Mosquito: diseases and control

Mosquitoes: The Diseases They Carry and Methods of Controlling the Populations

People who live in Alaska are definitely aware of the tiny insect known as the Mosquito. Most people do not realize the deadly diseases that they may carry and the possible effects that commonly used repellants may have. There are three main diseases carried and transmitted by mosquitoes, they are: West Nile, Malaria, and Dengue. Although these diseases are more prevalent in tropical areas, there is still a high risk for the citizens of Alaska of contracting one of these deadly diseases.

Many people drench themselves in repellants, many containing N-diethyl-meta-toluamide (DEET), but are there alternatives? There are as many as 230 products containing the chemical DEET known to the EPA, but there are many alternatives to using DEET, such as citronella and essential oils (Hayhurst). DEET has been approved by the EPA for years to help deter mosquitoes from biting.

One of the most widely used ways in which modern society tried to control mosquitoes was by spraying dichlorodiphenyltrichloroethane (DDT) over the Island of Sardinia, and island off the coast of Italy. Malaria had been present, but not prevalent until World War II malaria raged to the status of a full on epidemic. The Italian government and a private foundation enlisted the help of 25, 000 people working in the field, 5 air craft, two helicopters, countless automobiles, and many field offices. The mosquito that was the subject of the extermination was the Anopheles labranchiae, the known carrier of malaria on the island. This species of mosquito has a soft body, brow coloring, and four dark marks on each wing. Not only did the workers attack

the breeding locations of the mosquitoes, but they also sprayed homes, rivers, ponds, and fields with the DDT. In the extermination effort the workers used around 256 tons, 260, 000 kilograms, of DDT. The effort was only partially successful. The number of reported malaria cases dropped to just 4 reported cases four years after the dusting, but when scouts went out to search for the Anopheles labrachiae they found that both adults and the larvae in the brackish streams and swamps. In the minds of the Italian government this was a failure (Andrew Spielman Sc. D 148-49).

Although the mosquito extermination was seen as a failure, the initial consensus in Greece, where 16% of children tested positive for malaria parasites, was that the use of DDT was a success. There were very few accidental deaths of other insects. Around 1942 over 50 percent of the population of Greece had been infected with malaria. In 1947 the government set out to eradicate the local carrier of malaria, Anopheles sacharovi. The citizens of Greece welcomed the workers who dusted the country as a “ liberating army” (Andrew Spielman Sc. D 149)

There were also positive effects on crops. Olive farmers were fortunate to get their olive trees dusted, which killed off the caterpillars that in previous years had destroyed the crops. They were able to have a much larger harvest. Many towns experienced a reduction in all pests, including cockroaches, lice, and fleas, along with the mosquitoes. Soon after the dusting began malaria was gone from the islands. The citizens couldn’t be happier, until something unexpected happened (Andrew Spielman Sc. D 149).

The scientists were having lunch out in the country, and began to notice the flies returning. They were not overly concerned until they saw the dreaded Anopheles sacharovi flying around them. They scientists could not understand how the mosquitoes were surviving in a place that had been dusted with DDT. It was soon realized that the deadly malaria carrying Anopheles sacharovi had adapted and become DDT resistant. After this discovery scientists discovered how to use the pesticide to upset the cycle of malaria infections (Andrew Spielman Sc. D 149-50).

Although DDT was widely used all across the world, a successful mosquito eradication campaign was started in 1900 in New Jersey. Before the start of this rigorous campaign certain low lying areas of large metropolitan areas were uninhabitable because of the high populations of mosquitoes. A scientist by the name of John B. Smith began the campaign and only had rudimentary knowledge of the mosquito behaviors and species in the state. The first state was to identify the dominant species transmitting the malaria. He then identified the most common breeding areas of the mosquitoes of the area, the Ochlerotatus sollicitans and the Anopheles quardrimaculatus. This kind of mosquito particularly liked to breed in brackish water and swamps. Smith termed this effort “ mosquito control” instead of extermination. At first this idea was completely rejected until the results of this revolutionary idea started to appear. Smith sent his crews all over the state to dig drainage ditches that would attract the mosquitoes for breeding. After the mosquitoes had laid their eggs in the ditches, the workers went back and filled them with oil. This caused the population of malaria carrying mosquitoes to drop dramatically in the areas where this technique was utilized. This had a

positive secondary effect on the economy of the larger cities such as Newark and Elizabeth. There was a housing boom in the formerly unlivable areas and a population growth. In addition to these effects, the cases of malaria were diminished to only a few. These original ditches are still in use today across the states of New Jersey and New York (Andrew Spielman Sc. D).

Malaria is one of the most widespread diseases transmitted by mosquitoes carrying the parasite. There are as many as 50 types of malaria carrying Anopheles mosquitoes around the world (Major mosquito-borne diseases). The Anopheles mosquito tends to bite at night, why every person needs to sleep under a mosquito net in areas ravaged with malaria (Brody). The parasite that causes malaria is the Plasmodium. There are four kinds of Plasmodium that affect humans. They are: Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae, Plasmodium ovale. The most common are Plasmodium falciparum and Plasmodium vivax. One of these happens to be the most dangerous, Plasmodium falciparum (WHO). Even though malaria is a parasitic disease, it is 100 percent preventable and also can be cured with the proper medication. The first symptoms of malaria tend to begin about ten to fifteen days. After the ten to fifteen days the first symptoms tend to be a fever, headache, chills, and vomiting (WHO). Travelers who do not have immunity and pregnant women, even those who have partial immunity, are at the highest risk for contracting malaria from an infected mosquito (WHO).

The most widely used medication to cure malaria is artemisinin-based combination therapies (ACTs). The best chance for curing a patient is early diagnosis and treatment with these medications. Not only is curing the

already infected important, but disease prevention, especially in low income countries, is key. In the developing nations of malaria, the disease has a large impact on the economy and but a burden on the country as a whole. The one down side to these widely used drugs is that the Plasmodium parasites are quickly developing a resistance to them. To avoid the resistance people are now using ACTs as well as artemisinin monotherapy (WHO).

According to Jane Brody, in recent years there has been a large increase in the number of cases of dengue fever. This mosquito-borne disease is not directly transmitted from human to human, but is transmitted through mosquitoes. If a mosquito bites an infected human, and then bite a non-infected human, the disease will be spread. The main mosquito that transmits the dengue fever is the Aedes aegypti, which likes to bite during the day especially in the morning and late afternoon (Brody).

There are four kinds of the virus that cause dengue fever. They are a flavivirus and all vary slightly, but the four kinds are DEN-1, DEN-2, DEN-3, and DEN-4. Once a human being is infected with one of the four kinds of dengue fever, they have a life time of immunity to that particular type, but are still susceptible to a secondary infection from any of the other 3 types. Research shows that it is most likely the second infection, instead of the third or fourth, that can lead to dengue hemorrhagic fever, which is much more deadly. When this happens a person’s capillaries begin to leak fluid. The person does not die from dengue hemorrhagic fever, but rather dengue shock syndrome due to extreme blood loss (Brody).

According to the author of an article in Natural History Magazine, dengue fever may be deadly; the mortality rates are not high. The virus can only live for a short time in a human host and only has an incubation period of between four and seven days. The kinds of mosquitoes that are carriers of the virus are Aedes aegypti, Aedes polynesiensis, and Aedes albopictus. As the Aedes albopictus begins to spread into the western hemisphere, there is a greater risk for people in the United States of contracting this virus. After a person has been infected with a form of dengue they have some immunity against yellow fever and vice versa (Major mosquito-borne diseases).

The West Nile virus was first seen in Uganda around the West Nile region, hence the name, in the mid 1900s. Although this disease has been recognized for over 70 years, the first cases appeared in the United States in 1999. Once the disease hit America, the virus spread at an alarming rate across the country and is now reported in almost every state. Even though the virus is wide spread, it is rare to contract this disease. If it is contracted, the symptoms are usually not severe and tend to manifest like a mild case of the flu. The virus become deadly when a person is elderly or has a compromised immune system. If a person with such a condition becomes infected with the virus West Nile becomes deadly because the risk of encephalitis, also known as swelling of the brain, occurring goes up (Tufts University). Certain birds in the United States are the main carriers of the West Nile virus. Those birds are crows and jays. The mosquitoes pick up the virus when they bite an infected bird and the virus then goes to the insects' salivary glands. Once an infected mosquito bites a human, the virus incubates for between two and fourteen days. There are other ways,

although extremely uncommon, that West Nile can be transmitted. They are: organ transplant, blood transfusion, mother to unborn child, breast-feeding, and laboratory acquisition (Mayo Clinic Staff).

The mosquito is a vector of many different diseases, the most common being malaria, dengue fever, and West Nile virus. Many people over the years have tried to eradicate the tiny insect in an effort to prevent disease. Today a solution is needed for the growing mosquito problem across the globe that has not only killed millions in Africa, but is beginning to claim lives in the Northern Hemisphere, including lives in the United States. If steps are not taken to address this problem, tens of millions of people will fall victim to the diseases carried by this tiny insect benign in appearance. The mosquito may seem nonthreatening, and the bite an annoyance, but the itchy welt may spell out disaster for humans in every country of the world.