www.frontiersofknowledgeawards-fbbva.es

Acceptance speech

20 June 2023

Marlene Zuk, awardee in the Ecology and Conservation Biology category (15th edition)

It is a great honor to receive the BBVA Foundation Frontiers of Knowledge Award in Ecology and Conservation Biology.

I find it extraordinarily meaningful to see the recognition of animal behavior as part of ecology, part of our understanding of the interactions between organisms and their environment, and as a necessary component of efforts to conserve biodiversity. I think it is important to study living things at all levels – ecosystem, community, population and individual. The last is where animal behavior has its focus, and it isn't always included in considerations of conservation. I am grateful to my nominators as well as to the many colleagues and students who have worked with me and who have taught me about science and scholarship.

I am particularly thrilled to share the award with Jeanne Altmann and Susan Alberts. Jeanne is a longtime hero of mine. She is a foundational scientist in the field of animal behavior, having shaped it as a rigorous science since the beginning of her career. Her groundbreaking study of baboons in the wild, now led by Susan, who also contributed exceptional insights to the project, showed us how complex animal societies are and how they respond to changes in the environment.

This award is also significant to me because my work does not showcase what are sometimes called charismatic megafauna, the large, glamorous animals that people often first associate with biodiversity. To me, small creatures, especially insects and other invertebrates, matter.

I am not only interested in those less than glamorous animals, I am interested in the way that parasites and pathogens, the creatures that people either overlook or attempt to eliminate, have affected the ecology and evolution of their hosts. For the last several decades, we have been studying evolution in a cricket that lives in rather humble surroundings like lawns and fields. Like most

crickets, the males in the species we work on chirp at night, a signal that attracts females for mating. In some locations, that song also attracts a parasitic fly that deposits larvae on and around the cricket. The fly larvae burrow into the host and eat it from the inside out, eventually killing the cricket. This poses an obvious dilemma for the male cricket, because calling is both a ticket to reproduction and hence obviously favored by selection, and a means to a rather grisly death. This kind of conflict between natural and sexual selection has fascinated scientists since Darwin. In our case, an unexpected solution emerged: a genetic mutation that renders males unable to call has spread in some populations.

The silent males are safe from the fly. But what about the other side of the equation – without a mating call, how do they attract females? Unraveling the answer to this question has been complicated, but the short version is that the crickets rely on what is called satellite behavior, so that the silent morphs capitalize on the few remaining callers by remaining near them and intercepting females attracted to the song. Our work illustrates the importance of behavioral plasticity; the crickets can alter their behavior depending on whether or not they hear other crickets during their development. The plasticity is pre-existing, but was able to be co-opted in a way that favored the establishment of the mutation. Two things about this are noteworthy. First, the plasticity can allow some mutations to become established while others disappear, something that may explain how other novel traits arise. Second, that insects can exhibit such flexible behavior depending on social cues in the environment argues against the common notion that insects are robots, automatons controlled by their genes. Instead, even these non-charismatic crickets show subtle and complicated interactions between genes and the environment in their behavior.

Understanding sexual signaling is important for conservation, because it is an indicator of whether a species can adapt to changing conditions in its most basic function, its reproduction. I hope that our work and that of others underscores the need to incorporate behavior into our understanding of ecology and conservation biology.

Thank you once again.