Seasonal shifts in the gut microbiome indicate plastic responses to diet in wild geladas

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Abstract

Obtaining sufficient nutrients is a fundamental challenge for most animals. The availability and nutritional content of food can vary in response to changes in climate and geography, and nutritional demands can vary during life events such as growth and reproduction. Of the many ways that animals have evolved to cope with these demands, one has gained increasing attention. The gut microbiome helps to break down and ferment plant carbohydrates, making it a potentially important player in nutrient availability. A new study sought to evaluate the environmental drivers of gut microbial diversity by generating the largest wild nonhuman primate gut microbiome dataset. Using 758 samples from wild Ethiopian geladas, which live in an extreme environment with limited food quality, researchers tested how proxies of food availability (rainfall) and thermoregulatory stress (temperature) affected the gut microbiome. They found that microbial changes were driven by dietary differences across seasons, with grass specialists predominating in rainier periods and bacteria that break down starches from underground plant parts in dry seasons. Temperature had a smaller effect on the gut microbiome. These results shed light on the extent to which gut microbiota plasticity provides dietary and metabolic flexibility to a host through changing environments.