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Note

Apparent wing-assisted incline running in a Common Grackle (*Quiscalus quiscula*)

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Abstract

Wing-assisted incline running (WAIR) has been observed in bird taxa from multiple clades. Its wide phylogenetic distribution in modern birds suggests that it is an ancestral trait for class Aves. WAIR as a behaviour is speculated to predate the evolution of full-powered flight, and to have formed a behavioural and physiological stepping stone between terrestrial and aerial life. Here I report an observation of apparent WAIR in a Common Grackle (*Quiscalus quiscula*) photographed incidentally on a trail camera deployed in an urban backyard in Guelph, Ontario, Canada. To my knowledge this is the first documented observation of apparent WAIR for the family Icteridae. Furthermore, it highlights the value of non-systematic use of trail cameras for making unique natural history observations.

Key words: Wing-assisted incline running; WAIR; Common Grackle; *Quiscalus quiscula*; Icteridae; blackbird; urban wildlife; trail camera; camera trap; natural history

Wing-assisted incline running (WAIR) is a behaviour where birds use force generated by flapping their wings to assist them in climbing steep inclines (Dial 2003a). It is used to escape from terrestrial predators and gain access to elevated surfaces (Dial 2003a; Dial *et al.* 2006; Jackson *et al.* 2009; Heers *et al.* 2014). There are no reports of WAIR being used to assist insect hawking/fly catching, although domestic chickens will sometimes spontaneously engage in WAIR if presented with a ramp (LeBlanc *et al.* 2018).

WAIR has been recorded among diverse avian species. For example, it has been observed in eight species in seven genera of Galliformes (pheasants, turkeys, grouse, partridges, and quail; Dial 2003a; Dial *et al.* 2006, 2008; Jackson *et al.* 2009; Dial and Jackson 2011; UM Flight Lab 2016; Tobalske *et al.* 2017; LeBlanc *et al.* 2018; Viola *et al.* 2019), in two species in two genera of Charadriiformes (shorebirds and allies; UM Flight Lab 2016), in Strigiformes (owls; Heers *et al.* 2014; UM Flight Lab 2016), and in one species each of Tinamiformes (tinamous; UM Flight Lab 2016), Columbiformes (pigeons and doves; Jackson *et al.* 2011), Psittaciformes (parrots; Berg *et al.* 2013), Apodiformes (swifts and hummingbirds), Pelecaniformes (pelicans, cormorants, and allies), Procellariiformes (tube-nosed seabirds), Accipitriformes (eagles, hawks, and allies), and Falconiformes (falcons; UM Flight Lab 2016). At a finer phylogenetic scale, within just the Passeriformes, it has also been observed in disparate lineages. These observations include one species each of Emberizidae (buntings and allies), Turdidae (thrushes), and Corvidae (crows, jays, and magpies; UM Flight Lab 2016), one species of Passerellidae (New World sparrows; Jackson *et al.* 2009), and in Parulidae (New World warblers; Jackson *et al.* 2009). WAIR in birds has been observed in both the laboratory (e.g., Jackson *et al.* 2011; Tobalske *et al.* 2017; LeBlanc *et al.* 2018) and the field (e.g., Berg *et al.* 2013).

The occurrence of WAIR across a wide range of avian phylogeny has led to the conclusion by some that it is an ancestral trait for Aves (UM Flight Lab 2016). Furthermore, WAIR requires less exertion of upper-body muscles (Jackson *et al.* 2011) and less sophisticated biomechanical and physiological adaptations (Dial 2003a; Heers *et al.* 2014) than full-powered flight and can be performed by animals incapable of such flight (Dial 2003a; Dial *et al.* 2006, 2008; Heers *et al.* 2014; Tobalske *et al.* 2017). Some

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speculate that WAIR evolved before powered flight in the lineage that led to modern birds (Dial 2003b; Dial *et al.* 2006, 2008; Heers *et al.* 2014) and that it was instrumental in the evolution of powered flight in that it provided maniraptoran dinosaurs with a transitional step between being terrestrial and being capable of powered flight (Dial 2003a,b; Dial *et al.* 2006, 2008; Heers *et al.* 2014). However, despite the phylogenetically wide breadth of the taxa in which WAIR has been noted, recorded observations are still currently limited to a tiny fraction of the ~10 000 (Jetz *et al.* 2012) extant, described species of birds. Here, I report an incidental observation of WAIR in a species in which it has not, to my knowledge, been previously recorded: Common Grackle (*Quiscalus quiscula*).

I recorded the observation with a Campark T20 trail camera (Campark Electronics Co., Ltd., Shenzhen, Guangdong, China) deployed in an urban backyard in Guelph, Ontario, Canada, for the purposes of non-research incidental wildlife observation. The camera was mounted ~80 cm above ground, facing a corner of the house. The camera was set to take a sequence of three still photographs each time its motion sensor was triggered, with a minimum pause time between sequences of 30 s. Image resolution was set to 16 megapixels (image size of 5376 × 3024 pixels) and motion sensor sensitivity was set to "Low".

At 1150 on 1 June 2021, the camera captured a sequence of three photographs of a Common Grackle (Figure 1), positively identified based on its long tail relative to its body size, its "lanky" shape, and its dark plumage with a faintly visible patch of iridescence near the shoulder (Cornell Lab of Ornithology 2019). The bird had a tarsal length of ~27 mm, estimated using ImageJ version 1.53a (Abràmoff *et al.* 2004) and the known length of the central portion of the supportive strut of the table in Figure 1c. This tarsal length suggests that the bird was female (Willson *et al.* 1971).

In the first two photos in the sequence taken over ≤1 s, the bird is apparently standing still beneath a table, facing the wall of the house (Figure 1a,b). Then, less than 1 s later, the bird clambers up the wall, its wings held above its head in a mid-flap posture (Figure 1c,d). The bird's right leg can be seen dangling below its body, while the faint outline of its left foot can be seen raised to its breast, just slightly below its shoulders (Figure 1c,d), indicating that it was in mid-stride, moving upward or upward and to the right on the wall.

An alternative explanation is that the bird was merely "bouncing off" the wall in the second immediately following takeoff. However, because in reversing its position in Figure 1c, the bird would have crashed into the table behind it, there had to be at least some upward movement. This upward movement, combined with the bird's foot being planted on the wall, qualifies this behaviour as WAIR.

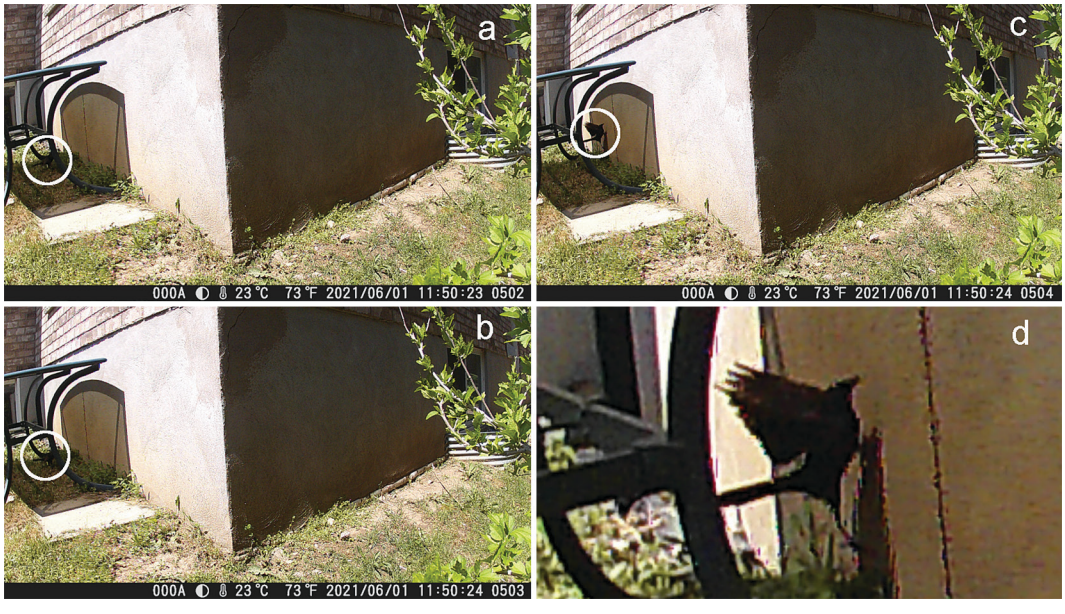

Figure 1. The initiation of a bout of apparent wing-assisted incline running by a Common Grackle (*Quiscalus quiscula*) captured in three consecutive photographs (a–c) taken by a trail camera and d. photograph c cropped to highlight the bird. In a–c the bird is circled for clarity. Photos: Nicholas B. Sakich.

For how long and over what distance this bird sustained apparent WAIR is unknown, because of the camera's 30-s minimum pause between image sequences. What caused the apparent WAIR, as opposed to the bird taking off in the standard manner in a direction not facing the wall, is also unclear. However, a Domestic Cat (*Felis catus*) heading from the street into this backyard was photographed by this camera at 1031 on the same day. Although the cat was not recorded by another trail camera that faced the backyard, it could have remained in the backyard until the sequence of grackle photos was taken. Therefore, it is possible that the grackle scaled the wall as the least vulnerable escape route from the cat.

Common Grackles using WAIR to avoid predators would match with WAIR's use in other bird taxa (Dial 2003a). It may also have been a startle response to movement inside the building, as a shape visible in the window to the left of and behind the bird does appear to change in the photo sequence (Figure 1a–c). Although I do not know anything about the behaviour of the grackle before the first image was taken, one might also speculate that the bird's choice of WAIR over a standard take-off method may have been a result of the bird having fatigued flight muscles from prolonged flying, as WAIR requires less exertion of the flight muscles than full-powered flight to traverse the same distance (Jackson *et al.* 2011). It is noteworthy that WAIR is often preferentially used over full-powered flight among flight-capable birds that also perform WAIR (Dial *et al.* 2006).

Yet another possibility is that the bird was pursuing small prey (e.g., a fly) on the wall. Other bird species have been documented to forage along buildings, taking advantage of the attraction of prey species to windows (Robertson *et al.* 2010) or ventilation (Mikula *et al.* 2013). Both Common Grackle and its relatives have been documented catching flying insects on the wing (Bartlett 1956; McNicholl 1981).

To my knowledge, this is the first recorded observation of apparent WAIR for Icteridae (blackbirds, orioles, and allies). If so, Icteridae join at least five other passerine families in which WAIR has been observed and further strengthen existing knowledge that WAIR is displayed widely across the avian phylogeny, thus lending further credence to the idea that WAIR played a central role in the evolution of avian powered flight.

My observation would not have occurred had it not been for the non-systematic use of a trail camera for urban wildlife observation. Much has been published about the value of systematic camera trapping for monitoring wildlife populations (e.g., Rowcliffe and Carbone 2008; Swann and Perkins 2014). However, the increasing miniaturization and decreasing cost of electronics puts technology like trail cameras in the hands of more and more amateur wildlife enthusiasts. Citizen science initiatives, such as iNaturalist (https://www.inaturalist.org/) have provided invaluable data for everything from assessing animal movement (Vardi *et al.* 2021) to discovering new species (Winterton 2020). The increasing use of trail cameras has the potential to greatly expand the amount and types of data generated and could be incorporated into environmental education.

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