

AN ANNOTATED LIST OF THE MOSQUITOES OF MARYLAND¹

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ABSTRACT. In the three physiographic areas of Maryland (Costal Plain, Piedmont, and Appalachian) 53 species of mosquitoes are known to occur. Comments are made on the relative abundance of these species in the three areas. Reported in

this paper are new state records for *Aedes abserratus* (Felt and Young), *A. excrucians* (Walker), *A. tormentor* Dyar and Knab, and *Culiseta morsitans dyari* (Coquillett).

Carpenter and LaCasse (1955) compiled records of mosquito species reported from the various states including Maryland. Bickley (1957) discussed several rare species and first recorded the occurrence of *Aedes fitchii* (Felt and Young) and *A. stimulans* (Walker) in Maryland. Additional new state records published since 1955 are: *Psorophora cyanescens* (Coquillett) (Joseph *et al.*, 1960), *A. thibaulti* Dyar and Knab (Joseph, 1961), *Orthopodomyia alba* Baker (Zavortink, 1968), and *Culiseta silvestris minnesotae* Barr (Cooperative Economic Insect Report, 1969). Personnel of the Mosquito Control Project, Maryland State Board of Agriculture, have operated light traps and have collected mosquitoes by other methods with the result that noteworthy information on the occurrence and distribution of mosquito species has accumulated.

The purpose of this report is to record data concerning the distribution and relative abundance of the species of mosquitoes which are known to occur in Maryland. Collecting has predominated in tidewater areas of the state where there are more severe pest problems, and consequently distributional patterns can be expected to change when additional collections are made in central and western counties. Similarly estimates of abundance are often subjective.

Rather than give complete reports from counties, emphasis is placed on physio-

graphical or ecological areas somewhat arbitrarily named 1. Coastal Plain, 2. Piedmont, and 3. Appalachian (Fig. 1). These areas correspond insofar as possible to the "provinces" named and described by Miller (1967) who quoted Vokes (1957). Area 1 (Coastal Plain) is separated from Area 2 (Piedmont) by the Fall Line. Area 2 is separated from Area 3 (Appalachian) by Catoctin Mountain.

Area 1 comprises 8 Eastern Shore counties, most of Cecil County, 5 Southern Maryland counties, and parts of Howard County, Baltimore City, and Baltimore and Harford Counties. Area 2 comprises about a third of Cecil County, about two-thirds of Frederick County, most of Baltimore City, most of Harford, Baltimore, and Howard Counties, and all of Carroll and Montgomery Counties. Area 3 comprises about a third of Frederick County and all of Washington, Allegany, and Garrett Counties.

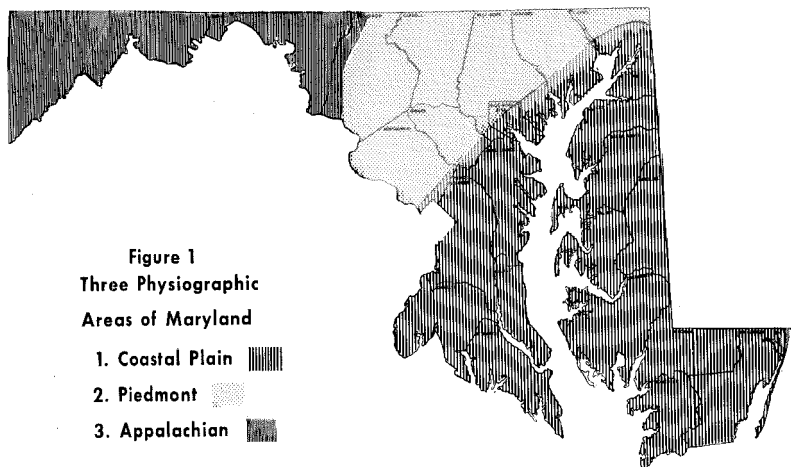
In the list that follows one or more numbers appear after names of species. These numbers designate the areas in which each species has been collected. Species are listed alphabetically without subgeneric designation.

Aedes abserratus (Felt and Young). 3. Rare. Larvae were collected in Cranberry Swamp, near Finzel, Garrett County, 30 April 1971 and 5 May 1971 in association with *A. canadensis*. Reported to C.E.I.R.

A. aegypti (Linnaeus). 1, 2. Occurs only in laboratory colonies.

A. atlanticus Dyar and Knab. 1, 2, 3. Locally abundant. This diurnal feeder is not often attracted to light traps.

¹ Scientific Article No. A1678, Contribution No. 4428 of the Maryland Agricultural Experiment Station, Department of Entomology, Project H-73A.



A. atropalpus (Coquillett). 1, 2, 3. Common only in rock holes. This species occurs just below the Fall Line in Baltimore and Harford Counties. Unknown elsewhere in Area 1. The type locality is Plummer's Island.

A. aurifer (Coquillett). 1. Rare. Collected only in Dorchester, Worcester, and Charles Counties. The last collection was in the Pocomoke Cypress Swamp 10 May 1966, S. R. Joseph.

A. canadensis (Theobald). 1, 2, 3. Common and widespread.

A. cantator (Coquillett). 1. Common in early spring in salt marsh areas. We suspect that larvae occur in water of low salinity.

A. cinereus Meigen. 1, 3. Rare. Collected in 5 Eastern Shore counties, 4 Southern Maryland counties and in Garrett County. It no doubt occurs in Area 2. At Laurel pupation usually occurs about May 1.

A. excrucians (Walker). 1. Rare. Larvae were collected by the authors and Robert W. Lake, 3 April 1969, near Elkton, Cecil County. This is a previously unpublished state record. Lake and Doll (1969) first collected this species in Delaware 28 March 1961. Through the courtesy of Mr. Lake it was possible to visit woodland pools in Maryland near

the Delaware line where larvae were expected to be present.

A. fitchii (Felt and Young). 1. Rare. Collected only in Prince George's County.

A. fulvus pallens Ross. 1, 2. Rare. The last record was from Worcester County, 1967.

A. grossbecki Dyar and Knab. 1, 2. Uncommon but locally abundant.

A. infirmatus Dyar and Knab. 1. Rare. Between 1939 and 1960 this species was not recorded in Maryland. It was taken in a landing rate collection (S. R. J. and R. A. B.) 25 August 1960 at noon near Madison P. O., Dorchester County. Additional collections have been made in Wicomico County.

A. mitchellae (Dyar). 1. Rare. Specimens collected in traps are often damaged and very hard to identify. In 1969 specimens from light traps in Worcester, Wicomico, and Talbot Counties were identified.

A. sollicitans (Walker). 1, 2. Common. Adults have been collected above the Fall Line. Boats moved from Chesapeake Bay and Lower Potomac marinas are believed to sometimes carry resting adults. Larvae have not been found except in Area 1.

A. sticticus (Meigen). 1, 2, 3. Uncommon but locally abundant. Until recently this

species was thought to be rare. During the past 5 years it has been found to be locally very abundant. It is often a vicious biter along the C. and O. Canal.

A. stimulans (Walker). 1, 2, 3. Uncommon but locally abundant. Collected in Talbot, Caroline, Calvert, Prince George's, and Washington Counties.

A. taeniorhynchus (Wiedemann). 1, 2. Common. This species appears to compete with *A. sollicitans* which is nearly always more abundant.

A. thibaulti (Dyar and Knab). 1. Rare. Collected in Somerset and Wicomico Counties (Joseph, 1961), and more recently in Worcester and Dorchester Counties.

A. tormentor Dyar and Knab. 1, 3. Rare. Larvae of this species were collected at Fort Frederick, Washington County 1 August 1967 by Mallack. An adult male was taken in a light trap at Salisbury by Joseph 26 June 1968. Larvae were taken near Largo, Prince George's County 31 July 1969 by Mallack. These are previously unpublished records for Maryland. *A. tormentor* no doubt occurs along the C. and O. Canal in Frederick and Montgomery Counties.

A. triseriatus (Say). 1, 2, 3. Common wherever there are treeholes or suitable container habitats.

A. trivittatus (Coquillett). 1, 2, 3. Uncommon but locally abundant. This floodwater species fluctuates in numbers from year to year in known habitats. It is sometimes a very severe diurnal biter which shuns light traps.

A. vexans (Meigen). 1, 2, 3. Common and widespread.

Anopheles atropos Dyar and Knab. 1. Rare. Little is known about this species in Maryland.

A. barberi Coquillett. 1. Rare. This species no doubt occurs in treeholes throughout the state, but few collections have been made. Males and females came to a resting box in Dorchester County in 1964.

A. bradleyi King. 1. Common in salt marsh habitats. Very large numbers of this species are attracted to light traps,

but little is known of its biology in Maryland.

A. crucians Wiedemann. 1, 2. Rare. It is probable that females of this species are present in light trap collections and are reported as *A. bradleyi*.

A. punctipennis (Say). 1, 2, 3. Common and widespread, but large populations apparently do not occur.

A. quadrimaculatus Say. 1, 2, 3. Uncommon. Suitable habitats for larvae of this species have diminished.

A. walkeri Theobald. 1. Rare but occasionally locally abundant. Comparatively little is known about this species in Maryland. Large numbers are found near Upper Marlboro where it is suspected to be a vector of dog heartworm.

Culex erraticus (Dyar and Knab). 1, 2. Rare. Locally abundant along the C. & O. Canal. This species no doubt occurs in Area 3.

C. pipiens pipiens Linnaeus and *C. pipiens quinquefasciatus* Say. 1, 2, 3. Common and widespread. The subspecies, *quinquefasciatus*, is considered rare.

C. restuans Theobald. 1, 2, 3. Common. This species is found frequently during cool weather.

C. salinarius Coquillett. 1, 2. Common. Large numbers come to light traps. This species probably occurs in Area 3.

C. territans Walker. 1, 2, 3. Common and widespread but large populations apparently do not occur.

Culiseta inornata (Williston). 1, 2. Uncommon. Most of our records are from Southern Maryland and the southern Eastern Shore.

C. melanura (Coquillett). 1, 3. Uncommon except in southern Eastern Shore Counties (Joseph and Bickley, 1969). Larvae have been taken in Anne Arundel, Prince George's and Garrett Counties.

C. morsitans dyari (Coquillett). 3. Rare. Larvae were collected 6 May 1970 in Cranberry Swamp, Garrett County by Joseph and Mallack. The determination was confirmed by Alan Stone. This is a previously unpublished record for Maryland.

- C. silvestris minnesotae* Barr. 1. Rare. This species was first collected in a light trap 14 September 1967 at Grasonville, Queen Anne's County (Berry and Joseph). The determination was confirmed by Alan Stone. Also 14 September 1967 in a light trap at Rock Hall, Kent County (C.E.I.R. 19(40):766, 3 October 1969). This species was also taken in a light trap at Chesapeake City, Cecil County 2 July 1969 and 25 July 1969, J. Myers and G. J. Tompkins (C.E.I.R. 19(41):781 and 19(48):854). This species is not known to occur south of Queen Anne's County.
- Coquillettidia perturbans* (Walker). 1, 2, 3. Uncommon but locally abundant. This species is a very serious pest near swamps and marshes in which there are plants which provide air for the larvae. Stone (1967) explained the change in names. *Mansonia* (Coquillettidia) *perturbans* becomes *Coquillettidia* (Coquillettidia) *perturbans*.
- Orthopodomyia alba* Baker. 1. Rare. Zavortink (1968) recorded this species from Maryland. In the U. S. National Museum there is a specimen labelled "College Park" without date or collector's name.
- O. signifera* (Coquillett). 1, 2. Uncommon. Additional collections from tree-holes will no doubt result in the discovery of this species in Area 3.
- Psorophora ciliata* (Fabricius). 1, 2. Uncommon but locally abundant.
- P. confinnis* (Lynch-Arribálzaga). 1, 2, 3. Common. At times this species is a very serious pest in many localities.
- P. cyanescens* (Coquillett). 1. Uncommon. This species was reported from Dorchester and Worcester Counties, 1959 by Joseph *et al.* (1960). Additional collections have been made in the following counties: Somerset, Wicomico, Talbot, Queen Anne's, Calvert, and St. Mary's.
- P. discolor* (Coquillett). 1. Rare. In 1968 and 1969 this species was taken in light traps at Grasonville, Queen Anne's County and Rock Hall, Kent County.
- P. ferox* (Humboldt). 1, 2, 3. Common and widespread, but seldom found outside of wooded areas.
- P. horrida* (Dyar and Knab). 1, 2. Rare. Collected in Dorchester, Prince George's and Montgomery Counties.
- P. howardii*. Coquillett. 1, 2. Uncommon but locally abundant.
- P. varipes* (Coquillett). 1. Rare. Connell (1941) collected specimens in Worcester County in 1936. This species is infrequently recognized. Appreciable numbers are found at College Park.
- Toxorhynchites rutilus septentrionalis* (Dyar and Knab). 1, 2. Uncommon. Most collections have been made from discarded tires. This species no doubt occurs throughout the state.
- Uranotaenia sapphirina* (Osten Sacken). 1, 2, 3. Uncommon but large numbers are found along the C. and O. Canal.
- Wyeomyia smithii* (Coquillett). 1. Rare. Collected from pitcher plants in Anne Arundel, Dorchester and Worcester Counties.

ACKNOWLEDGMENT. We thank Dr. Alan Stone for continuing assistance in making identifications and Mr. Robert W. Lake for showing us woods pools in Cecil County.

SUMMARY AND CONCLUSIONS. Mosquito control reflects the abundance of mosquitoes. The vast majority of organized mosquito control work in Maryland takes place below the Fall Line. Outside of localities where mosquito control is in progress a relatively insignificant amount of collecting has been done. Only two species, *Culiseta morsitans dyari* and *Aedes abserratus* have been collected exclusively above the Fall Line.

There are now 53 species of mosquitoes known to occur in Maryland. Reported in this paper are new state records for *Aedes abserratus*, *A. excrucians*, *A. tormentor*, and *Culiseta morsitans dyari*.

Aedes dupreei (Coquillett) and *Culex peccator* Dyar and Knab have been collected in Delaware and Virginia and probably occur in Maryland. Intensive collecting in Eastern Shore counties may reveal their presence.

Culex tarsalis Coquillett was collected at New Cumberland, Pennsylvania 2 September 1970 (C.E.I.R., 1970), a new record for Pennsylvania. New Cumberland is about 30 miles north of the Maryland-Pennsylvania line. This species may occur in Maryland.

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PLASTIC CAGES FOR MOSQUITO REARING AND DISEASE TRANSMISSION STUDIES

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Mass colonization of mosquito vectors to support disease transmission studies has led to the development of two new types of mosquito cages in our department. The cages are variations of those used in our insectary for a number of years, which were fabricated of 3/4-inch plywood frames covered by transparent plastic sheeting (Tenite)[®] and 18-mesh wire screening.

Plastics have long been used to construct mosquito cages. Among the first plastic cages used in malarial transmission studies were small, cylindrical cages designed by Young and Burgess (1946). Some plastics however, have been found unsuitable for

cage construction. Maramorosch (1952) observed that cellulose acetate impregnated with diethyl phthalate (a plasticiser) was toxic to both fish and plants. This material is also toxic to the cigarette beetle, *Lasioderma serricornis* (F.) (Simeone, 1953) and *Culex tarsalis* Coquillett (Barnett, 1955). Other plastics have proven satisfactory. Chao (1959) constructed a cage partially of a clear acetate material for holding *Culex tarsalis* and *C. pipiens* L. and Hayward, *et al.* (1969) described an insect cage made with an aluminum framework and polyethylene sheeting.

Our new cages are constructed of clear thermoplastic polymers, Lexan,[®] a polycarbonate resin, and Lucite,[®] an acrylic resin. Many characteristics of these plastics,

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