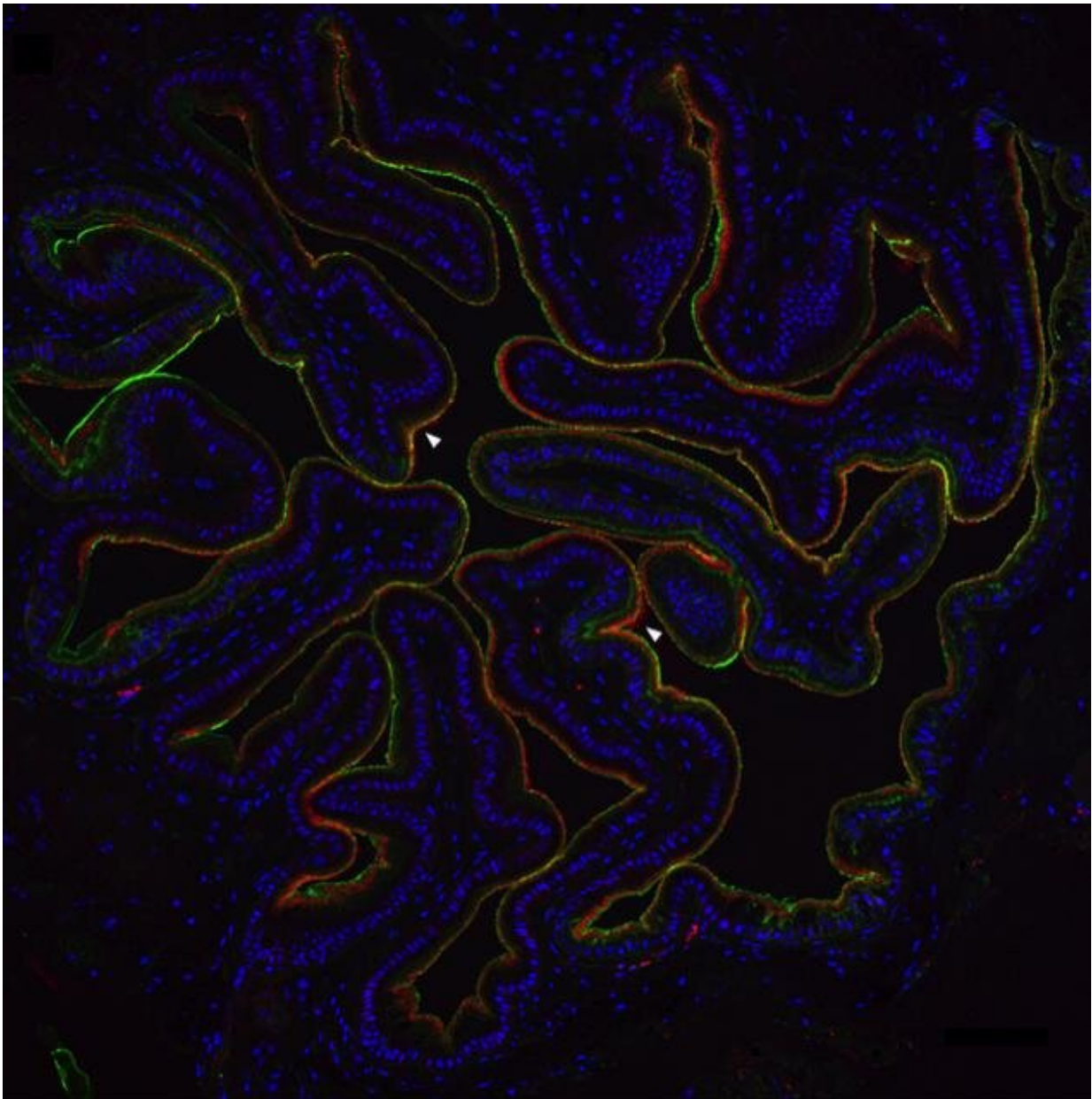


The cuttlefish may be flashy, but its microbiome is super simple, team reports

July 25 2019



A layer of bacteria in an unusual place, the esophagus of a cuttlefish. Bacteria (red) are in a layer of mucus (green) lining the inside of the esophagus. Cuttlefish cell nuclei are shown in blue. Credit: Tabita Ramírez-Puebla and Jessica Mark Welch

Animals have an intimate and important connection with the microbial populations (microbiomes) that live inside their bodies. This holds for the behaviorally sophisticated cuttlefish, whose microbiome, it turns out, contains only two different kinds of bacteria.

In a collaboration led by Marine Biological Laboratory (MBL) scientist Jessica Mark Welch, scientists characterized the microbiome of the European common [cuttlefish](#), *Sepia officinalis*, an animal whose impressive camouflage skills and behavior have long been studied. They published their findings in this month's issue of *mSystems*.

The project began when Roger Hanlon of the MBL and Jack Gilbert of University of California, San Diego, chose the cuttlefish to look for a connection between the [gut microbiome](#) and behavior. However, they first needed to identify the microbes present.

"Not much is known about the microbiomes of cephalopods (cuttlefish, squid and octopus), other than a famous symbiosis between the bobtail squid and *Vibrio* bacteria in its light organ," says Mark Welch.

Holly Lutz, a postdoctoral scientist from Gilbert's lab, examined microbial populations from the cuttlefish's [digestive tract](#), gills, and skin. She found that the cuttlefish microbiome has just two families of bacteria: *Vibrionaceae* and *Piscirickettsiaceae*. By comparison, humans have hundreds of different kinds of bacteria in the gut microbiome

alone.



The European common cuttlefish, *Sepia officinalis*, is a master of camouflage.
Credit: Roger Hanlon

The simplicity of the cuttlefish microbiome came with other surprises. Tabita Ramírez-Puebla, a postdoctoral scientist at the MBL, fluorescently probed the bacteria to reveal their organization under the microscope. "It turned out that most of the microbes were in the esophagus, an unusual place to find the most dense community of microbes," says Mark Welch.

Bacteria in the *Vibrio* family include some species that cause disease, but others form symbiotic relationships with their hosts, such as in the [bobtail squid](#). "It's interesting that we find those *Vibrios* in association with the cuttlefish. It suggests that there is a long-term evolutionary relationship between *Vibrios* and [marine invertebrates](#)," says Mark Welch.

While *Vibrio* species are sometimes found in the gastrointestinal tract of fish, the findings hint at an expanded range of organisms and body sites associated with *Vibrio*. It's possible that *Vibrio* species in the esophagus serve as a reservoir of bacteria that seed the cuttlefish gut, bringing along enzymes that can aid in digestion. Or *Vibrio* colonization of the esophagus (and the rest of the animal) may be pathogenic or opportunistic.

Understanding the microbiome of cuttlefish can help aquariums care for these animals. "We need to know how to keep them healthy and knowing something about their microbiome is very useful," says Mark Welch. For example, antibiotic treatment can alter an animal's microbiome, causing unintended consequences elsewhere in the animal. In their study, the scientists treated cuttlefish with enrofloxacin, an antibiotic commonly used by aquarium veterinarians. They found enrofloxacin had no effect on the cuttlefish [microbiome](#).

More information: Holly L. Lutz et al, A Simple Microbiome in the European Common Cuttlefish, *Sepia officinalis*, *mSystems* (2019). [DOI: 10.1128/mSystems.00177-19](https://doi.org/10.1128/mSystems.00177-19)

Provided by Marine Biological Laboratory

Citation: The cuttlefish may be flashy, but its microbiome is super simple, team reports (2019,

July 25) retrieved 10 April 2024 from <https://phys.org/news/2019-07-cuttlefish-flashy-microbiome-super-simple.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.