

## AEDES THIBAUTI IN NORTHERN NEW JERSEY

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**ABSTRACT.** *Aedes thibaulti* Dyar and Knab occurs from southern Louisiana, USA, to Ontario, Canada, but has an exceptionally patchy distribution over much of its range. Typical breeding habitat for this univoltine species includes cavities at the bases of trees growing in low-lying swampy areas or dark recesses within the root balls of upturned trees. Larvae have never been collected in the northeastern portion of the range, but adult records suggest that breeding populations are present. The lack of low-lying swampland in northern areas where adults have been collected suggests that the breeding habitat for this species may not be as specific as previously believed. On April 20, 1997, we collected *Ae. thibaulti* larvae from the flooded cavity of a red maple tree (*Acer rubrum*) growing next to a temporary snow pool in northern New Jersey. Larvae persisted in this habitat until mid-May when the cavity dried completely. The collection suggests that *Ae. thibaulti* is a cavity breeder in the northern portion of its range, but is able to utilize cavity habitats associated with temporary pools in dry forested areas.

**KEY WORDS** Mosquito, *Aedes thibaulti*, distribution, northern range, larval habitat, snow pool

*Aedes thibaulti* Dyar and Knab, a mosquito with a univoltine life cycle, occurs from southern Louisiana, USA, to Ontario, Canada, but has an exceptionally patchy distribution over much of its range. The single generation of larvae is locally common in February and March in most of the southeastern states west to Texas (Carpenter and LaCasse 1955). Typical breeding habitat in the south includes hollow cavities in the base of sweet gum (*Liquidambar styraciflua*) and tupelo (*Nyssa uniflora* = *Nyssa aquatica*) trees growing in low-lying swampy areas. The species has not been reported from the Appalachian mountain range, but extends north to Ohio (Darsie and Ward 1981), Indiana (Siverly 1961), and southwestern Michigan (Copeland 1986) in the western portion of its distribution. Larvae have been collected in Maryland (Joseph 1961), Delaware (Lake 1967), and southern New Jersey (McNelly 1984) along the Atlantic seaboard. Typical habitat near the Atlantic coast includes dark recesses under hummocks in swamp habitat formed by the root balls of wind-felled trees. Larvae have never been found north of the New Jersey pine barrens in the eastern portion of this mosquito's range, but adult collections suggest that breeding populations extend further northward. Host-seeking adults have been taken in biting collections and baited traps in upstate New York (Means 1979), Connecticut (Wallis and Whitman 1971), Rhode Island (Cookman et al. 1985), and Ontario, Canada (Belton and French 1967). Many of these areas do not support the type of breeding habitat normally associated with the species.

On April 20, 1997, 2 *Ae. thibaulti* larvae were collected from the hollowed-out base of a mature red maple (*Acer rubrum*) that was growing at the edge of a deep 47 × 100-m temporary snow pool

near Newton, in Sussex County, NJ (Fig. 1). Sussex County is located in the northwestern corner of New Jersey and Newton is approximately 30 km from the point where New York, Pennsylvania, and New Jersey intersect. Nearby High Point, NJ, is 600 m above sea level, the highest elevation in New Jersey. The northern geography, high elevation, and lack of lowland swamp habitat makes the area extremely atypical for *Ae. thibaulti*.

The temporary pool where the first specimens were collected was located in a highland valley at the top of a steep knoll 230 m above sea level in mixed hardwood forest growing in Nassau series soil. Nassau soils are typically well drained with steep slopes, prominent rock outcroppings, and low fertility (Fletcher et al. 1975). The cavity where larvae were found was below ground level, but contiguous with the ground water source at the time the collections were made. One specimen was an early 2nd instar and the other molted to the 3rd instar in the collection vial. Both were identified to species as larvae and reared to the adult stage for confirmation. Return to the site on April 23 revealed that small numbers of additional larvae were developing in the tree cavity. Fairy shrimp (*Eubranchipus* sp.) and chaoborid midges (*Machlonyx* sp. and *Chaoborus* sp.) were numerous in the pool. On 5 separate dates from April 23 to May 12, larvae were collected, field identified as *Ae. thibaulti* by the length and shape of the air tube, recorded by instar, and returned to the tree cavity to monitor further development. As the spring season progressed, water levels dropped and the hole in the base of the tree became isolated from the pool. Sampling became more difficult when the water in the cavity receded below the root mat of the tree. Sampling was discontinued May 15 when the habitat dried completely. No pupae were taken; thus, we do not know if the species was able to emerge successfully.

Previous reports limit larval habitats for *Ae. thibaulti* to low-lying swampland subjected to repeat-

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Fig. 1. Cavity habitat on the edge of a temporary snow pool where *Aedes thibaulti* larvae were collected in Sussex County, New Jersey.

ed flooding. Carpenter and LaCasse (1955) list the flooded bases of sweet gum and tupelo as primary breeding habitat and reported that the species is rarely found in hollow bases of other kinds of trees found in similar locations. Baldcypress (*Taxodium distichum*) provides acceptable cavity habitat for *Ae. thibaulti* in some parts of its range. Horsfall (1939) described cavity habitat in Arkansas and stated that larvae are not found in tree holes, holes in stumps, or any cavities in trees that are not flooded by groundwater. Shields and Lackey (1938) coined the term "gum pond" to describe swampland that supports *Ae. thibaulti*. Although normally restricted to cavities, Carpenter (1941) did find lar-

vae in an open swamp under a partially submerged log 100 yd from the nearest hollow tree. Lake (1967) found *Ae. thibaulti* larvae in Delaware in the hollow bases of red maples growing in semi-permanent swamp as well as in red maples flooded by temporary woodland pools. Joseph (1961), Siverly (1972), and McNelly (1984) all reported finding *Ae. thibaulti* in the darkest recesses of domed hummocks formed by the root balls of mature trees that were overturned in flooded swamp habitat. Wallis and Whitman (1971) collected adults from a number of locations in Connecticut but did not find the larvae. They noted that their collections were far removed from the southern swamp scenario as-

sociated with the species and suggested that breeding habitat for *Ae. thibaulti* may not be as restricted as previously believed.

Our collection site in Sussex County indicates that *Ae. thibaulti* is a cavity breeder in the northern portion of its range, but is not restricted to swamp habitats. The temporary pool where the collection was made was at the very top of a hill in dry forest, did not support aquatic vegetation, and dried quickly once trees in the area began to leaf. The larvae were utilizing cavity habitat in a tree that was flooded by a perched water table in otherwise well-drained soil. We did not find additional habitat at that site, but deep snow pools are numerous in forested areas of Sussex County. *Aedes thibaulti* is an exceptionally early season mosquito and snow pool habitat may remain flooded sufficiently to permit the single generation of this species to emerge in early spring.

The habitat we found in Sussex County, New Jersey, may partially explain the existence of relic populations of *Ae. thibaulti* northward into Canada where southern swampland is not found. The species appears to be able to utilize cavity habitats associated with temporary pools in forested areas. Additional collections from northern areas where the species is known to occur are needed to describe the true range of breeding habitats utilized by this interesting univoltine species.

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#### REFERENCES CITED

- Belton, P. and D. E. French. 1967. A specimen of *Aedes thibaulti* collected near Belleville, Ontario. *Can. Entomol.* 99:1336.
- Carpenter, S. J. 1941. The mosquitoes of Arkansas. Arkansas State Board of Health, Little Rock, AR.
- Carpenter, S. J. and W. J. LaCasse. 1955. Mosquitoes of North America (North of Mexico). Univ. of California Press, Berkeley, CA.
- Cookman, J. E., N. E. Scarduzio and R. A. LeBrun. 1985. *Aedes thibaulti*: a new adult record from Rhode Island. *J. Am. Mosq. Control Assoc.* 1(2):251.
- Copeland, R. S. 1986. The biology of *Aedes thibaulti* in northern Indiana. *J. Am. Mosq. Control Assoc.* 2(1):1-6.
- Darsie, R. F. and R. A. Ward. 1981. Identification and geographic distribution of the mosquitoes of North America, North of Mexico. American Mosquito Control Association, Fresno, CA.
- Fletcher, S. J., R. A. Shook and A. D. Backer. 1975. Soil survey of Sussex County, New Jersey. USDA Soil Conservation Service, Washington, DC.
- Horsfall, W. R. 1939. Habits of *Aedes thibaulti* Dyar and Knab (Diptera: Culicidae). *J. Kans. Entomol. Soc.* 12: 70-71.
- Joseph, S. R. 1961. *Aedes thibaulti* in Maryland. *Mosq. News* 21:251.
- Lake, R. W. 1967. Notes on the biology and distribution of some Delaware mosquitoes. *Mosq. News* 27:324-331.
- McNelly, J. R. 1984. *Aedes thibaulti* in New Jersey. *Mosq. News* 44:247-248.
- Means, R. G. 1979. Mosquitoes of New York. Part I. The genus *Aedes* Meigen with identification keys to genera of Culicidae. Bull. 430a. New York State Museum, Albany, NY.
- Shields, S. E. and J. B. Lackey. 1938. Conditions affecting mosquito breeding with special reference to *Aedes thibaulti* Dyar and Knab (Diptera: Culicidae). *J. Econ. Entomol.* 31:95-102.
- Siverly, R. E. 1961. Occurrence of *Aedes thibaulti* Dyar and Knab in Indiana. *Indiana Acad. Sci. Proc.* 70:137.
- Siverly, R. E. 1972. Mosquitoes of Indiana. Indiana State Board of Health, Indianapolis, IN.
- Wallis, R. C. and L. Whitman. 1971. First report of *Aedes thibaulti* Dyar and Knab in Connecticut and New York. *Mosq. News* 31:111.