Bird Environmental DNA from the Air

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Investigations based on environmental DNA (eDNA) have attracted considerable attention in recent years. For example, eDNA from water samples is a powerful tool for examining habitats of fishes. In this study, we examined whether bird eDNA could be detected from the air and used for assessments of bird habitats. When a bird flaps its wings, microparticles such as wax, which may contain the bird cells, are released into the air. We might be able to detect the DNA in these particles if we developed a proper method to collect them. As a proof of principle, we set out to collect and detect eDNA of nocturnal owls from the air, as locating owls by sight at night can be difficult. First, we constructed several trial devices to collect microparticles from the air. The most effective way to achieve this goal was to pass the air through an aqueous solution containing benzalkonium chloride, which is an effective eDNA stabilizer. Next, we checked species-specific PCR primers (designed based on mitochondrial DNA sequence data of the birds) whether they work or not, using the feathers. Finally, we collected samples in the field in areas where the target birds were likely (or unlikely) to be found. We successfully detected eDNAs from Ural owl (Strix uralensis) and brown hawk-owl (Ninox scutulata). To our knowledge, this is the first study to successfully detect bird eDNA from the air. We believe this method can be applied to environmental assessments or for detecting viral particles floating in the air.

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