

The world each animal perceives

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Q. What is the one thing you want to know the most right now?

I would like to experience visual world of swallow-tail butterflies. “Sensory world” perceived by other animals than human ourselves must be different among species because their sensory abilities differ each other. Jakob von Uexküll (1864-1944) described the world that each animal perceives as “Umwelt” in German. That is exactly what I want to know.

Q. What do you consider to be a challenge at the moment?

Umwelt can be described as the subjective world reconstructed by the brain of each animal based on information in its environment. Understanding neural mechanism underlying the subjective world is still a major challenge in my field, which is called “behavioral neuroscience”.

I am interested in the “brain” of each species creating its own subjective world. If we can understand the subjective world that differs from species

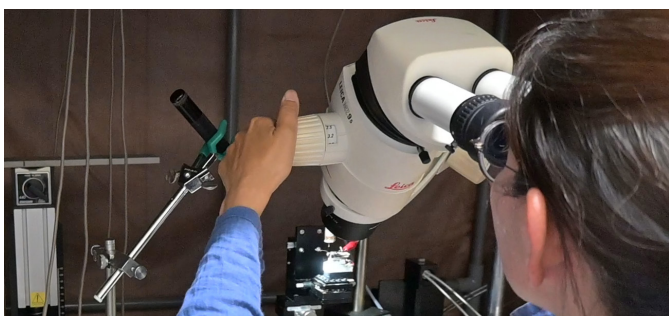
to species as the function of the brain, we can think about the evolution of the brain.



Q. Could you share your thoughts on the future prospects of this field?

Behavioral neuroscience (neuroethology) focuses on the particular behaviors in a certain animal, and have investigated its neuromechanisms. Researchers chose appropriate methods from the different fields in accordance with a specific question.

Recently, great strides have been made in understanding the nervous system of model animals, such as *Drosophila*, for which genetic techniques can be used. On the other hand, non-model animals are characterized by complex behaviors with superior sensory perception than *Drosophila*. In the future, integration of the knowledge and methods in both model and non-model animals proceeds understanding nervous system underlying behaviors.



Q. What was the most enjoyable moment and the most challenging moment during your research?

I feel the fun of research when I established my own indoor behavioral experimental protocol where I tested visual ability of butterflies in a small cage, and managed unexpected rapid progress in my project. Exciting as well as surprising moments were to face important discoveries of neural processing for color vision by intracellular recording. The experience happened twice in my carrier. The first one was when studying neural system for sun compass navigation in desert locusts I discovered “color opponency” representing spectral gradient over the sky. In the second case, I found that spectral properties of neurons innervating to the center for learning and memory; the mushroom body were similar with cortical color encoding neurons in primates. These experiences make me hard to stop doing research.

The difficulties ... may be that I have only two hands to do experiments, and only 24 hours in a day.



Most of my hobbies are with my two large dogs and a cat at the moment. I also love to draw flowers and animals and make things with my small handiwork when I have time.

Q: Do you have a message for undergraduate and graduate students who are interested in joining your lab? Also, do you have any interests other than research?

I enjoy the process of the research as a kind of arts, in which I create something original. I hope that students in my group will enjoy creating something new through the scientific activities, where you directly observe animal behavior, incorporate your questions into experimental studies, and built a scientific story from the results.