



ScienceWatch – Preserving Parasites

“Low levels of a variety of parasite infections might even improve the conservation outcomes, perhaps paradoxically for the host, as well as, more obviously, for the parasite.” – H. G. Spencer & M. Zuk

You might think that no one likes parasites. Even thinking about them might disgust you—a tapeworm might be living in your gut, absorbing nutrients meant for you and passing eggs with your feces.

In the past, medical science was dedicated to eradicating human parasites under the notion that anything living inside us was bad. But many recent studies have shown that isn't true. The trillions of bacteria or “gut microflora” that live in our large intestine and comprise half of each bowel movement are not only beneficial, but also necessary for us to maintain a healthy existence; without them we wouldn't develop a normal digestive system and our immune system wouldn't work properly. New research shows that even some potent anticancer drugs only work well for people with a certain set of microflora, which converts the drug to the active ingredient.

The “hygiene hypothesis” states that lack of early childhood exposure to infectious agents, symbiotic microorganisms (such as the gut microflora) and even parasites, increases susceptibility to allergic diseases by suppressing the natural development of the immune system. In our modern, sterile environment infants are not exposed to enough foreign antigens, i.e. germs, to properly “train” their immune system, which then can overreact when it encounters something foreign. Too often such a hyperactive immune system attacks our own bodies, destroying healthy tissue and causing autoimmune diseases like asthma, type I diabetes, inflammatory bowel disease, celiac disease, multiple sclerosis (MS), rheumatoid arthritis, ulcerative colitis, Crohn's disease, and maybe autism.

As proof that parasites can also be beneficial, scientists point to people in less developed countries, living in “unclean conditions” and often infested with parasites, who rarely if ever suffer from autoimmune diseases. Evidence is also mounting that dosing affected people with hookworm larvae or whipworm eggs can cure them of ulcerative colitis, Crohn's disease, asthma and MS. In fact clinical trials to test the efficacy of hookworm (*Necator americanus*) for celiac disease, asthma and MS, and whipworm (*Trichuris trichiura*) for Crohn's have already been conducted and the results are being evaluated.*

The idea is that these parasitic worms evolved with us and “learned” how to suppress our immune system to keep it from attacking them. This suppression in turn blocks any overactive immune response to our own tissues. Severe infestations of hookworm and whipworm can cause anemia and bloody diarrhea, respectively. But mild infestations

produce few symptoms and many sufferers infested with a few dozen pig whipworm eggs or hookworm larvae have reported being cured of their illness. But hopefully researchers can discover what molecules parasites make to modulate the immune system and someday use those instead.

Now an article by Hamish Spencer at the University of Otago, New Zealand and Marlene Zuk at the University of Minnesota, Minneapolis, MN, published in the April 2016 issue of *Trend in Ecology & Evolution*, extends the hygiene hypothesis to the preservation of endangered species: their parasites should be saved as well.

The authors admit that, “Of course, parasite control is necessary to manage severe infestations, and in captive breeding programs such treatment might be essential to prevent the emergence of novel disease or the establishment of novel parasites in captive hosts.” But they argue, “... parasites are an important element of an endangered host’s normal environment, and should be conserved along with food sources and natural shelter.”

That conservation, they contend, should extend as well to the myriad of microbes normally passed down at birth from mother to child. Dr. Spencer believes that captive bred animals may be more susceptible to infection because they lack protective components of the microbiota—the entire community of microbes, inside and out—that evolved with them. “There are a number of cases where reintroduced populations haven’t done very well. It might be that their immune systems are not very good,” he said. This may occur because wildlife biologists generally de-worm their charges and often dose them with antibiotics before releasing them. “We are arguing against the idea that you just dose the hell out of everything before you put animals back in the wild,” said Dr. Spencer.

It’s an idea worth considering ... so is throwing out the triclosan-laden soap and maybe feeding your baby a little dirt once in a while. **

Saul Scheinbach

*These therapies are currently illegal in the US, but are performed in other countries.

**A new study shows that infants fed peanuts are less likely to become allergic to them.