

Mosquitoes of Cowlitz County

Aedes japonicus

Distribution, biology, and importance.-

GEOGRAPHIC DISTRIBUTION: The first North American specimens of *Ochlerotatus japonicus* were adults recovered from light trap collections in Ocean County, NJ and Suffolk County, NY in September 1998. The larvae were first discovered in automatic horse watering devices in Ocean County, NJ the following spring. Presently, breeding populations of *Oc. japonicus* are known in 18 of NJ's 21 counties. At the end of 2003, *Oc. japonicus* had been collected from 19 states in the USA (CT, DE, GA, MA, ME, MD, NC, NH, NJ, NY, OH, PA, RI, SC, TN, VA, VT, WA, and WV) and Quebec, Canada.

SEASONAL DISTRIBUTION: Present all season long. The earliest recorded larval collection was made on March 6, 2002 in Bergen County, NJ. The latest larval collection was made on 07 January 2003 in Somerset County, NJ. In central New Jersey, the adults have been collected with gravid traps from early April through late November.

LARVAL HABITAT: The larvae of *Oc. japonicus* are typically found in small-volume containers of relatively clean, clear water. They are most often recovered from artificial containers, including bird baths, buckets, plastic milk jugs, wheelbarrows, animal watering containers, and tires. They have also been collected from natural containers such as tree holes in Sussex County, and rock pools in Hunterdon, Sussex, and Warren Counties. Within their native range, they are occasionally collected from ground water, and Bergen County has collected *Oc. japonicus* larvae from standing water in tire ruts. It has also been collected from cement catch basins in Warren County, NJ and New York.

COMMON ASSOCIATE SPECIES: *Ochlerotatus japonicus* larvae have been found in container habitats with: *Aedes albopictus*, *Anopheles barberi*, *An. punctipennis*, *An. quadrimaculatus*, *Oc. atropalpus*, *Oc. hendersoni*, *Oc. triseriatus*, *Culex pipiens*, *Cx. quinquefasciatus*, *Cx. restuans*, *Cx. salinarius*, *Cx. territans*, *Culiseta melanura*, *Cs. incidens*, *Orthopodomyia signifera* and *Toxorhynchites rutilus septentrionalis*. More than likely, the larvae of *Oc. japonicus* will eventually be found with other container breeding mosquito species as its range continues to expand in North America.

Aedes vexans

Distribution, biology, and importance.-

This species is found over the greater part of the Northwestern States. It is one of the most important pest species in both irrigated and floodwater areas. It is present in overflow areas along many rivers, but it is most abundant on the bottom lands along the Columbia River and its tributaries for about 100 miles below the Bonneville Dam. In this area the larvae are associated with those of *Aedes sticticus* in the partially open, brushy, or wooded areas. The adults sometimes disperse for 15 to 20 miles or more from their breeding places and are a serious pest to man and livestock for 3 to 4 months during the summer. Along the Columbia River several hatchings may occur depending on the number of floods, since all eggs may not hatch with the first flooding. More than one generation may also occur in the irrigated sections. This species has been found naturally infected with western equine encephalitis and has been experimentally infected with St. Louis encephalitis virus

Anopheles freeborni

Distribution, biology, and importance.-

Anopheles freeborni is distributed throughout the Northwestern States. Comparatively large populations develop in irrigated areas in the Yakima Valley in Washington and in the vicinity of Scappoose, Prineville, and Klamath Agency, Ore. It has been abundant in the irrigated section of west and central Idaho and is fairly prevalent in the Willamette Valley in Oregon. The females hibernate in cellars, barns, outbuildings, and other sheltered locations. They emerge from these places by the last part of February in the warmer parts of this region, but few eggs are laid before April or May. Larvae have been taken along the margins of rivers, creeks, and irrigation ditches and in ponds, sloughs, and roadside ditches from early May until frost. Ecological studies in California of this and other anophelines have been made by Bailey and Baerg. Some of the specimens of *A. freeborni* they released flew as far as 17.5 miles and lived for 3 and 4 months. It was the most important malaria carrier in the Western States before this disease was reduced to its present extremely low level in the United States. Western equine encephalitis has been isolated from it in nature.

Anopheles punctipennis

Distribution, biology, and importance.-

This is a common species throughout Washington, west of the Cascade Mountains in Oregon, and in the northern half of Idaho. Usually the species is not sufficiently numerous to be a serious pest. The larvae are often associated with *A. freeborni* in clear shaded pools. *Anopheles*

punctipennis has been considered to be of little importance as a malaria carrier, but Gray believed it may have been an important vector from 1830 to 1856 in California.

Culex pipiens

Distribution, biology, and importance.-

This species develops in largest numbers where human populations provide it with a favorable environment. The larvae develop in temporary and permanent pools, catch basins, improperly covered cesspools, and artificial containers. In Oregon large numbers breed in log ponds. The females commonly enter houses and usually bite after dark. Reeves and Hammon found that of 52 wild caught 76 percent of freshly engorged females collected at Yakama, WA, had fed on birds and the rest on horses, cows, or dogs. Nielsen and Rees stated that in Utah the females readily enter dwellings but rarely attempt to bite. In the Willamette Valley of Oregon we noted that the species readily enters homes, where it is probably the most important nocturnal pest of man. Of the numerous freshly engorged mosquitoes collected by the junior author in his home at night, all were *C. p. pipiens*. This species was reported to be a serious pest in New Jersey by Smith.

St. Louis and western equine encephalitis were recovered from this species in the Yakima Valley, Wash. It was considered to be the principal vector of encephalitis in the 1933 outbreak in St. Louis, MO. Some information indicates that *C. p. pipiens* feeds mainly on birds.

Culex stigmatasoma

Distribution, biology, and importance.-

This species occurs principally in the southwestern half of Washington and western part of Oregon. No collections have been made in Idaho. The larvae develop in large numbers in log ponds. They also occur in street catch basins and in water polluted by sewage. The females rarely bite man. Although the species is known to feed on chickens, mice, guinea pigs, and man in the laboratory, most specimens that we and our associates collected in Oregon were very reluctant to feed on white mice, chickens, or frogs. However, this is not considered unusual for strains initially brought into the laboratory. Western equine encephalitis has been isolated from wild caught specimens in California

Culex tarsalis

Distribution, biology, and importance.-

This is one of the most important and widespread species in the Northwest. The larvae develop in many types of permanent and semi permanent water such as log ponds, ditches, and marshes. Other important breeding places are pools formed by floodwaters and irrigation. In Utah it has been found at elevations up to 9,000.

The adults seek shelter during the daytime. In the Central Valley in California the adults remain in resting shelters from 8 a.m. until sunset. The preferred hosts are domestic and wild birds, but this species will bite man, livestock, and other animal species. It will feed on rodents, snakes, and frogs when these are restrained. This species seldom bites man during daylight but will readily attack soon after sundown. Hibernating females have been found in late winter in storage cellars, in rock piles, under rocks on rock-covered hillsides and in abandoned mines or caves. This species is the most important known vector of western equine encephalitis (WEE) and St. Louis encephalitis (SLE). California encephalitis virus has also been isolated from it. Blackmore and Dow suggested that it is unlikely it is a winter reservoir of encephalitis virus since less than 0.3 percent of the hibernating females recovered by them had taken a blood meal. However, Bellamy et al. showed experimental overwintering of SLE virus in this species. Rush et al. found no WEE virus in large populations of winter caught adults. They also reported that it is unlikely the virus overwinters in this species.

Studies by Bellamy and Reeves in Bakersfield, Calif., showed that a diapause, which they believed to be caused by a decreasing period of daylight, results in an almost complete cessation of blood feeding from October to January. Considerable information on the flight and dispersal habits of this species has been obtained by Reeves and Bailey et, al. Although the maximum flight distance recorded by these workers was 15.75 miles, they stated "effective numbers of *C. tarsalis* disperse 2 and 3 miles downwind in one evening and significant numbers in the Sacramento Valley can travel 7 miles or more in two evenings, with the aid of the wind." They estimated a likely dispersal of 20-25 miles. In studies on the dispersal of adults into an area undergoing larvicide treatments the maximum recovery distance was 9.6 miles.

Culex territans

Distribution, biology, and importance.-

This species is well distributed in the Northwestern States but occurs only in small numbers. The larvae are found in swampy areas or in other permanent or semi permanent pools containing considerable aquatic or no aquatic vegetation. They also occur along the grassy margins of streams. These populations may include both *Culex territans* and *C. boharti*. The females have been observed to feed on frogs and snakes but are not known to bite man. Little is known about the economic importance of the species.

Culiseta impatiens

Distribution, biology, and importance.-

This species has been found in small numbers in the timbered sections of Oregon and Washington and in two counties in Idaho. The larvae have been taken in roadside ditches, holes left from fallen or uprooted trees, margins of beaver-dam lakes, wheel ruts in logging roads, and other small pools with bordering brush or trees. The females will bite man but are seldom present in sufficient numbers to be of importance.

Culiseta incidens

Distribution, biology, and importance.-

This species is widely distributed at lower elevations in the Northwestern States. The largest numbers occur in Washington and Oregon west of the Cascade Mountains, but it is common also in Idaho. The larvae breed in both permanent and semi permanent pools and in artificial containers. They are often associated with *Culiseta inornata* and *Culex tarsalis*. Only the females hibernate. They will readily attack man but are not considered important as a pest because of their small numbers and breeding habits. The species has been reported as favoring mammals for blood meals, although it is seldom abundant enough to be a pest of livestock. It has been infected experimentally with western equine, St. Louis, and Japanese B encephalitis viruses

Culiseta inornata

Distribution, biology, and importance.-

This species is rather widely distributed. It occurs in largest numbers in poorly drained irrigated areas. However, it has been collected in almost every type of semi permanent and permanent water. The larvae are often found with those of *Anopheles freeborni* and *Culex tarsalis*. It is also found in shaded pools in forests at elevations up to 6,000 feet. It is not a serious pest of man but can become a pest of livestock because of its long breeding season and wide distribution in irrigated areas. The females hibernate, and Rees believed that some larvae may overwinter, since they are very resistant to low temperatures. Western equine encephalitis has been isolated from this species in nature. Experimentally the species has been shown to transmit St. Louis and Japanese B encephalitis viruses.

Culiseta minnesotae

Distribution, biology, and importance.-

This rare species has been found in small numbers in Washington and Oregon and two counties in Idaho (map 10). The larvae have been collected from unshaded pools with scattered grass fed by fresh water. Although little is known of the feeding habits of the adults, they apparently do not readily attack man.

Culiseta particeps

Distribution, biology, and importance.-

This species is rare in the Northwest. The single collection from Washington was represented by larvae taken at Port Townsend, Jefferson County, by Myklebust in July 1961. In southwestern Oregon collections the larvae were associated with larvae of *Culiseta incidens* and *Culex territans* in pools overgrown with vegetation. Little is known of the feeding habits or economic importance of the adults.

Ochlerotatus (Aedes) aborigines

Distribution, biology, and importance.-

This species is present in considerable numbers in some places in the timbered coastal areas of Washington and Oregon but is uncommon in Idaho. It is also common at moderate elevations in the Cascade Range and in other mountain areas in Washington and northern Idaho. The larvae are found in snow and rain pools in wooded and semi wooded areas. It is of economic importance only in a few areas.

Ochlerotatus (Aedes) aloponotum

Distribution, biology, and importance.-

This species occurs in small numbers in wooded or semi wooded areas in Washington and Oregon. It has been collected as far east as Spokane, Wash., and as far south as Odell Lake in Oregon. Little is known about its economic importance.

Ochlerotatus (Aedes) cinereus

Distribution, biology, and importance.-

This mosquito is found throughout the partially wooded areas of all three States. It breeds in woodland and open meadow pools. Larvae have been collected from early April at lower levels to late June at higher elevations. In some mountain areas it is the predominating species and is a serious pest; it is found in smaller numbers at lower elevations. In Nevada it is apparently found only in foothill and valley areas. The females attack both during the day and at dusk. They are known to rest near the ground in the grass or underbrush or other places near their breeding sites.

Ochlerotatus (Aedes) communis

Distribution, biology, and importance.-

This is one of the most widely distributed species in high mountain areas of the Northwest. In many localities it is present in large numbers and is a serious pest. It breeds in flooded mountain meadows and woodland pools left by melting snow and around the margins of mountain lakes. The larvae may be found alone or in association with other species. In Oregon it is numerous throughout the Cascade Range and Blue Mountains. It is abundant in the Cascade and other mountain ranges in Washington and northern Idaho and is present, in smaller numbers in central and southern Idaho. The adults are sometimes seen late in May and may occur until mid-August. The females are persistent biters, and although they will attack during the day, they are generally more active at dusk.

Ochlerotatus (Aedes) increpitus

Distribution, biology, and importance.-

This is a common species that is generally distributed over the plains areas of Washington, Oregon, and Idaho. The larvae have been taken also in open meadows and small pools in semi wooded country from sea level to an elevation of about 6,000 feet. Chapman has collected larvae at 8,200 feet in Nevada. In the Willamette Valley of Oregon development of larvae and pupae and even some adult emergence occur in winter. This information would indicate that all stages of this species may be involved in carrying it through the winter in some areas. This species is one of several found at higher elevations that contribute to the serious discomfort of man and animals.

Ochlerotatus (Aedes) sierrensis

Distribution, biology, and importance.-

The species occurs in all the Northwestern States but is usually not too abundant, especially in Idaho. The largest numbers are found in the foothills of the Coast Ranges and the Olympic Mountains in Washington. It is a rather small mosquito and breeds in tree holes and in many kinds of artificial containers, also in rock pools and wooden receptacles under trees. In Oregon numerous larval collections have been made in old automobile tires and tree stumps. The larvae may be found in midwinter if temperatures below freezing do not prevail for long periods. The life cycle may be completed in as little as 15 days under optimum conditions. In unpublished observations on development at approximately 75^o F we found that about 12 days were required for eggs (conditioning), 10-14 days for larvae, and 4-6 days for pupae. This compares favorably with the

data reported by Judson et al. These authors found that the dissolved oxygen required for egg hatching was very low (0.025 ppm. or less). It is a persistent biter but apparently has a restricted flight range. It has been found to be an experimental vector of western equine encephalitis.

Ochlerotatus (Aedes) sticticus

Distribution, biology, and importance.-

This is one of the most important mosquito presents in the Northwestern States. It breeds in large numbers in the brushy bottom lands along the Columbia River and in similar places. It also occurs along some other rivers in northwestern Washington and various locations in Idaho. The larvae, which are usually associated with *Aedes vexans*, are found in large numbers for about 100 miles below the Bonneville Dam when the annual spring flood of the Columbia inundates the bottom lands. The adults disperse for 15 to 20 miles or more and remain a serious pest to man and livestock throughout the summer. The eggs may remain viable for at least 3 or 4 years if not reached by normal floods. This species has been capable of transmitting western equine and St. Louis encephalitis viruses.

Coquillettidia perturbans

Distribution, biology, and importance.-

Although this species has been collected in all three States, it does not occur in large numbers. The eggs are laid in rafts in swamps, marshes, or log ponds containing cattails, sedges, or other suitable host plants. The eggs hatch in 4 or 5 days, and the small larvae attach themselves to the roots or stems of the plants by means of the modified tip of their air tube, which is inserted into the root to provide air. The pupa also attaches itself to plants by means of modified air tubes. It comes to the surface when the adult is ready to emerge. The species usually over winters in the larval stage and there is apparently only one generation each year even as far south as Florida. Adults have been collected from early June to September in Douglas County, OR but were most numerous in June and July. The adults readily bite man and animals, but in most areas they do not occur in large enough numbers to be a serious pest. This species may transmit eastern equine encephalitis in nature.