Disease can be our ally, not just our enemy, says evolutionary biologist

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In a time when we worry about bird flu and contaminated spinach, Marlene Zuk, an evolutionary biologist at UC Riverside, offers a fresh perspective on disease and the role it plays in our lives. Her new book, *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are* (Harcourt, 2007), argues that disease is not always our foe; it can be a vital partner and friend.

"Disease can be natural, normal, and sometimes even essential," said Zuk, a professor of biology. "Certainly the experience of being sick isn't pleasant, and of course illness causes a lot of harm, but we – and all other living things – evolved with disease, and if you take it away, there are unforeseen consequences."

In the book, Zuk explains how disease influences everything in our lives, from the evolution of two sexes, to our personalities, to how we choose our mate. It also answers questions such as: Why do men die younger than women? Why do we – and lots of other animals – get sexually transmitted diseases? Why do we have sex at all, rather than simply splitting off copies of ourselves like certain geckoes? And how is our obsession with cleanliness making us sicker?

She offers in her book the example of children who grow up with antibacterial products from soap to cutting boards and computer keyboards, and sanitary wipes for grocery cart handles. "They run the risk of chronic health problems like asthma and allergies," she said.

According to Zuk, the role of disease, once seen as a whole, is not always scary. "Disease is like the constant companion humans have had since the beginning of time, evolving right along with us, shaping us as much as we shape it," she said. "We need disease to function."

To underscore her point, Zuk advises that we understand the importance of disease in our lives by considering how gravity has shaped our evolution. "Gravity makes us break our bones when we fall and our body parts droop with age, but in a weightless environment we don't function very well either," she said. "Like it or not, we evolved with gravity, and we evolved with disease."

At UCR, Zuk studies parasites and behavior in a variety of animals. Her research centers on sexual selection and the effects of parasites on mate choice and the evolution of secondary sex characters. Her popular writings include contributions to the *Los Angeles Times*, *Natural History*, and *The Chronicle of Higher Education*.

A native of Los Angeles, Zuk is also the author of *Sexual Selections: What We Can and Can't Learn about Sex From Animals* (University of California Press, 2002), which argued that while animals display considerable and interesting variation, not all of it can be extrapolated to explain human behavior. In addition, she is coeditor, with Jenella E. Loye, of *Bird-Parasite Interactions: Ecology, Evolution, and Behaviour* (Oxford University Press, 1991).

Zuk got her undergraduate degree from UC Santa Barbara and her Ph.D. from the University of Michigan at Ann Arbor. After a postdoctoral appointment at the University of New Mexico, Albuquerque, she joined UCR as a faculty member in 1989.

Q & A with Marlene Zuk:

Q: Your last book was about sex – why did you turn to disease?

A: Sex *is* all about disease, so they aren't as different as you might think. For one thing, disease may be responsible for why we and most other animals have sexual reproduction at all, instead of just cloning ourselves. It's much more efficient to just have a female produce Xerox copies of herself. But the parasites and pathogens are always evolving back at us, so a copy of even the most resistant set of genes will become outdated and useless in a matter of generations. A sexually produced baby, however, has an entirely new set of genes to outwit the diseases that surround us.

Q: We keep hearing about new and scary diseases: bird flu, West Nile virus, E. coli. Which should we be worried about the most?

A: None of these. Although it's important to keep an eye on new epidemics, and keep them from growing, a far more urgent problem is antibiotic resistance in many of the most dangerous diseases, like infections with formerly easily conquered bacteria. Nearly a third of infections with *Streptococcus pneumoniae*, the bacteria that causes a form of pneumonia, meningitis, and ear infections, are resistant to penicillin. Tuberculosis, syphilis, typhoid, gonorrhea – all have antibiotic-resistant strains in some parts of the world. Because of the frequent use of antibiotics in hospitals, infections acquired there are particularly problematic; more than 70% of the bacteria causing infections in people while they are patients in hospitals are resistant to at least one of the drugs commonly used to fight them. It's a problem we've caused, and it's not going away any time soon.

Q: So what can we do to be healthier, if diseases are always going to be around?

A: For one thing, we can ease up on the siege mentality that tells us we

have to scrub every surface we touch. Children growing up with more siblings and pets, and those that get more colds, end up with fewer allergies and a lower incidence of asthma, and scientists increasingly think that is because their immune systems are exposed to the normal barrage of particles that stimulate appropriate function.

Q: If disease is so natural, does that mean we should let our bodies heal themselves and not try and interfere with modern medicine?

A: Absolutely not. Disease symptoms can be either produced by the body to help get rid of a disease agent, or they can be produced by the agent itself as part of an effort to spread to other hosts. You want to encourage the former and squelch the latter. Take fever, for instance. Animals allowed to raise their body temperatures through fever recover more quickly than those given fever-reducing drugs. Children in particular are given fever reducers far more often than necessary. On the other hand, sneezing and sniffling likely helps the organism that causes them to spread, so reducing their frequency probably won't harm us.

Source: University of California - Riverside