

2/20/2018

Body Horror – The First Human Case of *T. gulosa*

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Imagine that it's just another day. You get out of bed early in the morning, cranky, and go to look in the mirror. Your left eye has been bothering you for a while now, feeling irritated, with the sensation of a foreign object in there. You had been assuming that it was just a cat hair, but as you peer closer, you feel a wave of shock go through your body. Buried in the pink membrane of your upper eyelid is a tiny, translucent worm. Your heart plummets as you realize that it's not just another day—this morning, you've woken up just to step into your worst nightmare. That's what happened to a 26 year old woman from Oregon who experienced the first human case of a parasitic infection by a nematode called *Thelazia gulosa* (Bradbury *et al* 2018). This case, which occurred in August of 2016, is a rare event. In the United States, it's almost unheard of. The investigation behind this occurrence doesn't need to be explained—naturally, it's to try to prevent something like this from ever happening again.

Humans have had infections from *Thelazia* in the past. Human thelaziasis is also called eyeworm, and it infects the cavities around the eye. It is especially prevalent in impoverished communities and in individuals such as children and the elderly. The nematode infection can be from mild to severe, and can have complications such as corneal ulcers (Otranto 2008). It is transmitted by flies that feed on lacrimal secretions, or fluids from the tear gland. The lacrimal gland is about the size and shape of an almond, and it produces tears. When the flies land and feed on these secretions, they can transmit the nematode and infect that individual. It is most commonly seen in livestock that are kept in close capacity with each other. In the case of the

woman from Oregon, she had been practicing horsemanship in Gold Beach, OR, which is a place where cattle are raised. At some point during her time there she must have been exposed to an infected fly. After about a week of experiencing symptoms, she removed a worm herself from her eye. Over the next twenty days, specialists would extract some of the worms and she would extract some of them herself. The eye was washed out several times, but the patient continued to remove worms from the region. After fourteen were removed, no more were observed and her symptoms ceased (Bradbury *et al* 2018).

It was fortunate that she addressed the problem because in some cases, the worms migrate across the surface of the eye and can cause blindness. In more mild cases, one will experience involuntary weeping and inflammation. The infection is usually localized and the worms can be removed manually. This is “good news.” Obviously the entire experience is rather distasteful. The nematodes have a very specific vector—meaning they travel from host to host using one species of fly called *Musca autumnalis*. Anyone who has been around animals, especially large livestock animals, has probably seen these flies gathering and crawling in the eye area. Basically, while the flies are ingesting secretions from the eye of an animal, they can also ingest nematode larva that will develop within the abdomen of the fly. The larva will then migrate back to the mouthparts of their fly host and will pass into the eye of a new individual the next time the fly feeds (Bradbury *et al* 2018).

It’s probably a good thing these nematodes only have one known way of getting around. If you think about it, they also parasitize the flies, because the flies don’t get anything out of the relationship. It’s a very one sided thing. However, the larva don’t remain in the fly. They are merely using it to get from host to host. Once scientists got their hands on a specimen of the worm from the woman’s eye, they were quick to investigate it. The worm was preserved in a

formula and then examined by three morphologists. Morphology is the physical appearance of an organism. That means that these scientists were just using physical features to identify the worm. Some of the identifying features were a deep and cup-like mouth cavity and discrete ridges in the surface of the creature. Once they identified it, they realized that this was the first recorded infection in a human. Previously, it had only been seen in livestock. This case is important because it means that this particular species of nematode has the ability to parasitize humans, and now we know to take prophylactic measures. This could be as simple as avoiding livestock, but if you have to be around them, avoid facial contact with flies.

Once the larvae reach the eye of a primary host, such as a human or a cow, they develop into the adult stage. They then shed larvae that will move on to a new host eventually. Being the primary host for this nematode is unfortunate because that is when they are in their most recognizable worm-like form. With the woman in Oregon, one worm was removed from her eye and measured to be 11 millimeters long. That 0.43 inches, about the length of a pencil eraser. That's pretty big for an organism living in your eyeball. This case definitely has a gross factor. Most people shudder at the thought of parasites, and are mortified by the thought of a facial infection. However, there is good news. Anyone who has the mental and physical capacity to keep flies away from their face is probably safe. The flies can only transmit the nematodes through physical contact with the area around the eye. Scientist theorize that the woman with the infection, at some point during her outdoor activities near animals, had failed to take preventative measures.

Previous studies had been conducted on this genus of nematode before. In the early 2000s, four male patients were admitted to a hospital in Italy. They were all from northwestern Italy and southeastern France, where there had been reports of infections in animals.

Interestingly enough, all the cases occurred during the summer. This has been corroborated by other studies to the point that we can deduce that this parasite is most active during the warm months. None of the patients had a pre-existing eye disease, meaning that you don't need any prerequisite infections in order for this one to occur. Any healthy or unhealthy individual that is exposed to the nematode larva can acquire an infection. Examination shows that these organisms are white in color and thin, and are sometimes mistaken for conjunctivitis, or irritation of the eye, especially when symptoms are mild. The study also showed that the only way to truly cure the infection is to mechanically, or manually, remove all the worms from the eye area, and then perform an eye wash. Once the worms are gone there is no larvae left to continue further infection, and the individual can't spread the disease. Reoccurring infections can happen if there is repeated exposure to infected flies (Otranto 2008).

If any individual wished to explore this topic further, whether because of morbid curiosity or a desire to avoid infections, there are a number of resources available. The US National Library of medicine has an article called "Human Thelaziasis, Europe" that details a study of this infection. The CDC is also an accredited source of information, even showing a diagram of the life cycle (Thelaziasis 2018). Life cycles are important to understand because they help the scientific community have comprehensive knowledge of an organism, and help us understand how to take preventative measures. While slogging through all this information, should one feel a vague discomfort in the eye area, rest assured. Unless you have been spending large amounts of time letting flies crawl on your face, there is a very low chance of transmission. If you live in an area that lacks livestock, then there is little to no chance of infection. Most cases occur in warm, impoverished areas that may have a lower degree of health and sanitation.

Although all persistent health concerns should be referred to a doctor, most cases of eye irritation are negligible, and can have a variety of more menial and less disturbing causes.

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