

3D scans map widespread fish disease

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Seventy-five per cent of antibiotics in Danish fish farms is used to treat fish with enteric redmouth disease. With the help of 3D scans, researchers at the University of Copenhagen have mapped how the fish are infected with the bacterium. The findings were recently published in the scientific publication *PLOS ONE*.

Fascinating 3D images of [rainbow trout](#) give researchers a crystal clear picture of how the bacterium causing enteric redmouth disease infects fish.

"The new scans show us that the fish are infected through their ultra-thin gills," explains postdoc Maki Otani, the Department of Veterinary Disease Biology, Faculty of Health and Medical Sciences.

Educated in Japan, Maki Otani has supervised the scanning process, where advanced technology and precision combine to form a higher synthesis. For this reason, the research group can now map with extreme precision the bacterial infection (*Yersinia ruckeri*) causing enteric redmouth disease in fish.

The disease, which reduces fish well being and increases fish mortality in Danish fish farms, is harmless to humans.

The infection pathway

The researchers have scanned the ultra-thin gills of rainbow trout. The

gills are a specialised organ whose chief function is to absorb oxygen from the water so the fish can breathe. Only two cell layers separate the outer water from the blood in the fish's small arteries. The new findings show that the bacterium infects the fish via a specific cell type in the gills.

As little as 60 seconds after the bacterium is introduced into the aquaculture, its presence can be registered in the fish's bloodstream. The bacterium subsequently infects the fish via its intestine and the lateral line canal— a sensory apparatus running along both sides of the body.

Rare 3D scanner

The University of Copenhagen possesses a so-called OPT scanner (Optical Projection Tomography) – a rare piece of equipment enabling researchers to monitor the infection with unparalleled precision.

"The research findings are presumably the first of their kind and the scanning images exceed our wildest dreams," explains associate professor Martin Raida, the Department of Veterinary Disease Biology, who is heading the project.

Among other things, he is conducting research in developing vaccines. The Danish fish production industry currently vaccinates its [fish](#), also against enteric redmouth disease, but to date this has not solved the problem. Martin Raida hopes that the new knowledge can contribute to the development of a more effective vaccine against enteric redmouth [disease](#). This will contribute to bring down the amount of antibiotics used and thus reduce the burden on the environment.

Provided by University of Copenhagen

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