

# The evolutionary link between diet and stomach acidity

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An analysis of data on stomach acidity and diet in birds and mammals suggests that high levels of stomach acidity developed not to help animals break down food, but to defend animals against food poisoning. The work raises interesting questions about the evolution of stomach acidity in humans, and how modern life may be affecting both our stomach acidity and the microbial communities that live in our guts.

"We started this project because we wanted to better understand the relationship between stomach acidity, diet and the microbes that live in the guts of birds and mammals," says DeAnna Beasley, a postdoctoral researcher at North Carolina State University and corresponding author of a paper on the work. "Our idea was that this could offer some context for looking at the role of the human stomach in influencing gut microbes, and what that may mean for human health."

The research team - including scientists from Washington University and the University of Colorado, Boulder - examined all of the existing literature on stomach acidity in birds and mammals, and found data on 68 species. They then collected data on the natural feeding habits of each species. The researchers then ran an analysis to see how feeding behavior was related to stomach acidity.

The researchers found that scavengers, or species that eat food at high risk of microbial contamination, have more acidic stomachs. This acidity allows the stomach to act as a filter, effectively controlling which microbes can pass through the stomach to the gut.

"The finding confirms our hypothesis, but you have to get that confirmation before moving forward," Beasley says. "The next step will be for scientists to examine the microbial ecosystems in the guts of these animals to see how these ecosystems have evolved. Do animals with high stomach acidity have smaller or less diverse populations of gut microbes? Or do they simply host microbes that can survive in acidic environments?"

One surprise was that, while the researchers classified humans as omnivores, human stomachs have the high acidity levels normally associated with scavengers. Meanwhile, the literature shows that medical treatments - from surgery to antacids - can significantly alter the acidity in a human stomach.

"This raises significant questions about how humans have evolved, our species' relationship with food over time, and how modern changes in diet and medicine are affecting our stomachs, our [gut microbes](#) and - ultimately - our health," Beasley says. "Those are questions the research community is already exploring, and the answers should be interesting."

**More information:** The paper, "The Evolution of Stomach Acidity and Its Relevance to the Human Microbiome," will be published July 29 in the journal *PLOS ONE*.

Provided by North Carolina State University

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