



## Intestinal parasites may help the immune system, researchers say



Tapeworm infection of the intestine occurs when people eat raw, contaminated pork, beef, or freshwater fish. Most people with tapeworms have no symptoms, but some report abdominal discomfort, diarrhea, and loss of appetite.

NEWSCOM

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Almost two years ago, Julius Lukes sat down to a meal of raw fish riddled with tapeworm eggs. "I did not enjoy it," he recalls. Happily, it took just a second or two: "You put it on your spoon and shovel it down."

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and a professor at the University of South Bohemia in the Czech Republic, belongs to a small but growing group of scientists who maintain that some parasites may actually be good for us. In other words, the dictionary isn't completely accurate when it says that a parasite "obtains nourishment" from its host, "which does not benefit from the association, and is often harmed by it."

The researchers are exploring whether parasites could be used to treat a raft of autoimmune disorders, such as inflammatory bowel disease, multiple sclerosis and arthritis – chronic and often painful conditions in which the body's immune system produces antibodies that attack its own tissues. Studies have repeatedly shown that the incidence of such disorders is highest in the developed world, where people live in relatively sterile environments.

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Inflammatory bowel disease – Crohn's disease and ulcerative colitis – affects about a quarter-million Canadians. An estimated 100,000 in this country have multiple sclerosis, one of the highest rates in the world. And arthritis affects no fewer than 4.5 million of us. There is no cure for any of these illnesses – only treatments that provide inconsistent relief.

But what if there is a cure, and we've been too squeamish to take it seriously? Scientists are beginning to investigate a theory that parasites can prime the immune system so that, when faced with a minor insult such as gluten or cheese, for example, it does not overreact and cause a serious disorder.

In a recent review in *Trends in Parasitology*, Mr. Lukes and his colleagues go so far as to call some parasites "old friends" who have evolved along with us over millions of years. Today's overly hygienic lifestyle, however, has reduced our contact with these friends, perhaps sparking the rising rates of autoimmune disorders.

Not that every one gets a pass. "There is no good parasite in human blood or in the brain," says Mr. Lukes, who is also a researcher at the Czech Academy of Sciences. "The argument is for intestinal parasites only."

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of tapeworms, Mr. Lukes plans to add to the helminth research with a rodent study of his own. He is collaborating with University of British Columbia microbial ecologist Laura Wegener Parfrey on a CIFAR-sponsored study of two parasites: a species of tapeworm called *hymenolepis* and a single-celled parasite called a blastocystis. Working with rats suffering from a form of inflammatory bowel disease, they will see what impact both parasites have on the illness, and hope to have results next fall.

Ms. Wegener Parfrey's previous research suggests parasites are a normal part of a healthy gut. In a study published in June in *Frontiers in Microbiology*, she found that a greater variety of parasites live in the guts of healthy people in remote areas of Malawi than in those of North Americans. "The ubiquity of parasites in healthy people in developing countries and high abundance even in westernized countries shaped my thinking that parasites are likely good, at least some of the time," she says.

According to Ms. Wegener Parfrey, the critical time for infection is probably in childhood, when our immune system is still developing. But small clinical trials in Europe and North America involving adults suggest that infection with worms in particular can reduce symptoms of some autoimmune diseases. Biopharmaceutical companies Ovamed GmbH in Germany and Coronado Biosciences in Massachusetts are conducting trials involving *T. suis*, a pig whipworm that sometimes infects humans and may be effective against inflammatory bowel disease, multiple sclerosis and arthritis.

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*T. suis* is a good candidate for therapeutic infection because it can't complete its life cycle in humans: To survive, it must find its way into a pig at some point, meaning it can't stick around in the human gut long enough to cause serious problems. Other good candidates include parasites that don't migrate to the blood or brain, and those that aren't infectious when excreted from the body.

Mr. Lukes's tapeworms – a species called *Diphyllobothrium latum* – fit the bill on all counts. He does not suffer from an autoimmune disorder; the point of his experiment is to see whether the worms can do him any harm. And so far, so good, he says – de **PAUL FROM TO 12**



of infestation.

Medical textbooks suggest he should be suffering a vitamin B12 deficiency by now, but tests show that he is healthy. "I feel wonderful," he says.

As a guinea pig, Mr. Lukes is not alone. Last year, James Logan, a parasitologist at the London School of Hygiene and Tropical Medicine, infected himself with hookworms, providing detailed online video documentation of his body's reaction. Mr. Logan did not feel wonderful. He suffered stabbing abdominal pains that kept him up at night. On the other hand, he found relief from a long-standing allergy to bread products – an immune-system overreaction to something normally harmless. After two months, he swallowed a pill to get rid of his parasite along with his new-found ability to eat bread.

Mr. Lukes could do the same for his tapeworms, but says he won't. In fact, last month he tried to infect himself with giardia, a microscopic parasite known among North American backpackers as the cause of "beaver fever." It is most often transmitted through contaminated water and is widely believed to cause violent diarrhea, nausea and cramping that can last weeks without treatment. "Everybody freaks out about giardia," says Mr. Lukes, whose first dose didn't take – although he plans to down another one soon. "But in most cases, it doesn't do anything. So that's my testable hypothesis. That can be a follow-up story in a year."

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