

The West Nile Virus

West Nile virus (WNV) is a disease spread by mosquitoes. Mosquitoes become infected with WNV by biting infected birds. WNV first appeared in New York City in 1999 and has since spread throughout the United States and into Canada. In 2001, Canada had its first case of WNV in Ontario and since then it has been reported in Nova Scotia, New Brunswick, Quebec, Manitoba, Saskatchewan, and Alberta. As of the spring of 2007, there have been no reports of WNV activity in British Columbia. The British Columbia Center for Disease Control www.bccdc.org and Health Canada <http://www.phac-aspc.gc.ca/wnv-vwn/index.html> websites have regularly update information on WNV and its presence in Canada.

Mosquito Life Cycle

There are four stages to the mosquito life cycle: **egg**, **larva**, **pupa**, and **adult** (Figure 1). Eggs are laid on the surface of standing or still water. Larvae hatch from the eggs (1) and develop in standing water (2). Larvae go through four growth stages called instars. They feed on organic matter by filtering the water and they must come to the surface of the water to breathe. At the end of the fourth instar, the larvae transform into a pupae (3) which must also come to the water's surface to breathe but do not feed. The adult mosquitoes emerge from the pupae (4), rest on the water's surface to dry their wings and then they fly away in search of a mate or a blood meal (5). Female mosquitoes require a blood meal (6) in order to mature a new batch of eggs, and they will bite before laying each batch. Male mosquitoes do not bite; instead they feed on flower pollens.

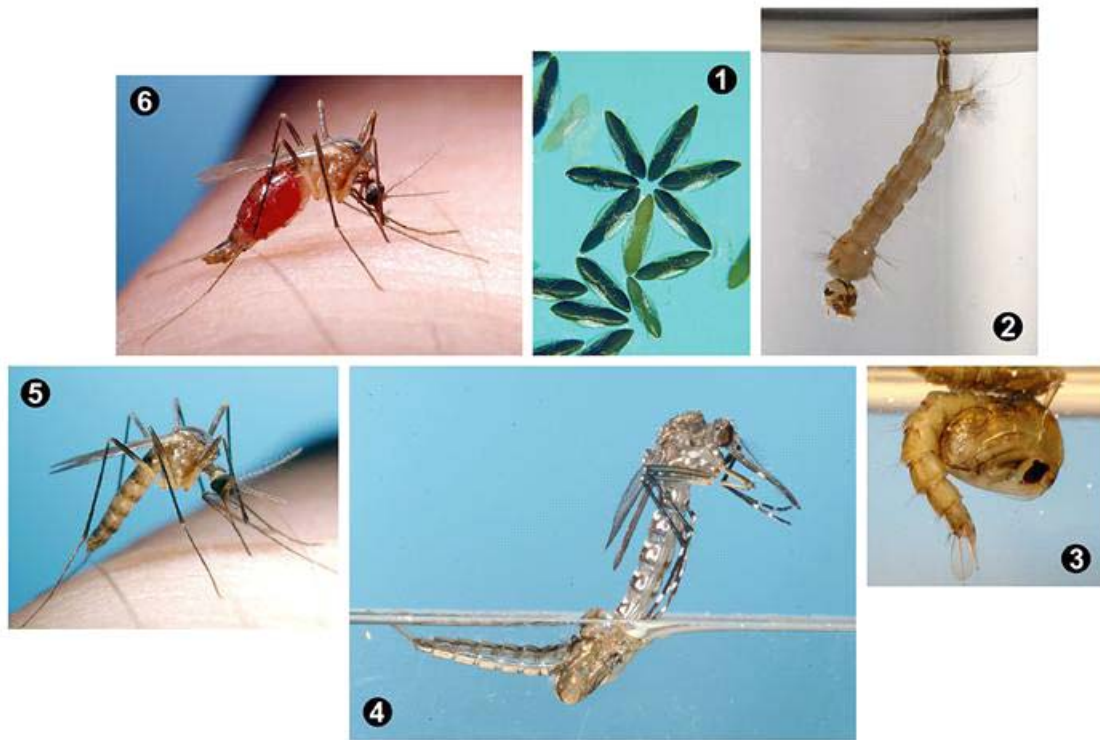


Figure 1. Mosquito Life Cycle- Provided by the Florida Medical Entomology Lab.



Figure 2. A 300ml Dipper loaded with mosquito larvae! It does not take much water to produce thousands of larvae.

West Nile Virus Cycle

Mosquitoes are called WNV vectors, which means that they are responsible for transmitting the virus. Mosquitoes suck in the virus when they bite an infected bird and then when the mosquito bites another bird or a mammal (including humans), they pass on the virus. Mammals, including humans, are considered “dead-end hosts” meaning that they are unable to pass the virus on to other mammals or back to mosquitoes (Figure 3).

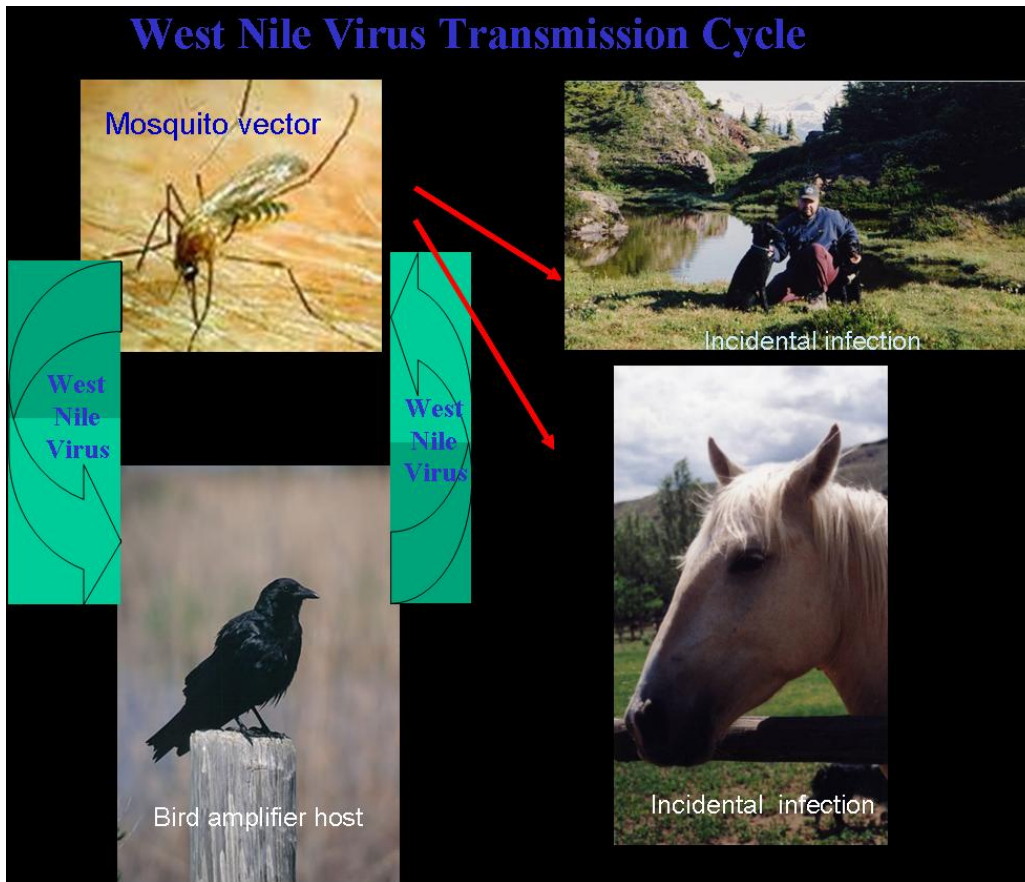


Figure 3. West Nile Virus Cycle

Not all mosquito species are vectors of WNV. In the Interior Health Authority there are approximately 30 species of mosquitoes, and only two species are considered to be significant vectors of WNV. The scientific names of these two mosquitoes are *Culex tarsalis* and *Culex pipiens*.

In the Okanagan, these species have been found in very high numbers in many locations.

Ministry of Health WNV Assistance Grants

Since the spring of 2004 the Ministry of Health Services has offered grant funding for all municipalities, First Nations bands and Regional Districts in the province. Regional Districts throughout the Okanagan have been applying for and receiving this grant. The funding has been used for mosquito surveillance, mosquito larval control, larval habitat mapping and public education.

Adult mosquito surveillance is used to monitor mosquito abundance and determine which species of mosquitoes are present in an area. Mosquitoes are trapped using a mosquito light trap baited with dry ice (Figure 6). Mosquitoes are attracted to the light and the CO₂ from the dry ice and they are sucked into a collecting container.

The Regional Districts and the Interior Health Authority have participated in adult mosquito trapping throughout the Okanagan. All mosquitoes trapped by the Interior Health Authority are shipped to the British Columbia Centre for Disease Control where they are ground up and tested for the presence of West Nile virus. Tens of thousands of mosquitoes have been tested from the Okanagan and non have tested positive for virus.

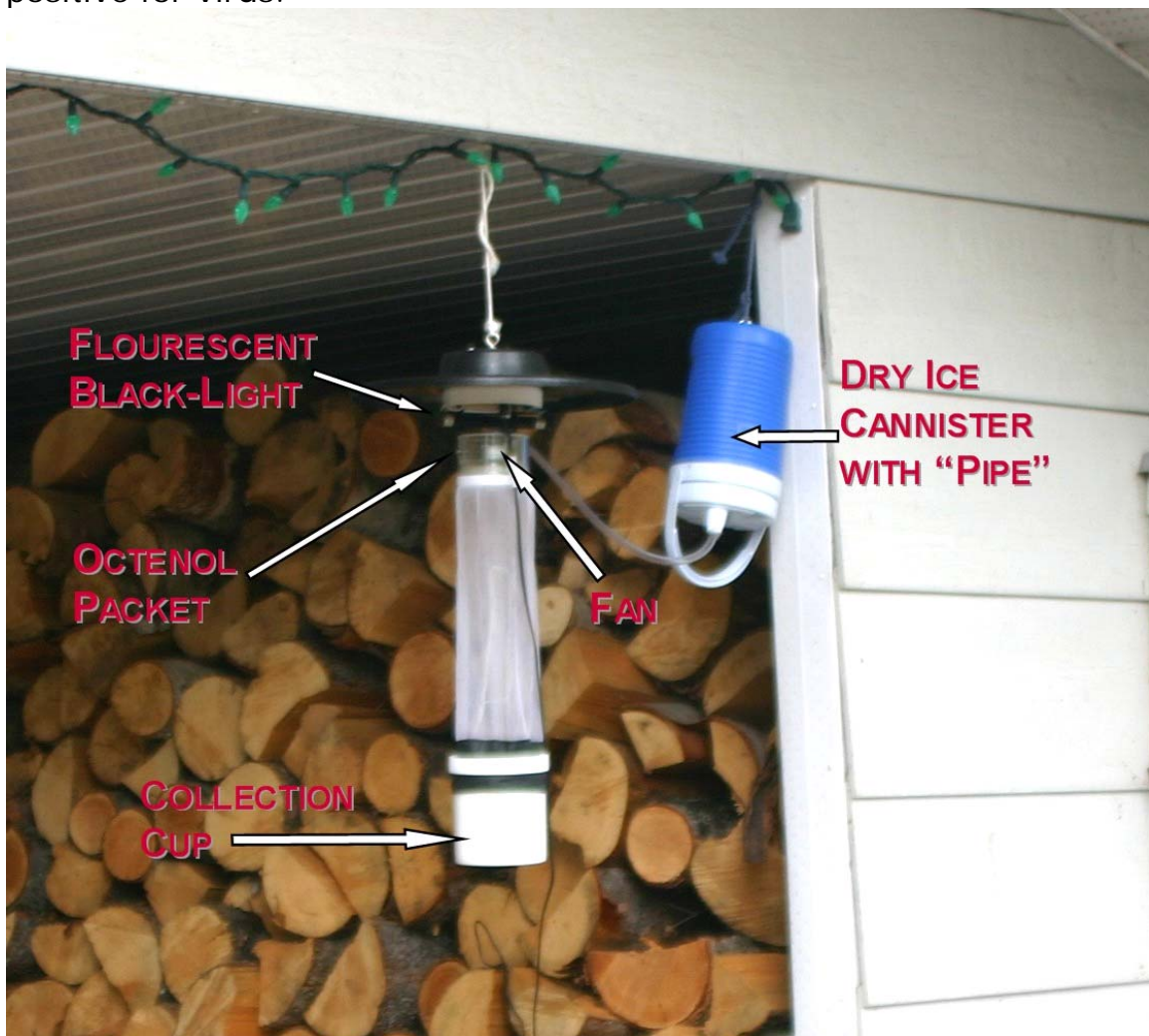


Figure 6. Mosquito Light Trap

Known mosquito larval development sites are monitored throughout the summer in the Okanagan, and when mosquito larvae are present,

the Regional Districts consider the use of larvicides. The larvicide product(s) that are being used are called Vectobac and/or Aquabac whichever is more readily available at the time. These essentially identical products contain the active ingredient *Bacillus thuringiensis israelensis* (*Bti*)(Figure 7). *Bti* is a bacterium which occurs naturally in soils and aquatic environments and although kills mosquito larvae, it is safe for other insects, mammals, fish and amphibians. *Bti* is certified for organic gardening.

Catch basins in urban areas of the Okanagan often contain larvae of *Culex pipiens*. The larvicide VectoLex with the active ingredient *Bacillus sphaericus* is used to control larvae in catch basins. This product contains live bacteria that reproduce in the gut of mosquito larvae and kill them. This product will kill larvae for up to 30 days and is safe for all other organisms.



Figure 7. Aquabac- *Bacillus thuringiensis israelensis* formulated on corn-cob

Frequently Asked Questions

What attracts mosquitoes?

Mosquitoes are attracted by body odour, perspiration, heat, light, and carbon dioxide.

Why do mosquitoes bite?

Only female mosquitoes bite and they use the blood to obtain protein for egg development.

How do people become infected with WNV?

People become infected with WNV when they are bit by an infected mosquito.

What are the chances of getting infected with WNV?

The chances of getting WNV are very low. Approximately 80% of people infected with WNV will not get sick at all; the remaining 20% will experience flu-like symptoms (fatigue, fever, headache, body aches) that last about a week or less. In very rare cases (less than 1%), infected people can develop encephalitis, inflammation of the brain, or meningitis, inflammation of the lining of the brain, which can result in death.

Does WNV only infect humans?

No. There have been cases of horses, birds, cats, chipmunks, domestic rabbits, squirrels, and skunks being infected by WNV. These animals cannot infect other animals or humans.

Can my pet get West Nile virus?

- West Nile virus can infect domestic dogs and cats however, these infections very rarely develop into serious illness. These animals usually fully recover without treatment and usually show no symptoms whatsoever.
- Domestic birds such as parrots can be infected and may become very ill or die from the virus.
- Horses are the most susceptible domestic animals to serious West Nile virus illness and up to 40% of infected horses will die. There is a vaccine available for horses.
- All domestic animals acquire the virus through the bite of a mosquito and none are able to pass on the virus to other animals or humans once they are infected. Please contact your local veterinarian for more information about protecting domestic animals from West Nile virus infection.

Why should I report a dead bird?

Members of the corvid family (crows, ravens, magpies, blue jays, and Steller's jays) are particularly sensitive to the virus causing high death rates if infected and are therefore good indicator species of WNV activity.

Who do I call if I find a dead bird?

Birds of the corvid family which include crows, ravens, magpies, blue jays and Steller's jays that are dead but not decayed should be reported to the Interior Health Authority (IHA) at **1-866-300-0520**.

Efforts will be made to collect the bird and send it for testing at the provincial Animal Health Lab in Abbotsford, BC. If at all possible, place the bird in a double bag and store in the freezer until a representative from the IHA can collect the bird.

Can I get WNV directly from birds?

No. Precautions should be taken when handling dead birds due to the fact that you don't know the bird's cause of death. Avoid bare-handed contact; use gloves or double plastic bags when handling dead birds and wash your hands after disposal.

How can I protect myself from WNV?

The best way to protect yourself from WNV is to minimize your exposure to mosquitoes and to reduce mosquito larvae development sites. The following are ways to accomplish this:

- reduce mosquito larvae development sites around your home by draining standing water on a regular basis
 - change the water frequently in bird baths, pet dishes and children's wading pools
 - keep gutters clear so they will drain properly
 - empty or turn over anything that holds standing water such as buckets, wheel barrows, old tires, and toys
 - drill holes in tire swings
 - empty water out of plant saucers
- keep a fine mesh screen over rain water barrels so female mosquitoes cannot land on the water and lay eggs
- aerate ornamental ponds or stock with fish
- repair holes in screens on windows and doors
- wear tightly woven clothing with long sleeves, and long pants. Try to wear light-coloured clothing (Mosquitoes are attracted to dark clothing because it absorbs heat)
- use insect repellent that contain DEET (*important*: read the product label for proper use) or Oil of Lemon Eucalyptus products such as OFF! Botanicals®

What product is being used to kill mosquito larvae in stagnant water?

Aquabac 200G or Vectobac 200G. These are larvicides that contain the bacterium *Bacillus thuringiensis* var *israelensis* which is certified for organic gardening. The bacteria is attached to ground corn cob and spread on the surface of standing water containing larvae.

Mosquito larvae eat the bacteria and it causes their death. Other insects, amphibians, fish, birds and mammals are unharmed by this naturally occurring bacteria.

Is Aquabac/Vectobac safe for the environment?

Aquabac and Vectobac are two of the least toxic insecticides used today. *Bacillus thuringiensis* var *israelensis*, the active ingredient in these products, is a naturally occurring bacterium found in soil and aquatic environments.

How does Aquabac/Vectobac work?

Aquabac and Vectobac are applied to standing water that contains larvae in their third and fourth instar. Once in the water, the *Bacillus thuringiensis* var *israelensis* is eaten by the larva which causes death within 4 to 24 hours.

For more information, refer to the British Columbia Center for Disease Control website at www.bccdc.org, the Interior Health Authority website at www.interiorhealth.ca or call the Interior Health West Nile Virus information line at 1-866-300-0520