House Wren Nest Architecture: A Natural History

Chandler E. G. Carr, Zoë M. Swanson, and Dustin G. Reichard
Department of Biological Sciences, Ohio Wesleyan University



Introduction:

- Songbird nests are one of the first factors that determine the survival of offspring, predicting strong selective pressure on their construction.
- However, House Wren nest architecture is **extremely** variable.



- Previous research on House Wrens has been unable to explain this variation with proxies of fitness.
- Females are thought to be the primary contributor of sticks to the nest, so we investigated whether female identity explains this variation.
- We predicted that the nesting female would build similar nests for each clutch, implicating female preferences as an important driver of nest variation.

Methods:

- We monitored nest boxes on a near daily basis. After females completed laying eggs, we measured their nests and boxes (mm; n = 108).



- We counted number of offspring hatched and measured morphology at eight days of age.
- After fledge or fail, we collected nests and dissected for an analysis of nest composition, e.g., number of sticks and grass, feathers, fecal material, anthropogenic objects, etc. (n = 104).

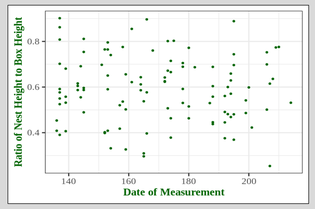


- Unlike previous literature, “sticks” and “grass” were defined by an arbitrary length of 4mm as not to include likely broken pieces in analysis.
- Linear Regression Models and Generalized Linear Mixed-Effects Models made with R packages “lme4,” repeatability analyzed with “rptR,” and graphs made with “ggplot2.”

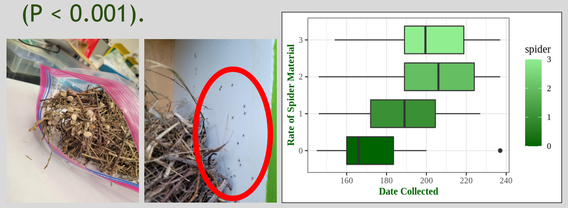
Results:

- HOWR nests are *highly* variable…
  - Height: 48.95-196.7mm [$\bar{x}$ =114.73]
  - Berm Width: 7-77.45mm [$\bar{x}$ = 42.69]
  - % of Box Full: 25.1-90.2% [$\bar{x}$ = 58.7]
- and remains so throughout the breeding season (*P* = 0.50).

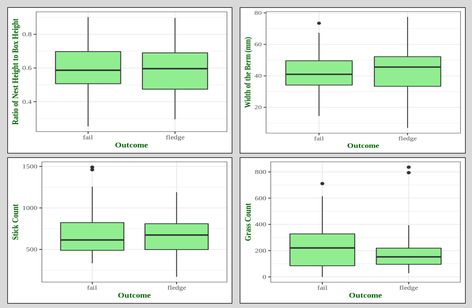




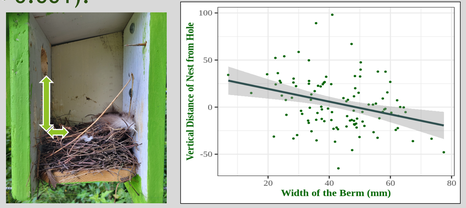
- Many nests contain spider egg sacs; abundance positively correlated with the egg laying date (P < 0.001).



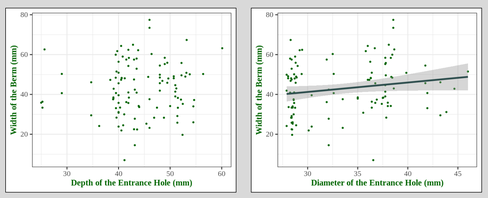
- There was no statistical difference in nest architecture between failed and fledged nests. (*P* > 0.15 for all comparisons).



- The width of the berm negatively correlated with its vertical distance from the box entrance (*P* < 0.001).



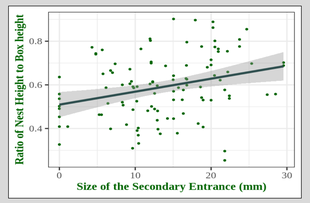
- The width of the berm marginally correlated with the diameter of the entrance hole (*P* = 0.06) but did not correlate with its depth (*P* = 0.40).



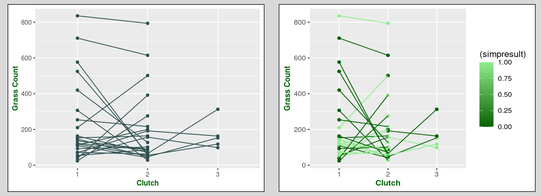
Results (continued):

- Some boxes had a secondary entrance between door and ceiling; the amount of nesting material positively correlated with the size of this opening (*P* = 0.002).



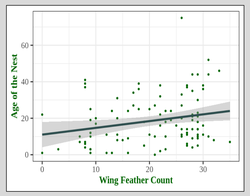


- Female identity (N = 24) did not predict nest height (P = 0.12) or the number of sticks (P = 0.30), but strongly predicted grass count (P = 0.001). Addition of the previous clutch outcome strengthened the correlation (*P* > 0.001).

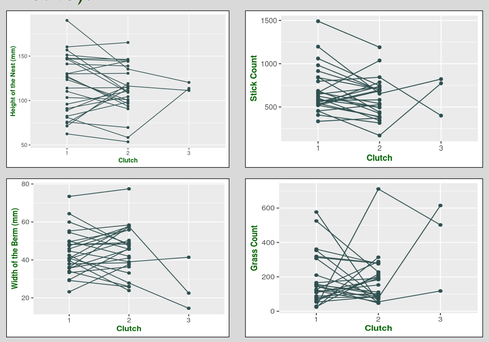


- The number of wing feathers within the nest correlated with the age of the nest at which it was collected (*P* = 0.019).

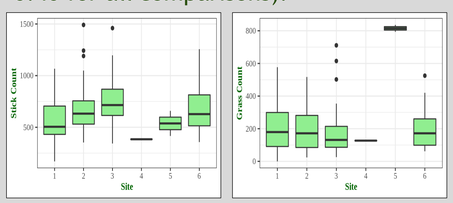




- Box identity (N = 20) predicted the height of the nest (*P* = 0.009), stick count (*P* = 0.003), and width of the berm (*P* = 0.005), but not grass count (*P* = 0.40).



- Nest architecture variation was not site specific (*P* > 0.40 for all comparisons).



Discussion:

- Extreme variation in House Wren nests has been anecdotally reported for decades, but little research has explored the extent or *cause* of the variation; even less has found significant results.
- Similar to previous research, offspring survival was found to be unrelated to variation in nest proportions or contents.
- **We argue that selection on House Wren nests is likely weak, with nest variation explained by a combination of the identity of the nesting parents, random material availability, and variation in cavity proportions.**
- The protective role of nests from predation and the environment may be offloaded to the cavity itself in cavity nesting species.
- **Spider sac material abundance was the only nesting material explained by seasonal variation.**
- Contrary to the observation by *Alworth and Scheiber (2000)* our research may also support observations that the nesting female’s role in nest building is largely concentrated on the cup, and not the stick platform.

Future Directions:

- One suggested role for the variation found in House Wren nest heights (i.e., the platform) is to spread out the concentration of the nest to limit the “parasitic load” of nestlings.
- **We plan to continue an examination of our data set in the fall semester, focusing on ectoparasites found within the “debris.”**

Acknowledgements:

- Special thanks to **Ali Amer** for their help in dissecting nests over the last year; **Davis and Fink families, and Big Walnut School System** for allowing use of their nest boxes, and the **OWU Summer Science Research Program** for funding this project.
- This project would not be where it is without them!





Citations:

Alworth, T., & Scheiber, I. B. (2000). Nest building in house wrens (troglodytes Aedon): A reexamination of male and female roles. *Journal of Field Ornithology*, *71*(3), 409-414. https://doi.org/10.1648/0273-8570-71.3.409