

Research Article

First Metagenomic Insights into the Gut Microbiota and Adaptive Physiology of Migratory Bar-Headed Geese in the Upper Wardha Reservoir, Maharashtra, India

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ABSTRACT

The Bar-Headed Goose (*Anser indicus*) is a migratory bird known for its high-altitude flights across the Himalayas, traveling from North Asian breeding grounds to wintering regions in India. This study aims to characterize the gut microbiota of Bar-Headed Geese inhabiting the Upper Wardha Reservoir, Maharashtra, India, to understand potential microbiota adaptations that support migratory physiology. Faecal samples were collected and examined via whole-genome metagenomic sequencing to detect microbial populations and functional pathways. The findings indicated a microbiome predominantly composed of Firmicutes, Proteobacteria, and Actinobacteria, alongside metabolic pathways related to carbohydrate and cofactor metabolism. The existence of taxa like *Campylobacter* and *Psychrobacillus* indicates microbial adaptations to certain environmental and nutritional conditions. These findings highlight the role of gut microbiota in supporting the geese's migratory endurance and offer insights for conservation strategies, particularly in addressing ecological and physiological challenges faced by migratory birds. Further investigation into seasonal and geographic variations in gut microbiota composition is recommended to enhance understanding of microbial adaptations essential for migratory health and resilience.

Key words: Bar-Headed Goose, gut microbiota, metagenomic sequencing, migratory birds, microbial adaptation, high-altitude migration

