

“Mosquitoes, Malaria, and Man”

By Katie King

Every twelve seconds, one malarial death occurs somewhere in the world (Kakkilaya). Since the eradication of Malaria in the United States, this infectious disease does not carry the same meaning for most Americans as it does for other natives of infected countries. According to an American nurse that has frequented Haiti, "Seeing a limp, lifeless malaria-stricken person is an eye-opener for what most of the world has to deal with on an ongoing basis" (Sanok). Living in a first-world country has blinded Americans to the devastation and inconvenience that malaria has emitted on other countries as well as the devastation malaria brought to a young America.

Carried by female *Anopheles* mosquitoes, this disease spreads at a very quick rate throughout the tropics and Africa. The large amount of rainfall in these very humid areas facilitates the life cycle of this mosquito along with the multiplication of the *Plasmodium* parasite inside the mosquito. The *Plasmodium* parasite is acquired by the female *Anopheles* mosquito when taking a blood meal from another human carrier. Sporozites in the mosquito's saliva enter the bloodstream of the human when he or she is pierced by the mosquito's proboscis. The sporozites then migrate and attack liver cells to asexually reproduce for about six to fifteen days. The parasites in the dead liver cells emit a chemical to prevent its detection. This allows amplification cycles to continue in red blood cells once the differentiated cells (now called merozoites) rupture and escape their host cell. Even though the spleen acts as a filter and destroys weak or infected blood cells, it does not filter most of the blood vessels that contain the malarial parasite. This occurs because the parasite secretes an adhesive protein, causing the red blood cell to stick to the side of a small blood vessel. Also, with over 60 different mutations, this parasite is very good at evading the human immune system. In an attempt to keep up with all of the mutated parasites that cause malaria, different combinations of medications and different

doses are now used. Quinine is the main drug throughout history that has been known for preventing the Plasmodium vivax parasite, one of the key parasites that causes malaria, from spreading throughout the body. If the Plasmodium vivax parasite invades, it can cause fever, anemia, joint pain, vomiting, convulsions, enlarged spleen, headache, renal failure, a coma, or possibly even death (Wikipedia).

Throughout history, man has had much contact with Malaria. While many cases are treatable, the longer one waits to be tested, the greater the odds of fatality (Kakkilaya). Also, advance scientific technology has brought about more prevention methods and the eradication of the disease in the United States. Even though malaria as an epidemic is no longer a part of the United States' present afflictions, finding a vaccine and thus a cure is what some American scientists, the World Health Organization, and Nongovernmental Organizations hope to contribute to the future. From the death of Genghis Kahn, the great Mongol Lord of the 13th Century, to President John F. Kennedy's malaria acquired in World War II, this disease has affected many different people in many different nations. When studying the independent histories of malaria and man, each story is interwoven in its similarities to contribute to one history – the history of malaria and man.

Throughout much of America's history, man was never sure of Malaria's exact cause, leading to hardship in the determination an appropriate cure for this disease. According to the author of Doctors in Blue: The Medical History of the Union Army in the Civil War, Preventative efforts were handicapped by a bewildering confusion of theories. These ranged from the belief that paroxysmal fevers were induced by "sleeping in damp blankets," rapid climatic changes, "bad drinking water," "exhilarations of a crowded camp," "poisonous fungi in

the atmosphere” and above all “gaseous emanations from the decomposition of vegetable matter, through the action of heat and moisture” (Adams 218).

The name malaria means bad air, and this is one of the speculations that people had about this disease. According to Civil War historian, Tom Nanzig, the damp and rotting smell of swamps allowed American civilians to believe that “bad air” seeping into peoples’ lungs was the cause of Malaria. “Since the marshes [along the Potomac River] were a primary breeding ground for mosquitoes and malaria developed with astounding frequency, his [Dr. Charles S. Tripler, army of the Potomac’s medical director] thinking [regarding bad air] had some validity (Bollet 17). So, by closing their windows and doors, Americans in the 1800s kept out the “bad air” or bad smell. However, they didn’t realize that by closing their doors, they were preventing mosquitoes from entering their home – contributing to the aversion of malaria. So, closing off their home to the bad smell did prevent malaria, just in a different way than was thought.

Even throughout the state of Michigan, malaria was very prevalent during the time of the pioneers. “Sickness also added to the hard lot of the pioneers. Malaria, known in the early days as ague or ‘chills and fever,’ was very prevalent in Michigan, due, doubtless, to the bite of the mosquitoes, which bred in great swarms in the marshy places” (Larzelere 201). The vast amount of mosquitoes in this state contributed to the sickness and death of many pioneers – thus contributing to the history of the state. As one pioneer in this state wrote:

“A family of three – man, woman, and child – were helplessly sick about one mile from us. In the night the child died. They fired alarm guns for assistance, but no assistance came, as there was none able to be out nights, and very few in day time. Three of us, then boys, were enlisted to conduct their funeral for them. We three were the undertaker, preacher, sexton, and funeral procession all together. So we buried their dead “without a funeral note or gospel word spoken,”

and left them in their helpless condition, as we three looked more like escapes from a graveyard than living human beings (Larzelere 201-202).”

This passage vividly states that malaria caused people to take on roles that they wouldn't normally be qualified for or willing to perform. However, lacking the help of professionals during such an uncertain time caused people to act in this responsible way. Malaria and numerous other diseases caused pioneers to respond in a multitude of different ways. Whether refusing to travel through a certain area due to the news of infestation or burying a loved one due to the devastating effects of malaria, this disease changed the history of the way the United States and many other countries were colonized.

As time went on, however, and medicine advanced along with sanitation, malaria was not necessarily a fatal disease. People struck with malaria would have bouts of fever and chills at particular times of certain days but usually wouldn't perish from it. According to Dunbar, a history professor at Western Michigan University, a common saying of the time was, “He ain't sick, he's just got the ager” (259). This statement illustrates the fact that malaria wasn't nearly as frightening as it previously was. Employers of the late 1800s to early 1900s would actually accommodate their employees' work schedules around their workers' bouts with “the shakes”. Thus, malaria was common and accepted as a normality of life. By this time, Peruvian bark, something we now know as quinine, used in today's treatments for the disease, was discovered. In his book entitled: Michigan: A History of the Wolverine State, however, Dunbar commented that, “It [quinine] was expensive and many doctors refused to prescribe it” (259). The expense of treatment not only plagued people throughout the history of the United States, but it still continues to be one of the major struggles of today's nations that are infected with this disease.

Even though the history of Malaria through the United States may have, at times, looked grim, the future of malaria in third world countries is very uncertain.

Since the costs associated with malarial treatments are so high, prevention seems like the cheapest option. However, prevention plans aren't without their own set of problems. After recently returning from a medical mission trip to Haiti, MaryEllen Sanok RN, MSN, FP, shared her own personal experience in accordance to the expenses that amount from malaria's prevention and treatment.

The best prevention would include the use of screens on windows and doors, having no standing water for breeding grounds, and sleeping under mosquito netting. Since Haitians only make \$90 - 300 US per year, the costs of screens and netting can be prohibitive. Additionally, it is very difficult in Haiti to obtain medical care or evaluations, and is even more difficult to find and buy the medications they would need to combat almost any illness.

Obtaining adequate funding for prevention and treatment is not necessarily an easy thing to do. According to Sanok, prevention is the key, and prevention can be accomplished in a number of different ways, including draining artificial containers, larviciding, and adulticiding. Prevention is much more convenient than treatment, and with the limited amount of funding, prevention is the best option available.

Even though mosquito control may seem like a trivial job, it has very important implications for human health. Mosquito control does not only eliminate mosquitoes to accommodate a person's outdoor activities, but it prevents the spread of serious blood-borne diseases. If third-world, malaria-infected countries could obtain the means and knowledge of a mosquito control program, their mortality rate would lower tremendously. According to Sanok, however, the government is not always willing to cooperate with programs such as this one.

Many restrictions are put in place to limit health care, travel, and treatment. Initiating a mosquito control program could be incredibly difficult but essential. When malaria kills in one year what AIDS killed in fifteen, prevention and eradication are necessities (Kakkilaya).

Hopefully, through continued economic support, research, and education, countries like Haiti will be able to put a stop to the devastating effects of malaria.

Bibliography

Adams, George Worthington. *Doctors in Blue: The Medical History of the Union Army in the Civil War*. Baton Rouge and London: Louisiana State University Press, 1952.

Bollet, M.D., Alfred Jay. *Civil War Medicine: Challenges and Triumphs*. Tuscon: Balen Press, 2002.

“Chloroquine.” Wikipedia. 7 Sept. 2006. 10 Sept. 2006

Dunbar, Willis Frederick. *Michigan: A History of the Wolverine State*. Grand Rapids: William B. Eerdmans Publishing Company, 1965.

Grover-Kopec, Emily K., et al. “Web-based climate information resources for malaria control in Africa.” Malaria Journal 5.38 (11 May 2006): 16 p. 5 Sept. 2006
<<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1475872>>.

Kakkilaya PhD, B.S . “What is Malaria?” Malaria Site: All About Malaria. 14 April, 2006. 5 Sept. 2004 <<http://www.malariasite.com/malaria/WhatIsMalaria.htm>>.

Larzelere, Claude S. *The story of Michigan*. Lansing: The Michigan Education Company, 1928.

“Malaria.” Wikipedia. 4 Sept. 2006. 5 Sept. 2006
<<http://en.wikipedia.org/wiki/Malaria#History>>.

Nanzig, Tom. Personal interview, 7 Sept. 2006. Sanok RN, MSN, FNP, MaryEllen. Personal interview, 10 Sept. 2006.