

2019

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Recommended Citation

Barry, Megan (2019) "Plasmodium: A Persistent Primal Parasite," *Celebrating Writers and Writing in our Communities*: Vol. 2 : Iss. 1 , Article 17.

Available at: <https://digitalcommons.humboldt.edu/rwc/vol2/iss1/17>

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Plasmodium: A Persistent Primal Parasite

By: Megan Barry

Background: “What is Malaria?”

Malaria is a dreaded sickness that has been around for thousands of years, but for every illness, there is always a cause, so before we jump right into Malaria’s history and how it has plagued our kind for centuries, let’s become familiar with the culprit that has prevented mankind from eliminating the disease once and for all. Plasmodium is a mosquito-borne parasite that develops inside a mosquito’s digestive system and stomach, and stays hidden inside the mosquito, (Medbroadcast), until it can be transmitted to a more preferred host, such as a homosapien, or human. For the parasite to complete its mission of invasion, it requires the hungry mosquito to find another organisms it can steal blood from. When a female mosquito lands on its target, such as your arm, it pokes around and attempts to find a nutritious, blood-filled vein, and once it senses one, the insect will instinctively release a special saliva onto the surface of your skin to numb the spot, greatly reducing the chance that you’ll notice or squash the sneaky insect. Once it pulls off the first step successfully, it sinks its long, needle-like proboscis into a vein flowing with fresh blood, and feasts. In fear of alerting the host, mosquitoes usually only stay for two minutes or less at a time just to be safe (YouTube). Once it is full and satisfied with its portion of blood, it retreats, and flies off, and will soon search for another victim to mooch off of.

The only visual sign that is left of the mosquito's presence is an irritated itchy bump. While this skin reaction usually is not dangerous itself, unless the host has an extreme reaction, something invisible to the human eye is. What if that mosquito had just unknowingly infected you with devious parasites of its own? Mosquitoes are known for carrying many different viruses, but what makes plasmodium stand out from the rest is that it's actually classified as a parasite, rather than a bacterium or virus, like most illnesses. If a mosquito bears plasmodium organisms in its stomach or digestive system, it can easily transmit those organisms through the saliva it used to numb where it bit you, and the tiny pinprick it gave you was more than large enough for the microscopic plasmodium to enter your body through (Medbroadcast). Only female mosquitoes suck blood, because they need the nutrients in the blood to produce their eggs. Male mosquitoes are practically tiny butterflies, for they prefer nectar from flowers than anything else (YouTube). However, that doesn't prevent the male mosquitoes from being infected with plasmodium, and therefore Malaria continues its rein.

Even though these parasites are so small, that the human eye can't even detect them, these organisms aren't at all unintelligent or inexperienced. Once the plasmodium is injected into the host, they set their sights on the host's blood cells. Our blood cells contain a special type of protein, known as hemoglobin, which allows the blood cells to produce oxygen for the body's tissues (Shah, pp.16-18). The protein seems like a deluxe treat for the hungry parasites. However, the plasmodium cells resist their temptations, and rush down to the

host's liver, where they multiply and divide into a fearsome army to match up against the immune system's antibodies, keen to destroy any invader or threat (Shah, pp.17). The plasmodium parasites are so familiar with the human body, that they use the dead liver cells they killed as a disguise to fool the antibodies. Because of their new appearance, the antibodies see them as friend, instead of deceitful foe, similarly to how villains get scanned by their security system to access their secret lair in superhero movies. After the parasites make their way past the antibodies, they are now fully armed with their overwhelming numbers, speed, and most importantly, strategy, and dash towards the bloodstream. They latch onto the blood cells and feast on the hemoglobin they have longed for so long, eventually killing the blood cell in the process, and makes the invading plasmodium multiply (Shah, pp.16-18). Similar to a game of freeze tag, this continues until all the plasmodium parasites are killed, which is almost impossible for the antibodies to manage when first confronted with this foe. Depending on the strength of the antibodies in a host, this raging battle can last for several days before either side wins (Shah, pp.17). The internal war causes the host to experience, most commonly, flu-like symptoms, random occurrences of chills and fevers that come and go, intense sweating, fatigue, body aches, headaches, an increased heartbeat, and can eventually lead to low blood pressure, weight loss, liver and kidney complications, seizures, lung failure, coma, and even death if either not treated, improperly treated, or treated too late. Unlike the mosquito, it seems that this parasite isn't planning to leave its host anytime soon, (CDC Unwanted Souvenir), and (CDC Symptoms-FAQ).

Annotated Bibliography

Centers for Disease Control and Prevention Frequently Asked Questions About Malaria CDC Malaria FAQs, www.cdc.gov, “Symptoms And Diagnosis” in FAQs section, info provided to CDC by Global Health, Division of Parasitic Diseases and Malaria.

This secondary source provided me with information about Malaria symptoms, similar to their “Unwanted Souvenir” section shown above in primary sources. The reason this CDC source is secondary, is because they received their information from another source, which was Global Health, Division of Parasitic Diseases and Malaria. CDC really helped me with my project, because it was a reliable source that helped me understand the basics of Malaria.

Centers for Disease Control and Prevention, 21 Sept. 2018, Unwanted Souvenir. www.cdc.gov/malaria/stories/unwanted_souvenir.html.

CDC also provided me with another useful primary source, about a very interesting story of a man and his daughter who went on a nice, thought to be relaxing trip to the Democratic Republic in April. However, once they returned to the U.S, they slowly realized that they had brought a devious parasite along with them. Not only did this source describe the family’s background thoughts, but it also revealed various side effects Julia experienced from Malaria, giving me information about the possible symptoms that could occur after contracting Malaria.

Medbroadcast.com. “Malaria” - “Causes, Symptoms, Treatment, Diagnosis.” *MedBroadcast.com*, medbroadcast.com/condition/getcondition/malaria.
<http://medbroadcast.com/condition/getcondition/malaria>

This source informed me about the parasite that causes Malaria, known as “Plasmodium,” and how this mosquito-borne disease dwells in the intestines and stomachs of mosquitoes.

Shah, Sonia. “The Fever”: “How Malaria Has Ruled Humankind for More Than 500,000 Years.” Created in 2010.

This outstanding secondary source book was likely the most useful source I have used so far while creating my paper. It informed me about countless Malaria facts and Plasmodium’s history. It taught me about the Sickle Cell gene, the Duffy gene, how Malaria even influenced slave trade, sickened sailors hoping to find a paradise, that India used protective nets to stop a mosquito's entrance to a home, the discoloration of blood cells, the lifecycle of plasmodium, different types of Anopheles mosquitoes, and many other extraordinary occurrences. This is definitely a book worth reading!

YouTube. “Return of the Plagues- Mosquitoes” By “Free Documentary” March 16, 2016.

This primary source told an amazing story of Malaria, mosquitoes, and the many people who struggle with its presence. It provided me with information about the local Kenyan people’s efforts in eradicating local malaria, African beliefs, mosquito survival information, (like how mosquito larvae can’t live in rushing water), the Plasmodium parasite, and various other facts about Malaria, and what has been done to attempt to stop its rapid transmission.