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OBSERVATIONS OF AN APPARENTLY FOLIVOROUS BARRED OWL (*Strix varia*)

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INTRODUCTION

Folivory is not common in birds and seems to be particularly uncommon in raptors and owls. We were unable to find any published reports documenting this behavior in Barred Owls; this behavior is not mentioned in the Birds of North America monograph for the species (Mazur and James 2000). Reports of other owls that eat leaves are documented solely with videos and not in the scientific literature. Species observed to be folivorous include a wild Great Horned Owl (*Bubo virginianus*, <https://www.youtube.com/watch?v=iuJulOHFHxY>) a hand-raised Eurasian Eagle-owl (*Bubo bubo*, <https://www.pond5.com/stock-footage/81820706/eurasian-eagle-owl-eating-leaves.html>) and a rehabbed Tawny Owl (*Strix aluco*, <https://www.youtube.com/watch?v=WiKJVD-buiU>).

OBSERVATIONS AND METHODS

On 6 August 2018, one of the authors (DAR) observed a Barred Owl (*Strix varia*) roosting during the day in the woods behind his residence. During the course of the day the owl variously slept and preened, but at one time appeared to be mantling and eating prey. Video footage of this behavior was obtained and examined; this video can be seen in its entirety at http://ksbirds.org/videos/2018_barred_owl.mp4.

The owl did not seem to have an obvious prey item. Rather it was observed to be nipping on leaves (Figure 1) and, in one instance, a twig (Figure 2), of the America Elm (*Ulmus americana*) in which it was roosting. After several minutes of this behavior, the owl hopped down to another branch and resumed normal daytime roosting behavior.



Figure 1 – Frame capture from video showing the owl peeling off part of the elm leaf. Photographic equipment - Canon EOS5D, Mark IV coupled to a Canon 500mm f/4 lens and a 1.4X teleconverter, for an effective focal length of 700mm. Aperture f/8, ISO 2000, 1/200 second at approximately 25-30 meters. Image by D.A. Rintoul.

Analysis of video frames and still captures indicates that this owl was a young (Hatch-Year, or HY) bird, possibly the offspring of a pair of Barred Owls that have resided in that woodlot for several years and successfully reproduced there previously. This age classification is based on the criteria outlined in the Birds of North America monograph for this species (Mazur and James 2000), and in an online resource (Berry, G. Aging Barred Owls in Rehabilitation Settings. <http://gloriberry.com/wp-content/uploads/sites/3/2013/11/Aging-Barred-Owls-in-Rehabilitation-Settings-Autosaved.pdf>).

According to all these authors, HY Barred Owls have a large white terminal bar on the rectrices in fresh plumage, compared to the smudgy, pale-tipped rectrices of



Figure 2 – Frame capture from video showing the owl nipping off a twig from the elm tree. Equipment and conditions as indicated in the legend for Figure 1. Image by D.A. Rintoul.

older Barred Owls. As can be seen in Figure 3, the bird observed in this instance had rectrices with a large white terminal bar.

Another criterion used to age this species is the presence or absence of a white “V” at the tip of the primary feathers; HY birds have this feature, and older birds do not (Berry, G. Aging Barred Owls in Rehabilitation Settings.

<http://gloriberry.com/wp-content/uploads/sites/3/2013/11/Aging-Barred-Owls-in-Rehabilitation-Settings-Autosaved.pdf>). As seen in Figure 4, the subject bird in this study has this feature. The bird also did not seem to have more than one generation of flight feathers, as judged by the lack of contrast in pigmentation and length among



Figure 3 – Closeup of the tips of the rectrices (ventral view) of the subject bird, obtained as a frame capture from a digital video. Photographic equipment as described in the legend for Figure 1. Image by D.A. Rintoul.



Figure 4 – Closeup of the tips of the primaries of the right wing of the subject bird, obtained from a digital photograph. Photographic equipment and parameters as described in the legend for Figure 1. Image by D.A. Rintoul.

individual primaries or secondaries. All these criteria are consistent with a classification of HY for the subject bird in this study.

DISCUSSION

The 3% (Cheong and Hong 2011) of birds known to regularly feed on leaves have the advantage of having access to one of the most abundant, easily obtainable and predictable food resources. The majority of folivorous species are terrestrial or aquatic, and only five families include arboreal members (Cheong and Hong 2011). Of these arboreal members two species, the Hoatzin (*Opisthocomus hoazin*) of South America and the critically endangered Kakapo (*Strigops habroptilus*) of New Zealand, obtain a large portion of their energy from leaves (Godoy-Vitorino 2008, Waite 2012). To achieve this requires a well-developed foregut fermentation system more akin to that of small mammals than to birds. Consequently, the necessary digestive system adaptations, including an enlarged pendulous crop and large multi-chambered esophagus, are accompanied by a shallow keel (sternum) and markedly reduced pectoral (flight) muscles.

Constraints in avian gut physiology, poor nutritional quality of leaves, presence of indigestible material such as lignins and cellulose, and the chemical defenses

present in many leaves are believed to prevent folivory in most passerines (Morton 1978, Bozinovic 1999, Karasov 2011). More often, folivory is supplemental as in the case of the Puerto Rican Spindalis (*Spindalis portoricensis*). An estimated 9% of their diet consists of leaves with an uptake during the driest part of the year when fruits are least available (Carlo 2012). It is likely that folivory also help the Spindalis cope with human-dominated landscapes and environmental changes on small islands (Carlo 2012).

One of the authors (SW) has observed two juvenile Great Horned Owls frequently nibble and tear at leaves and twigs, an immature Red-shouldered Hawk (*Buteo lineatus*) hold a bundle of leaves with a foot and bite and tear them, and other Barred Owls exhibiting similar behavior as described above. The overall impression was that not much of the plant matter was ingested due to the amount of falling pieces that could be seen.

Raptors and owls lack the necessary adaptations to utilize leaves as a food source. Additionally, they likely have access to more usual food sources and show very little actual intake, suggesting they are not practicing folivory to meet caloric needs. The significance of this behavior, and/or its motivation, remains unclear. A meta-analysis of Barred Owl diet items (Livezey 2007) does not document vegetation as part of the diet of these birds. Possible explanations for our observations could include boredom, beak maintenance, juvenile taste-testing of food items to see what is edible and what is not, anti-parasitic food ingestion, or just “playing around”. It should be emphasized that the video obtained in this instance does not unequivocally show the bird ingesting the bits of vegetation. It is possible that the bird is just playing with the leaf bits, and that may also be the case for the owls in the two videos referenced above. However, none of the bits of leaf (nor the twig) seem to be dropped by the bird observed in this instance. The video is high-resolution and if these items were simply nibbled and dropped, that should have been detectable in the video. Repeated viewings and searches of individual frames did not detect any of these items escaping from the owl or branch; the simplest conclusion is that the bird did indeed ingest these tiny fragments of vegetation. Further observations in other species or other age classes of Barred Owls may offer hints about the motivation for this behavior.

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