Elucidating the Structure of *Mycoplasma pneumoniae*'s Attachment Organelle in Humans

Professor Makoto Miyata, Graduate School of Science

Mycoplasma pneumonia, which develops in tens of thousands to hundreds of thousands of patients a year in Japan, is caused by the small bacteria *Mycoplasma pneumoniae*. Each bacterial cell forms a small protrusion on one side called an "attachment organelle", binds to the surface of host tissues and exhibits "gliding motility," where the cell moves around while bound to the surface. Gliding motility is essential for Mycoplasma infection. The attachment organelle is a complex structure formed of many types of proteins and present only in several species of Mycoplasma. Previously, the structure and mechanism of the attachment and the mobility had been uncertain.

A research group led by Professor Makoto Miyata of the Graduate School of Science newly discovered three types of component proteins and clarified which parts of the attachment organelle are formed by each of 15 types of component proteins, including those found previously, on a nanometer scale. Based on the results, they proposed the mechanism of gliding motility.

The results have led to greater understanding of common principles of biological movement. Today, when antibiotics possibly may not be the first choice for treating Mycoplasma infections due to the spreading of resistant bacteria, the results are also expected to lead to future measures against Mycoplasma infections.

Model of *Mycoplasma pneumoniae* created by a 3D printer based on the results

Reference video:
Mycoplasma gliding motility [*M. pneumoniae*]

https://www.youtube.com/watch?v=bjsKderHU5E

Researchers in Focus

Professor Makoto Miyata,
Graduate School of Science

"Humans have been able to create anything, except living organisms created from the very beginning. This is the realm of God," said Dr. Miyata. He was immediately fascinated by the mystery of living organisms and from his first year of high school aimed to become a biologist. At his house is a huge, home refrigerator-size insect rearing cage and also he keeps 130 rhinoceros beetle larvae. Every year he has a hard time finding people to take beetles after they become adults.