

Regional

Insects and humans share a complex history

With nearly 1.8 million species identified so far, insects not only represent a sizable portion of the earth's biodiversity, but they play a key role in many areas of human life. The relationship between insects and agriculture, for example, has a long and complex history. On the positive side, insects help pollinate crops, but on the flip side are the problems that have traditionally allowed pests to flourish, harming many crops and creating problems in a world with a growing population and increasing demand for food.

"I have been trying to deal with this issue during my professional career and it is hard to address it because there are a lot of different situations," said Kyong Yoon, an assistant professor in the environmental sciences program at Southern Illinois University Edwardsville. "We are trying to control this insect pest as much as we can and produce more food, but the problem is that insects have evolved insecticide resistance. So it's a continuing problem. And when chemical companies try to develop a new chemical, that takes a lot of time and energy and money."

A native of Seoul, South Korea, Yoon received his bachelor's, master's and doctoral degrees in environmental sciences from the University of Massachusetts in Amherst.

Yoon has also studied the issue of head lice in humans. There are a lot of lice species around the world and the most parasitic lice are what are called host specific, meaning they are capable of living in only one species of host. "And humans have three different forms of lice. One of them is the head louse, then we have the very close relative body lice, and then there is a distant relative called crab lice," Yoon explained.

Scientists have determined that the body louse species diverged from the head louse about 70,000 years ago when humans started wearing clothes. "Then



Dr. Kyong Yoon in the field.

Courtesy Dr. Kyong Yoon

the head louse at that time saw the opportunity to expand from the head to the human body. Body lice can transmit disease where there is no clinical evidence that head lice transmit the same disease," said Yoon.

Despite the fact that these insects are so common and are always a source of discussion when it comes to school-aged children, we really do not know enough about them, including how they move from one person to another.

"It could be in many different ways," said Yoon. "After World War II, people, mostly in developed countries, stopped having a lice problem. Because of that, research on these insects stopped. That is one of the reasons why we still have a poor understanding of the behavior of these insects." Yoon said that the main sense lice use to understand their environment is by detecting chemicals.

"Most insects can sense chemicals, which means that they can also be deterred by certain chemical substances. So scientists are trying to develop a repellent specific to the head and body lice, but we are at the very beginning stages of understanding the behavior of these unique insects," said Yoon, who added that the biology of lice contributes to their problem for humans.

"It has been thought that where you have a sanitation problem, or a social problem, or a disaster area, you see that there is a sudden outbreak of head and body lice," he said. "But we think lice always seek the opportunity to expand their population size. That means that humans can no longer maintain their sanitation so they can try to explore habitat wise and transmit more."

The first time in history when we heard about the issue of insects and agriculture dates back to biblical times and stories of plagues. Does that mean that from the moment that humans started to develop this large monoculture – perhaps about 10,000 years ago or so

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– the insects started to take advantage of the fact that there were all these homogeneous plantations there?

"That's a good question," said Yoon. "Maybe it's a mixed bag. Some insects probably like to stay where they see the monoculture in crops, and then some insects may not have liked the particular crop so they probably went away. But those insects that remained could most likely become pest insects." Geneticists can provide data on how these insects move around.

"The way that we can deal with it probably began a long time ago when we started using chemicals," Yoon said. "But they can adapt pretty quickly since they have a very short lifetime compared to ours. They have more flexibility than human beings." That means with the ability to produce many generations in a short period of time, the lice can evolve rapidly.

Yoon is now studying the relationship between low concentration exposure to pesticides and conditions increasingly common such as Type 2 diabetes and obesity.

"With one of my collaborators at the University of Massachusetts, we have been trying to get this research going," he said. "Hopefully we can find some new mechanism why this low level exposure could cause or enhance obesity or Type 2 diabetes."

Aldemaro Romero Jr. is the Dean of the College of Arts and Sciences at Southern Illinois University Edwardsville. His show, "Segue," can be heard every Sunday morning at 9 a.m. on WSIE, 88.7 FM. He can be reached at College_Arts_Sciences@siue.edu.