvae, WVU, J.A. Rare in West Virginia apparently restricted to permanent pools of water in flood plains of large rivers. The largest series was found in a permanent, shallow lagoon near the Ohio River in Mason Co.

Coquillettidia (Coquillettidia) perturbans (Walker,

- 1856). 28-V to 31-VIII. **BERKELEY**, S.R., Sleepy Creek Public Hunting Area, 28-V-77, J.A., WVU, J.A. **MONONGALIA**, Joe's Run, 31-VIII-77, J.A., adults and larvae, WVU, J.A. Rarely found in West Virginia; may be locally abundant and pestiferous, biting at night.
- Culex (Melanoconion) erraticus* (Dyar and Knab, 1908). 17-IX. **MASON**, S. R., Ashton, 17-IX-77, J.A., larva, WVU, J.A. Rarely found; it should be found in other parts of the state.
- Cx. (Culex) pipiens* Linnaeus, 1758. 9-V to 25-IX. **KANAWHA**, Charleston, 3-VIII-57, L.F., adults, WVU. **MERCER**, Athens, L.F., adult, WVU. **MONROE**, Pickaway, 25-IX-77, L.B., larvae, WVU, J.A. **PRESTON**, S.R. Pisgah, 1-VIII-56, L.F., adults, WVU. **TAYLOR**, L.F., larvae, Fletcher (1957). A very common mosquito in West Virginia and frequently pestiferous in urban areas, particularly in late summer and fall.
- Cx. (Cux.) pipiens quinquefasciatus* Say, 1823. 23-VIII to 2-IX. **KANAWHA**, S.R., Charleston, 23-VIII-57, L.F., larvae. **MERCER**, Princeton, 2-IX-57, L.F., adults. Fletcher (1957). Rarely found in southern West Virginia. The authors have yet to find specimens of this species.
- Cx. (Cux.) restuans* Theobald, 1901. 26-VI to 23-IX. **GREENBRIER**, L.F. **KANAWHA**, S.R., Kanawha Station, 16-VIII-1903, A.D.H. **MERCER**, Athens, 26-VI-57, L.F. **MONONGALIA**, Osage, 23-IX-57, L.F. **MONROE**, L.F. **POCAHONTAS**, L.F. **RANDOLPH**, L.F. **SUMMERS**, L.F. **WETZEL**, L.F. Dyar (1922). Fletcher (1957). A very common species found in various small ground pools, isolated pools of dried lagoons, containers, etc. Often found with *Cx. pipiens*.
- Cx. (Cux.) salinarius* Coquillett, 1904. 10-VI to 25-IX. **MONONGALIA**, Morgantown, 15-VI-74, L.B., adult, WVU, J.A. **MONROE**, Pickaway, 25-IX-77, L.B., larvae, WVU, J.A. **PRESTON**, Cranesville Swamp, 10-VI-77, J.A., adult females, WVU, J.A. **RANDOLPH**, Elkins, 11-IX-72, S.D., larva, WVU, J.A. **WOOD**, S.R., 18-VIII-72, L.B. larvae, WVU, J.A. The above identifications are based on the results of several keys for both larvae and adult females. However we are not confident in these identifications as no adult male *salinarius* have been found; a number of apparent "*salinarius*" larvae have been reared to adult male *Cx. (Cux.) pipiens*.
- Cx. (Neoculex) territans* Walker, 1856. 26-VI to 6-X. **MERCER**, S.R., Princeton, 26-VI-57, L.F., larvae. **MONONGALIA**, Joe's Run, 1-IX-77, J.A., larvae, adult, WVU, J.A.
- MONROE**, Pickaway, 25-IX-77, L.B., larvae, WVU, J.A. **PENDLETON**, North Fork Mt., 6 mi. above Smokehole Rec. Area, 24-IX-77, L.B., larvae, WVU, J.A. **POCAHONTAS**, Dunmore, 24-IX-77, L.B., larvae, WVU, J.A. **PRESTON**, Pisgah, 6-X-57, L.F. **WETZEL**, Lewis Wetzel Public Hunting Area, 14-IX-75, J.A., larvae, WVU, J.A. Fletcher (1957). A common species found in permanent water with aquatic vegetation; females observed feeding on frogs by J.A.
- Culiseta (Culiseta) inornata* (Williston, 1893). 10-VI to 21-IX. **MONONGALIA**, S.R., Morgantown, 21-IX-72, J.D., adult, WVU, J.D. **PRESTON**, Cranesville Swamp, 10-VI-77, J.A., adult, WVU, J.A. Rarely found.
- Orthopodomyia signifera* (Coquillett, 1896). 4-VI. **JACKSON**, Mill Creek (Rollins Lake), 4-VI-76, J.A., larvae, WVU, J.A. Found in a large rot hole in a fallen beech trunk.
- Psorophora (Psorophora) ciliata* (Fabricius, 1794). 20-VI to 8-VIII. **GRANT**, Mt. Storm, 18-VII, adult, WVU, Unknown collector. **KANAWHA**, S.R., Kanawha Station, 20-VI-07, A.D.H., adult. **MASON**, 8-VIII-71, L.B., adult, WVU, L.B. Dyar (1922). Fletcher (1957). Rarely found.
- Ps. (Grabhamia) columbiae* (Dyar and Knab, 1906). 10-VI to 16-X. **KANAWHA**, S.R., Kanawha Station, 20-VII-07, A.D.H., adult. **MONONGALIA**, Morgantown, 10-VI-56, L.F. Dyar (1922). Fletcher (1957). According to Fletcher, this species (called *confinnis*) was common around Morgantown in the wet summer of 1956; larvae were found in grassy pools. None was found in 1957.
- Ps. (Janthinosoma) ferox* (Humboldt, 1820). 26-VII to 17-IX. **JACKSON**, Ripley Landing-Lick Run, 17-IX-77, J.A., adult, WVU, J.A. **MONONGALIA**, S.R., Morgantown, 26-VII-56, L.F., adult. Fletcher (1957). Uncommon; a diurnal biter usually found in forested areas.
- Toxorhynchites rutilus septentrionalis* Dyar and Knab, 1907. 18-V to 16-IX. **KANAWHA**, Charleston, 1-VIII-75, C.P., adult, WVU, L.B. **MASON**, Point Pleasant, 12-VI-71, R.T., adult, WVU, L.B. **MCDOWELL**, Panther State Forest, 10-IX-77, L.B., adult, WVU, L.B. **MONONGALIA**, S.R., Morgantown, 10-VI-1898, A.D.H., adult. **UPSHUR**, French Creek, F.B., adult, WVU, L.B. Dyar (1922). Fletcher (1957). Uncommon; usually found at flowers since the females do not feed on blood. Two females were found in the fall inside buildings, apparently seeking a place for hibernation.

Uranotaenia (Uranotaenia) sapphirina (Osten Sacken, 1868). 21-IX. **MONONGALIA, S.R.**, Morgantown, 21-IX-77, J.A., larvae, WVU, J.A. Larvae were found among duckweed and other aquatic vegetation in a permanent, shallow lagoon adjacent to the Monongahela River.

Numerous other species of mosquitoes should be found in West Virginia, especially some species found in Maryland (Bickley et al. 1971). It is hoped that future studies by the authors will extend the information on culicids within the state.

Abbreviations Used

ADH	A.D. Hopkins, Entomologist 1890-1902 West Virginia University
BT	B. Thomas, student, WVU
CP	C. Power, student, WVU
CWS	Curtis W. Sabrosky, Entomologist, USDA, Systematic Entomol. Lab.
DB	D. Barger, graduate student, WVU
FB	F. Brooks, WVU Entomologist
JD	J. Darsie, graduate student, WVU
JA	J. Amrine
LB	L. Butler
LF	L. Fletcher
MR	M. Rosen, student, WVU
NC	N. Casto, student, WVU

RT	R. Thompson, student, WVU
SC	S. Carpenter
SD	S. Dixon, student, WVU
SR	State Record
USNM	U. S. National Museum of Natural History
WVU	West Virginia University Insect Collection

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