

Bird Environmental DNA from the Air

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Animal Sciences

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.

1. In this research project, the student directly handled, manipulated, or interacted with (check ALL that apply):

<input type="checkbox"/> human participants	<input type="checkbox"/> potentially hazardous biological agents
<input type="checkbox"/> vertebrate animals	<input type="checkbox"/> microorganisms
	<input type="checkbox"/> rDNA
	<input type="checkbox"/> tissue

2. I/we worked or used equipment in a regulated research institution or industrial setting (Form 1C): YES NO

3. This project is a continuation of previous research (Form 7): YES NO

4. My display board includes non-published photographs/visual depictions of humans (other than myself): YES NO

5. This abstract describes only procedures performed by me/us, reflects my/our own independent research, and represents one year's work only: YES NO

6. I/we hereby certify that the abstract and responses to the above statements are correct and properly reflect my/our own work. YES NO

The stamp or embossed seal attests that this project is in compliance with all federal and state laws and regulations and that all appropriate reviews and approvals have been obtained including the final clearance by the Scientific Review Committee.